SUMMIT ENGINEERING, INC.
Project No. 2011084
October 10, 2011

AETNA SPRINGS

St. Helena, Napa County, California

SANITARY SEWAGE WASTEWATER FEASIBILITY STUDY

Introduction

Project Description

Aetna Preserve, LLC is proposing improvements to the existing resort portion of Aetna Springs. The improvements at this location will include the rehabilitation of existing buildings. Site and utility improvements will be associated with these structures as well.

Site Description

Aetna Springs is located in an agricultural area with surrounding vineyard to the South. The topography of the site slopes towards the creek on either side. The proposed sanitary sewage management system and select major improvements planned are located on the Site Plan, see Enclosure A.

Sanitary Sewage Wastewater Generation

Sanitary sewage (SS) at Aetna Springs will consist of typical wastewater generated from restrooms, maintenance rooms, laundry rooms, and dining room facilities. Feasibility was verified based on the total projected peak generation rates with a credit for the existing permitted disposal capacity of the existing treatment system at the Club House.

The existing sanitary sewage percolation ponds, which currently serve the southern portion of the resort, will be taken out of service and abandoned. Abandonment of these ponds is preferred due to their proximity to a nearby stream and the capital costs of improvements required to bring the ponds into compliance with current codes.

When visitation is at its peak (summer weekend) SS flow onsite is projected to be 43,965 gallons per day (gpd) including a 10% safety factor. Average flows from the facility are expected to be 20,035 gpd. 4,800 gpd is to be disposed in the existing permitted subsurface drip system located at the Golf Club House. This reflects a net peak total of 39,165 gpd to be accommodated in the proposed new system for treatment and disposal. The daily usage values are assumed to include all daily visitors, commuting employees, overnight guests, and golfers. Refer to Enclosure B for more details regarding anticipated peak and average wastewater generation.

Sanitary Sewage Wastewater Treatment and Disposal

Wastewater disposal options are based on the acceptable soil depths assigned by the County and the types of systems that would be the least intrusive to the property and proposed uses. These include treatment followed by subsurface drip and surface irrigation. For the purposes of this report, treatment is assumed to be provided by a Membrane Bioreactor (MBR) manufactured by Smith & Loveless. However, various other treatment technologies have been utilized in Napa County, such as the AdvanTex treatment system by Orenco Systems Inc., that are known to provide effluent quality which meets County standards. The final system design may incorporate an alternative treatment technology provided the system can meet the required effluent limitations.

Feasibility of several disposal options was verified. These options include treatment followed by:

1. Combination of surface irrigation and subsurface drip

2. Subsurface drip only

3. Surface irrigation only

A block diagram for each treatment and disposal system can be found in Enclosure D.

Treatment

The following features are common to both treatment options examined:

1. Gravity Collection System -- Designed to provide low maintenance and no infiltration or exfiltration. Piping will be compatible with SS wastewater per Uniform Plumbing Code (UPC) and local requirements.

2. Grease interceptor: A pre-cast concrete grease trap tank will be used for removing and retaining grease from wastewater in kitchen areas prior to discharge into the pump sump. Such materials cause blockages in the system such as backups and overflows. The grease interceptors shall be sized using County and UPC guidelines. Anticipated sizing of the grease interceptor to be approximately 18,000 gallons.

3. Septic Tanks: Septic tanks upstream of the treatment system will provide solids removal and some treatment of raw SS waste. Per UPC guidelines, the minimum septic tank volume required would be 31,000 gallons. A septic tank capacity of this volume will provide approximately 0.8 days retention at peak flows and 1.6 days at average flows.

4. Pump Sump(s): Anticipated SS flows will be pumped to the treatment and disposal sites.

5. Flow measurement: An inline flow measurement device will be provided to measure SS flows to the treatment system.

6. pH control & chemical addition (if necessary)

7. Treatment System: Membrane Bioreactor (MBR) or equivalent System for treatment to pretreated effluent standards for subsurface drip disposal or for surface irrigation disposal. Guidelines for treatment sizing to meet local and Regional Board guidelines. The following components are part of the MBR system:

    a. Flow Equalization Tank

    b. Sludge Storage Tank

    c. Anoxic Zone (if denitrification is necessary)

    d. Aeration Zone

    e. Membrane Module

    f. Clear Well

g. Sludge storage and dewatering (future, if necessary)

8. Dosing/Effluent Storage: Collection and storage of treated effluent ready for disposal. Final storage sizing will be dependent on the disposal option selected. Sizing will accommodate storage during rain events if surface irrigation is employed. If disposal is to be by subsurface drip only, the tank will be sized for a minimum of 150% of the peak anticipated flow generation rate which would equate to a storage capacity of approximately 60,000 gallons.

9. Dosing Flowmeter: Flowrates of the effluent directed to the disposal location will be measured via an in-line flowmeter to determine the instantaneous flowrate and provide a non-resettable totalized volume for reporting purposes.

Treatment System:

A Smith & Loveless (S&L) Titan Membrane Bioreactor (MBR) system is proposed for reference, although an alternative manufacturer may be designed and permitted. The MBR treatment system consists of an aerated bioreactor and microfiltration as one unit process which provides superior secondary effluent quality. The major components of the S&L TITAN MBR treatment system include the treatment unit (65 ft long, 12 ft wide and 11.5 ft tall) with a flow equalization chamber, sludge holding zone, and aeration zone with submerged membrane modules. An anoxic zone can be added for denitrification if needed. Cut sheets for the MBR system can be found in Enclosure E.

SS from kitchen flows will be designed to pass through a grease interceptor before entering the septic tank. The flows will be collected via a gravity collection system and routed to pump sump(s) which will pump SS into the flow equalization zone of the MBR system. Blowers provide oxygen within the flow equalization zone and aeration zone. Diffusers are provided beneath the membrane module to scour the membrane and provide oxygen to maintain aerobic conditions. Sufficient membrane pressure is created by gravity which drives flow through the membranes. Solids are retained in the aeration zone while clear water is drawn through the membrane and discharged into a clear well. The suspended solids enter into a sludge holding zone where sludge wasting, thickening, and decanting occurs.

Sludge waste will initially be hauled offsite by a licensed sewage hauler. If sludge production and hauling frequency warrants the need for additional sludge handling methods, a dewatering system will be added for onsite dewatering followed by appropriate disposal offsite.

<u>Disposal Options</u>

A detailed discussion of each OPTION is provided below. The proposed SS treatment systems are illustrated on the Schematic Block Diagrams flow chart in Enclosure D.

<u>DISPOSAL OPTION 1 – Combination of Surface Irrigation and Subsurface Drip</u>

After the MBR treatment, SS flows can either be discharged via subsurface drip disposal and/or stored for surface irrigation as desired.

Effluent will be pumped to the effluent storage area to collect and store treated effluent during periods when irrigation reuse cannot occur such as the time restriction before, during, and after a rain storm event per Regional Board guidelines. The amount of effluent storage installed will be based on the amount of subsurface drip line installed to maximize the ability for surface irrigation.

Based on site evaluation results performed by CSW/Stuber-Stroeh Engineering Group Inc, up to 40,000 square feet is available in the vineyard area for the subsurface drip system. The site evaluation also showed that the required 200% reserve area is available in the vineyards south of the resort. Total available reserve area is approximately 131,000 square feet. See the Site Plan in Enclosure A for potential disposal field locations.

Surface irrigation areas would be located utilizing appropriate setbacks to prevent direct discharge to wells, reservoirs, and streams. Six acres is earmarked for surface irrigation on the golf course north of Aetna Springs Rd.

Treated effluent used for surface irrigation will be disinfected with chlorine to inactivate pathogenic microorganisms. If necessary, UV disinfection is proposed as an alternative to chlorine disinfection to alleviate maintenance and chemical concerns associated with chlorine based disinfection systems. The wastewater will remain in contact with the UV light long enough to disinfect the wastewater and inactivate pathogenic microorganisms.

The treatment system will be designed to produce water quality which meets or exceeds Title 22 standards prior to surface irrigation disposal.

DISPOSAL OPTION 2 – Subsurface Drip System Only

SS would first flow through the MBR treatment system discussed above. A dosing tank then distributes effluent to the subsurface drip system over the course of a day. The full 40,000 square foot primary subsurface drip system would be required for the proposed use based on site evaluation results performed by CSW/Stuber-Stroeh Engineering Group Inc. An additional 200% reserve area would be required for this option, an area of approximately 131,000 square feet is available for reserve.

DISPOSAL OPTION 3 – Surface Irrigation Only

Storage will be provided to capture effluent during periods of rain when surface irrigation cannot occur. Irrigation over 6 acres of golf course turf is sufficient area for disposal.

The treatment system will be designed to produce water quality which meets or exceeds Title 22 standards prior to surface irrigation disposal.

DESIGN CRITERIA

SANITARY SEWAGE

To recap the detailed data found in Enclosure B, the SS generated will consist of typical wastewater generated from restrooms, sinks, and kitchen facilities. Peak anticipated SS flows attributed to Aetna Springs in excess of the existing disposal capability is projected as follows:

Peak Day = 39,165 gpd

The above values include a 10% safety factor for a more conservative approach. See Enclosure B for more details on the flow generation basis.

Sanitary Sewage (SS) Septic Tank(s)

The required septic tank size based on Napa County Environmental Management criteria is calculated from NCEM Table 13.44.020:

Flow, gal/d	Recommended Minimum Capacity, gal
600	1,200
900	1,500
1,200	2,000
1,500	2,500

Since the peak flow is above the values listed in the table, the Uniform Plumbing Code formula is utilized.

Volume = 1,125 + 0.75 x Flow rate

Volume = 1,125 + 0.75 (39,165 gpd)
Volume = 30,499 gallon

Use Total Volume = 31,000 gallons

Septic tank sizing will be based on the flow anticipated from each building cluster and anticipated usage/flows utilizing County and UPC guidelines. Effluent filters will be installed at the outlet of septic tanks to reduce solids passage to the treatment system.

KITCHEN SS FLOWS

Various sources onsite are anticipated to generate kitchen SS wastewater flows. As can be seen in Enclosure B, the anticipated peak kitchen flow due to meal related wastewater generation is estimated at 10,266 gpd (9,333 gpd plus the 10% safety factor).

GREASE INTERCEPTOR SIZING

For meal preparation and cleanup, a generation rate of 15 gallons of SS per meal is assumed. Of the 15 gallons, 10 gallons should be assumed to be associated with food preparation and clean up and 5 gallons is assumed as a contribution from attendee restroom use. Therefore, the maximum flow generated by the kitchen which should flow through a grease interceptor is calculated as follows:

Minimum Volume = (Total number of meals) x WW Generation Rate x Retention Time x Storage Factor x 110%

= (641) meals peak x 10 gal/meal WW x 2.5 x 1.0 x 110%

= 17,623 gallons

Grease interceptors shall be sized as appropriate for the number of meals to be prepared at each location. The total volume of grease interceptor tankage is estimated to be approximately 18,000 gallons via precast concrete grease interceptors to handle kitchen SS flows.

SITE EVALUATION

Site evaluations were conducted with NCEM and CSW/Stuber-Stroeh Engineering Group, Inc. on July 11, 2007. Each test pit examined displayed at least 36 inches of suitable soil and ranged from sandy loam to sandy clay loam. The attached profile hole locations from CSW's site evaluations can be found in Enclosure C which identifies the locations of the test pits along with a detailed soil evaluation.

SUBSURFACE DRIP DISPOSAL SYSTEM (OPTION 1)

Primary Disposal Field

Subsurface Drip Disposal System field sizing is based on the drip tubing manufacturer's recommendation as well as Table 10 of the Napa County ASTS guidelines. Table 10 class II soil type (sandy loam), which corresponds to a hydraulic loading rate of 1.000 gal/ft^2/day is used to size the system for feasibility.

Approximately 100 square feet of drip field is required for every 100 gpd of effluent discharged. The size of disposal field required is calculated as follows:

$$39{,}165 \text{ gpd} \times \frac{100 \text{ ft}^2}{100 \text{ gpd effluent}} = \mathbf{39{,}165 \text{ ft}^2}$$

A primary disposal field of approximately 40,000 square feet will be provided for disposal of effluent from Aetna Springs. The subsurface drip lines will be buried at a depth of 6 inches minimum and back filled with clean, native soil. See Enclosure A for the location of the proposed primary disposal field.

Reserve Disposal Field

Subsurface Drip Disposal System field sizing is based on the drip tubing manufacturer's recommendation as well as Table 10 of the Napa County ASTS guidelines. Table 10 class III soil type (sandy clay loam), which corresponds to a hydraulic loading rate of 0.600 gal/ft^2/day is used to size the system for feasibility.

Approximately 167 square feet of drip field is required for every 100 gpd of effluent discharged. The size of disposal field required is calculated as follows:

$$39{,}165 \text{ gpd} \times \frac{167 \text{ ft}^2}{100 \text{ gpd effluent}} \times 200\% = \mathbf{130{,}811 \text{ ft}^2}$$

A reserve disposal field of 131,000 square feet will be held in reserve for disposal of effluent from Aetna Springs. The subsurface drip lines will be buried at a depth of 6 inches minimum and back filled with clean, native soil. See Enclosure A for the location of the proposed reserve disposal field with 131,000 square foot reserve area shown.

SURFACE IRRIGATION AND/OR SUBSURFACE DRIP DISPOSAL SYSTEM (OPTION 2)

A cost benefit analysis will be performed by the Owner to determine the amount of subsurface drip disposal line to be installed versus surface irrigation. Under no circumstance will the primary and reserve subsurface drip disposal fields exceed the sizing as shown for Option 1. The surface irrigation area proposed will be located on a 6 acre portion of the golf course at the north end of the facility. See Enclosure A for the location of the proposed surface irrigation site.

MISCELLANEOUS COMMENTS

Flood Level -- The proposed subsurface drip disposal system is located in the 100 year floodway. Based on Napa County guidelines, installation of subsurface disposal systems within the floodway is allowed. No surface irrigation would occur when the disposal area is flooded.

Noise -- Noise generated by the treatment system is anticipated to be <85 dB three feet from the equipment and will decrease in volume farther from the equipment. The system will include any and all noise attenuation measures and equipment which may result from consultation with the County to ensure that noise presents no issues.

Visual -- No change at disposal areas. Minimal visual impact at treatment area. See Enclosure E for information on MBR equipment size and visual appearance.

Access – There exists easy access to treatment and disposal areas. Vehicular access will be created at the treatment area for maintenance activities.

Solid Waste -- Septic tanks will be pumped regularly to remove accumulated solids. Hauling of solid waste at the treatment area will be regularly performed. Future dewatering of sludge to reduce hauling volumes may be implemented.

Odor Control -- There should be no obnoxious odors from a properly designed and operated treatment and disposal system of these types.

Groundwater Contamination -- The nearest water well to any of the wastewater treatment and disposal systems is a minimum of 100 feet. No disposal of reclaimed wastewater will occur within 100 feet of any wells or within setbacks per Regional Board and County guidelines. Irrigation/disposal of treated effluent is considered a beneficial use and is considered an effective means to protect groundwater quality.

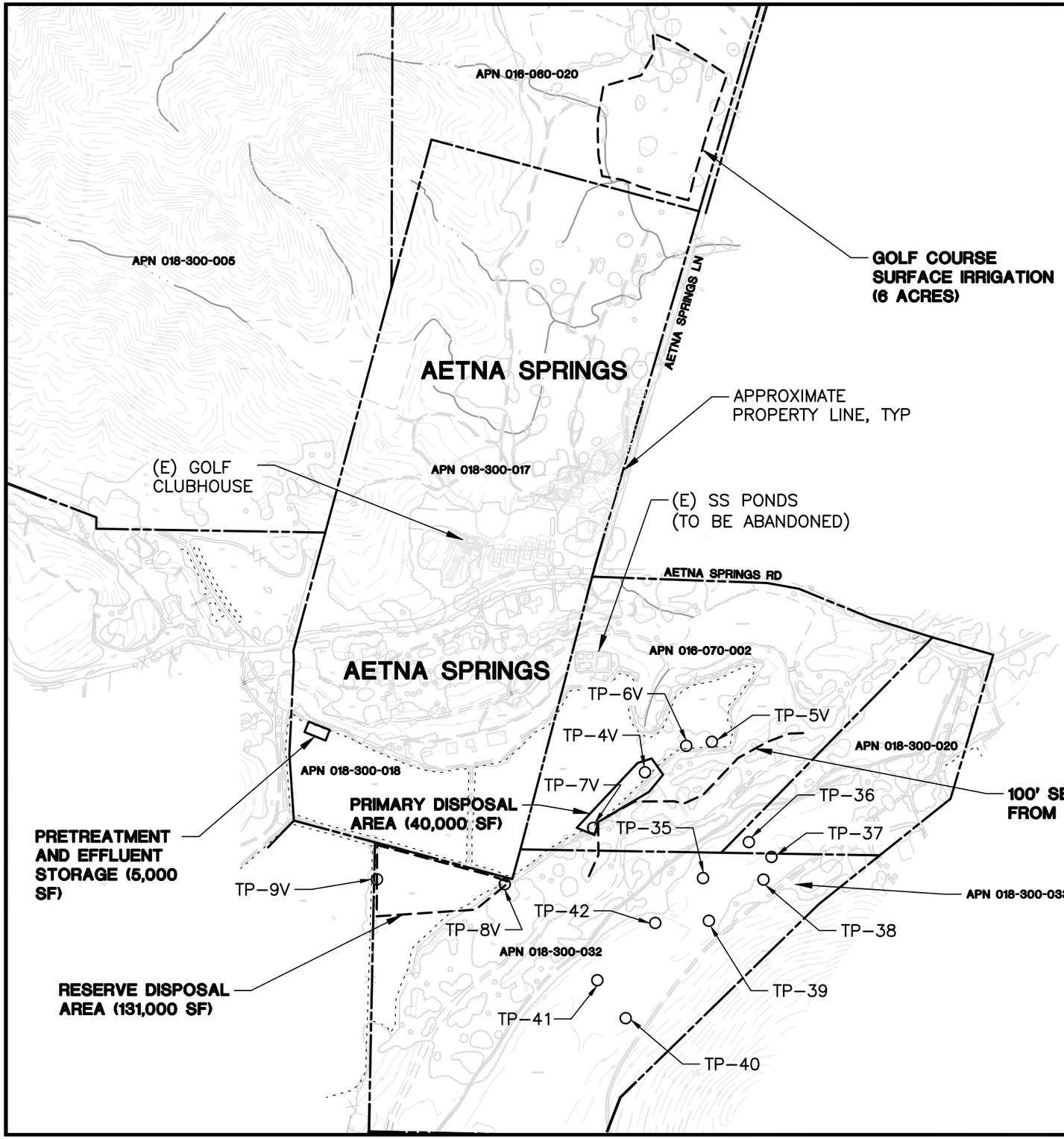
Protection -- Exposed wastewater treatment facilities will be posted with appropriate warning signs. The treatment area will be fenced, if necessary, to restrict public access.

AETNA SPRINGS

ENCLOSURE A

SANITARY SEWAGE WASTEWATER SYSTEM:

OVERALL SITE PLAN



TEST PIT SOIL PROFILES

TEST PIT	DEPTH	TEXTURE
4V	36"	SCL
5V	42"	SL
6V	42"	SL
7V	42"	SL
8V	72"	SL
9V	72"	SCL
35	45"	SCL
36	45"	SCL
37	40"	SCL
38	36"	SCL
39	43"	SCL
40	40"	SCL
41	41"	SCL
42	41"	SCL

0 500 1000

GRAPHIC SCALE IN FEET

SUMMIT ENGINEERING INC.
463 AVIATION BLVD. STE 200
SANTA ROSA, CA 95403
www.summit-sr.com - 707.527.0775

SUMMIT

SITE PLAN

DATE 09-19-2011
PROJECT NO. 2011084 CHK RR
BY KO SHT NO 1 OF 1

AETNA SPRINGS
1600 AETNA SPRINGS ROAD
POPE VALLEY, CALIFORNIA
APN 018-300-018, 017

PLOTTED ON: 10/14/2011 1:10 PM
P:\PROJECT\2011\2011084 AETNA SOUTH WASTE WATER ASSISTANCE\CAD\WWWATER\SITE PLAN.DWG

AETNA SPRINGS

ENCLOSURE B

SANITARY SEWAGE WASTEWATER SYSTEM:

ESTIMATED WASTEWATER GENERATION

SUMMER SEASON[1, 7]

Maximum Usage[2,6]			
Visitation and Usage	**Maximum**		
	Weekend	**GPD Factor**	**GPD**
Overnight Guests	200	125	25,000
Employees	120	15	1,800
Employees (golf)	21	15	315
Golfers	250	5	1,250
		Visitors Subtotal =	*28,365*
Meals Served			
Overnight Guests	200	15	3,000
Miscellaneous Daytime Visitors	150	15	2,250
Golfers	100	15	1,500
Catering	50	15	750
Other Meals (employees)[3]	141	13	1,833
Meals Subtotal =	*641*	Meals Subtotal =	*9,333*
Washing Machines[1]			600
Maintenance/Mechanical Room[5]			1,000
Water Treatment Backwash[4]			671
		Total =	*39,969*
		With 10% Safety Factor =	**43,965**
		Existing Permitted SS Disposal capability =	4,800
		Net Total =	**39,165**

1. Laundry will be off site-outsourced; however, there will be four sets of washers / dryers to serve the guests for incidental needs. Presume 12 loads on a peak day for incidental needs at 50 gallons water use per load.
2. No process wastewater will be forwarded to the SS treatment and disposal system.
3. Employee meals should be calculated differently than guest meals. For example, employees might have a choice of a casserole, salad bar, and/or cold cuts. The meals would be prepared in much larger batches than guest meals and wastewater generated would be closer to short order style restaurant use.
4. Water treatment equipment wastewater allocation based on a percentage (~1.5%) of total water use.
5. Allocation for wastewater generated due to maintenance activities or equipment within the Mechanical rooms that may generate wastewater that must be disposed of in the SS system.
6. The existing system will handle a portion (4,800 gpd) of the total flow with the remainder forwarded to the proposed treatment and disposal system.
7. Stormwater will be handled seperatley and will not be designed to flow to the collection/treatment systems.

AETNA SPRINGS

ENCLOSURE C

SANITARY SEWAGE WASTEWATER SYSTEM:

CSW PROFILE HOLE LOCATIONS & SITE EVALUATION RESULTS

AETNA SPRINGS
1600 AETNA SPRINGS ROAD
POPE VALLEY, CA
APN 018-300-017, 018

SUMMIT

TEST PIT LOCATIONS

PROJECT NO. 2011084 DATE 07-05-2011

BY CSW/ST2 CHK N/A SHT NO 1 OF 1

DRAWING BY: CSW/STRUBER STROEH
AUGUST 29, 2007

PLOTTED ON: 7/20/2011 9:38 AM
P:\PROJECT\2011\2011084 AETNA SOUTH WASTE WATER ASSISTANCE\CAD\WWWATER\SITE PLAN.DWG

SUMMIT ENGINEERING INC.

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SANTA ROSA, CA 95403
707.527.0775

6-13-07

TP-IV

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: # 3%

Described by: CSW/SEZ Vegetation: Grapes

Location: Vineyard (39/40 vines) APN 18-020-78 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth In.	Dominant Color	Mottles Qu. Sz. Cont., Color	Texture	Structure Gr. Sz. Sh.	Consis tence	Roots	Bound ary	Remarks: Clay skins, Etc.
1	0-15"	wet 10YR 3/3	N/A	SCL	2SBK	mfr	N/A		
2	15"-24"	wet 10YR 5/3	N/A	C	2SBK	mfi	N/A	C	

Notes: Hole filled & no roots visible

TP-2V

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: ± 3%

Described by: CSW/SL Vegetation: Grapes

Location: Vineyard (20/24 vines) APN-18-020-78 Land Use: Vineyard

Elevation: — Parent Material:

Horizon	Depth in.	Dominant Color	Mottles Qu. Sz. Cont., Color	Texture	Structure Gr. Sz. Str.	Consis tence	Roots	Bound ary	Remarks: Classification, Etc.
1	0-18"	wet 10YR 3/3	N/A	SCL	2SBK	mfr	N/A	—	
2	18"-24"	wet 10YR 5/3	N/A	C	2SBK	mfi	N/A	2	

Notes: Hole filled

6-13-07

TP-3V

SOIL DESCRIPTION FORM

Client: Aetna Reserve, LLC Project: ±3%

Described by: CSW/SE² Vegetation: Vines

Location: Vineyard (60/61 Vines) APN 18-020-78 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth in.	Dominant Color	Mottles (Qt. Sz. Cont., Color	Texture	Structure Gr. Sz. Gh.	Consistence	Roots	Boundary	Remarks: Clay skins, Etc.
1	0-10"	wet 10YR 3/3	N/A	SCL	2SBK	mfr	N/A		
2	10"-18"	3/3	N/A	locally CL	2SBK	mfr	N/A	c	±35% rock

Notes: Hole filled - Soils below 10" had ↑ rock content & firm

TP-4V

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: 1546

Described by: csc/st² Vegetation: Vines - Grape

Location: Vineyard (60/61) 18-030-38 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth in.	Dominant Color	Mottles Qu. Sz. Cont., Color	Texture	Structure Gr. Sz. Rk.	Consistence	Roots	Boundary	Remarks: Clay skins, Etc.
1	0-36"	wet 10YR 3/3	N/A	scl	2sbk	vfr	N/A	—	± Rock

Notes: ① Swale w/in 150' & edge of Swanty Creek Bank w/in 100'

② Soil looked acceptable, but the vines were too close to dig a deeper pit

TP-5V

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: ±5%

Described by: CSW/SE² Vegetation: Grape Vines

Location: Vineyard (103) APN 18-010-78 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth In.	Dominant Color	Mottles (Qu.Sz.Cont.Color)	Texture	Structure Gr.Sz.Gh.	Consistence	Roots	Boundary	Remarks: Clay Films, Etc.
1	0-42"	wet 10YR 3/3	N/A	SL	2SBK	mfr	360		±30 rock
2	42"-72"	wet 10YR 3/3	N/A	SL	2SBK	mfr	2 f	d	>50% rock

Notes:

TP. 6V

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: ± 5%

Described by: CSW / SE² Vegetation: Grapes

Location: 103 Vineyard APN 18-020-78 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth in.	Dominant Color	Mottles (Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	Boundary	Remarks: Clay skins, Etc.
1	0-42"	wet 10YR 3/3 wet color 3/3	N/A	SL	2SBK	mfr	3CO		± 30%
2	42"-72"		Lithic (Between Rock	SL	2SBK	mfr	2f	d	Less than 50%

Notes: TP-5V Similar

TP-7V

Soil Description Form

Client: Aetna Preserve, LLC Project: ± 3-6

Described by: CSW/SE Vegetation: Grape Vines

Location: Vineyard (56) APN 18-020-76 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth In.	Redoximorphic Color	Matrix Color (Hz., Chrom., Color)	Texture	Structure Gr., Sz., Sh.	Coarse Fragments	Roots	Boundary	Remarks: Classification, Etc.
1	0-42"	wet 10YR 3/3	N/A	SL	2SBK	mfr	2f		50% rock
2	42"-72"	wet 10YR 3/3	N/A	SC	2SBK	mfr	2f	d	> 50% rock

Notes: —

TP-8V

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: ± 3%

Described by: CSW/SE Vegetation: Grape Vines

Location: Vineyard (40) APN 18-020-76 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth in.	Dominant Color	Mottles (Qu., Sz., Cont., Color)	Texture	Structure (Gr., Sz., Gh.)	Consistence	Roots	Boundary	Remarks: Classification, Etc.
1	0-72"	wet 10YR 3/3	N/A	SL	2SBK	mfr	2f	—	± 50% rock

Notes:

TP-9V

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: ± 3 ac

Described by: CSW/SLT Vegetation: Grape Vines

Location: Vineyard (north side) APN 18-020-78 Land Use: Vineyard

Elevation: — Parent Material: —

Horizon	Depth In.	Dominant Color	Mottles Qu. Sz. Cont., Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	Boundary	Remarks: Clay skins, Etc.
1	0-71"	wet 10YR 3/3	N/A	SCL	2 MSBK	mfr	2f	—	≈ 50% rock

Notes: Close to Waterline

TP-35

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Slope: ± 5%

Described by: CSW / SCL Vegetation: Trees & Grass

Location: Lot 10 APN 18-020-78/79 Land Use: Residential

Elevation: — Parent Material: Alluvium

Hori zon	Depth in.	Dominant Color	Mottles (Qu.Sz.Cont.,Color	Texture	Structure Gr.,Sz.,Sh.	Consis tence	Roots	Bound ary	Remarks: Clay skins, Etc.
1	0-45"	wet 10YR 3/2	N/A	SCL	2SBK	mfr	2co		

Notes: ① Large Rounded Rock ≤ 50% w/ small drainage swale around test pits TP-35 to TP-42

② Possible reserve area for record

③ Need to locate swales w/in test areas

TP-36

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: ± 5 ac

Described by: CSW/SLC Vegetation: Trees & Grass

Location: Lot 10 APN 18-020-98134 Land Use: Residential

Elevation: — Parent Material: Alluvium

Horizon	Depth In.	Dominant Color	Mottles (Qu. Sz. Cont., Color)	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	Boundary	Remarks: Clay skins, Etc.
1	0-45	wet 10YR 3/2	N/A	SCL	2 SBK	mfr	2f		1 cobble 40cm

Notes: _____

TP-37

SOIL DESCRIPTION FORM

Client: Aetna Presence, LLC Project: ±5%

Described by: CSW/SE² Vegetation: Trees & Grass

Location: Lot 10 APN [redacted] Land Use: Residential

Elevation: Parent Material: Alluvium

Horizon	Depth In.	Dominant Color	Mottles Qu., Sz., Cont., Color	Texture	Structure Gr., Sz., Pl.	Consistence	Roots	Boundary	Remarks: Clay skins, Etc.
1	0-40"	wet 10YR 3/2	N/A	SCL	2 SBK	mfr	3f	-	± 40" Rock

Notes:

TP-38

Soil Description Form

Client: Aetna Reserve, LLC Project: 15%

Described by: CCW/SEC Vegetation: Trees & Grass

Location: Lot 10 APN 18-020-78/79 Land Use: Residential

Elevation: — Parent Material: —

Horizon	Depth in.	Dominant Color	Mottles Qu., Sz., Cont., Color	Texture	Structure Gr., Sz., Sh.	Consistence	Roots	Boundary	Remarks: Classification, Etc.
1	0-36"	wet 10YR 3/3	N/A	SCL	2SBK	mfr	few	—	5% Rock

Notes: Near gravel road

TP-39

SOIL DESCRIPTION FORM

Client: Astra Preserve, LLC Project: 15 c/o

Dencer Heath by: CSW/GZA Vegetation: Trees & Grass

Location: Lot 10 APN 18-020-78170 Land Use: Residential

Elevation: Parent Material data:

Horizon	Depth in.	Dominant Color	Mottles Qu. Sz. Cont., Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	Boundary	Remarks: Classification, Etc.
1	0-43"	Load 10YR 3/2	N/A	SCL	2SBK	mfr	3cc	—	± 10% Rock

Notes: large Rock Fragments

TP-40

SOIL DESCRIPTION FORM

Client: Aetna Preserve, LLC Project: 25%

Described by: CSW/SGC Vegetation: Trees & Grass

Location: Lot 10 APN: 078-78-199 Land Use: Residential

Elevation: — Parent Material: —

Hor. cm	Depth in.	Dominant Color	Mottles Qu.,Sz.,Cont.,Color	Texture	Structure Gr.,Sz.,Sh.	Consis tence	Roots	Bound ary	Remarks: Clay skins, Etc.
1	0-42"	wet 10YR 3/2	N/A	SCL	2 SBK	mfr	3co	—	1 rock scat

Notes: Large rounded rocks

TP-41

SOIL DESCRIPTION FORM

Client: Astra Preserve, LLC Slope: ± 6 %

Described by: CSW/SE[2] Vegetation: Trees & Grass

Location: Lot 10 APN 18-020-98/7? Land Use: Residential

Elevation: — Parent Materials: —

Horizon	Depth In.	Dominant Color	Mottles Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	Boundary	Remarks: Claysking, Etc.
1	0-41"	moist 10YR 3/2	N/A	GCL	2fPK	mfr	3co	—	± 30-40% Rock

Notes: Large rounded rock.

TP-42

SOIL DESCRIPTION FORM

Client: Acton Preserve, LLC Slope: ± 5%

Described by: CSW/SEC Vegetation: Trees & Grass

Location: Lot 10 MBL 18-020-76 Rear Land Use: Residential

Elevation: — Parent Material:

Horizon	Depth in.	Dominant Color	Mottles Qu.Sz.Cont.,Color	Texture	Structure Gr.Sz.Sh.	Consistence	Roots	Boundary	Remarks: Clay skins, Etc.
1	0-11"	wet 10YR 3/2	N/A	SCL	2 SBK	MFr	3C	-	

Notes:

AETNA SPRINGS

ENCLOSURE D

SANITARY SEWAGE WASTEWATER SYSTEM:

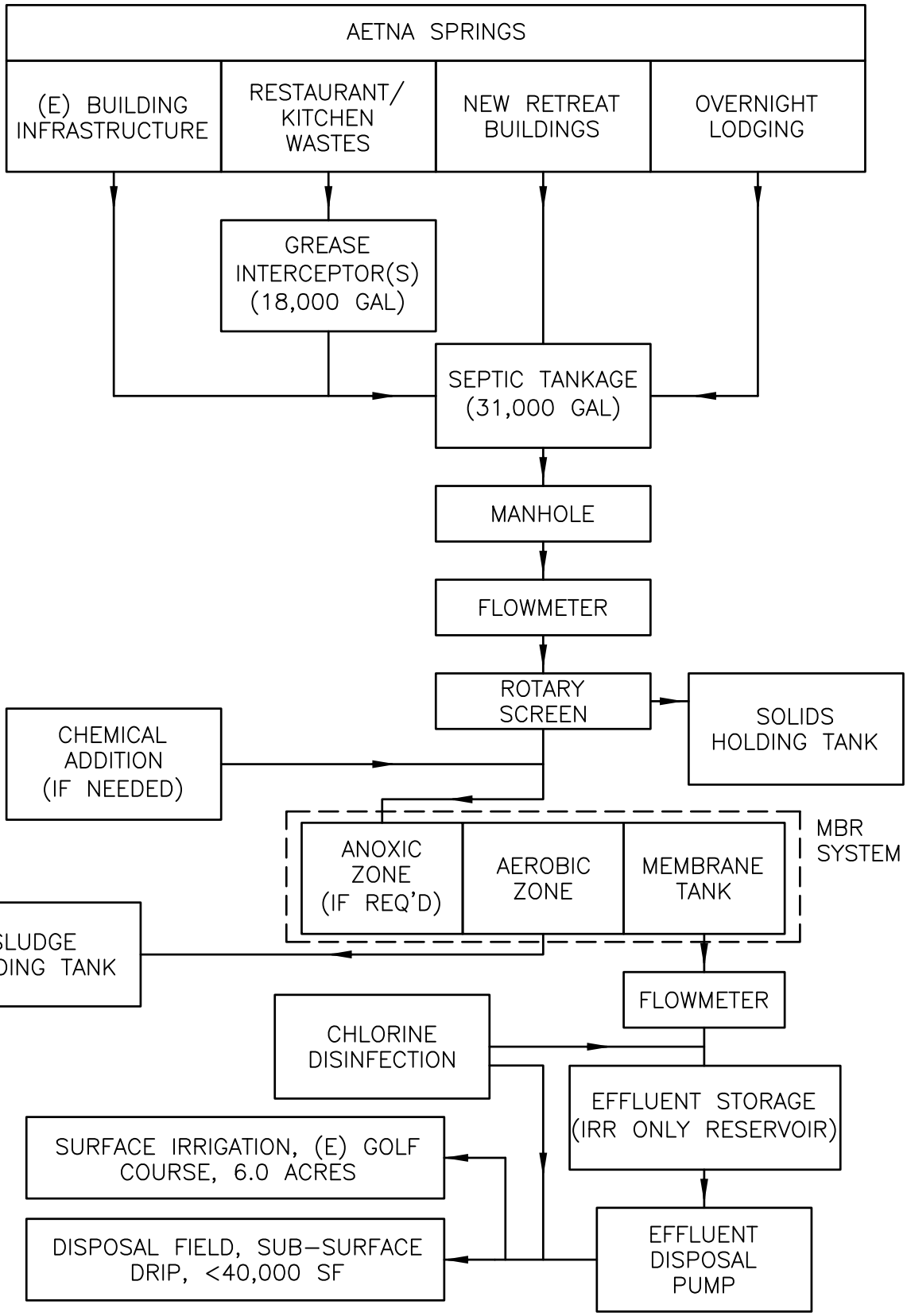
SCHEMATIC BLOCK DIAGRAMS

AETNA SPRINGS
1600 AETNA SPRINGS ROAD
POPE VALLEY, CA
APN 018-300-017, 018

SUMMIT

OPTION 1 FLOW SCHEMATIC

PROJECT NO. 2011084 DATE 07-01-2011
BY KO CHK RR SHT NO 1 OF 1



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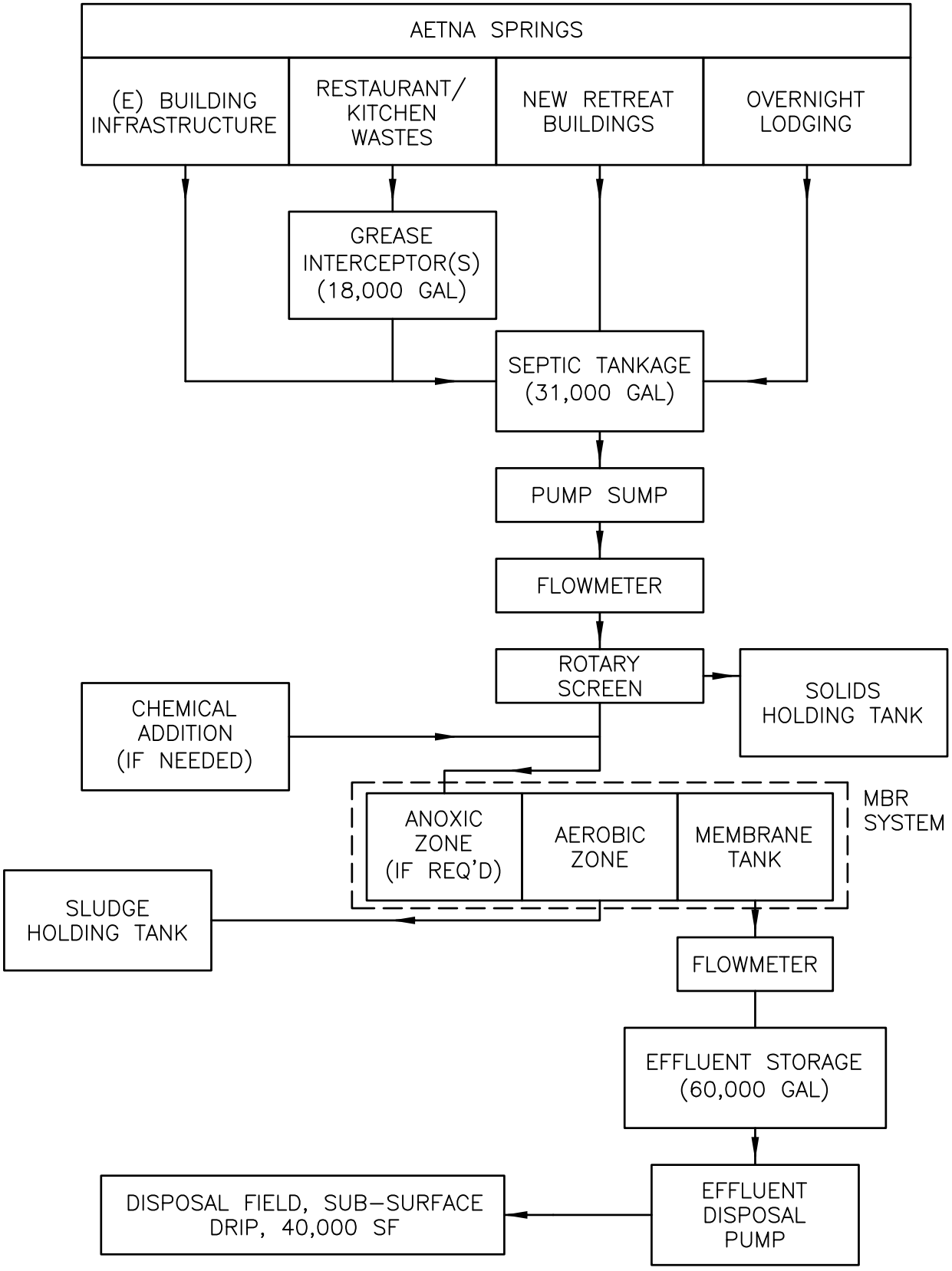
SUMMIT ENGINEERING INC.
463 AVIATION BLVD. #200
SANTA ROSA, CA 95403
707.527.0775
FAX 707.527.0212

AETNA SPRINGS
1600 AETNA SPRINGS ROAD
POPE VALLEY, CA
APN 018-300-017, 018

SUMMIT

OPTION 2 FLOW SCHEMATIC

PROJECT NO. 2011084 DATE 07-01-2011
BY KO CHK RR SHT NO 1 OF 1



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FAX 707.527.0212

AETNA SPRINGS
1600 AETNA SPRINGS ROAD
POPE VALLEY, CA
APN 018-300-017, 018

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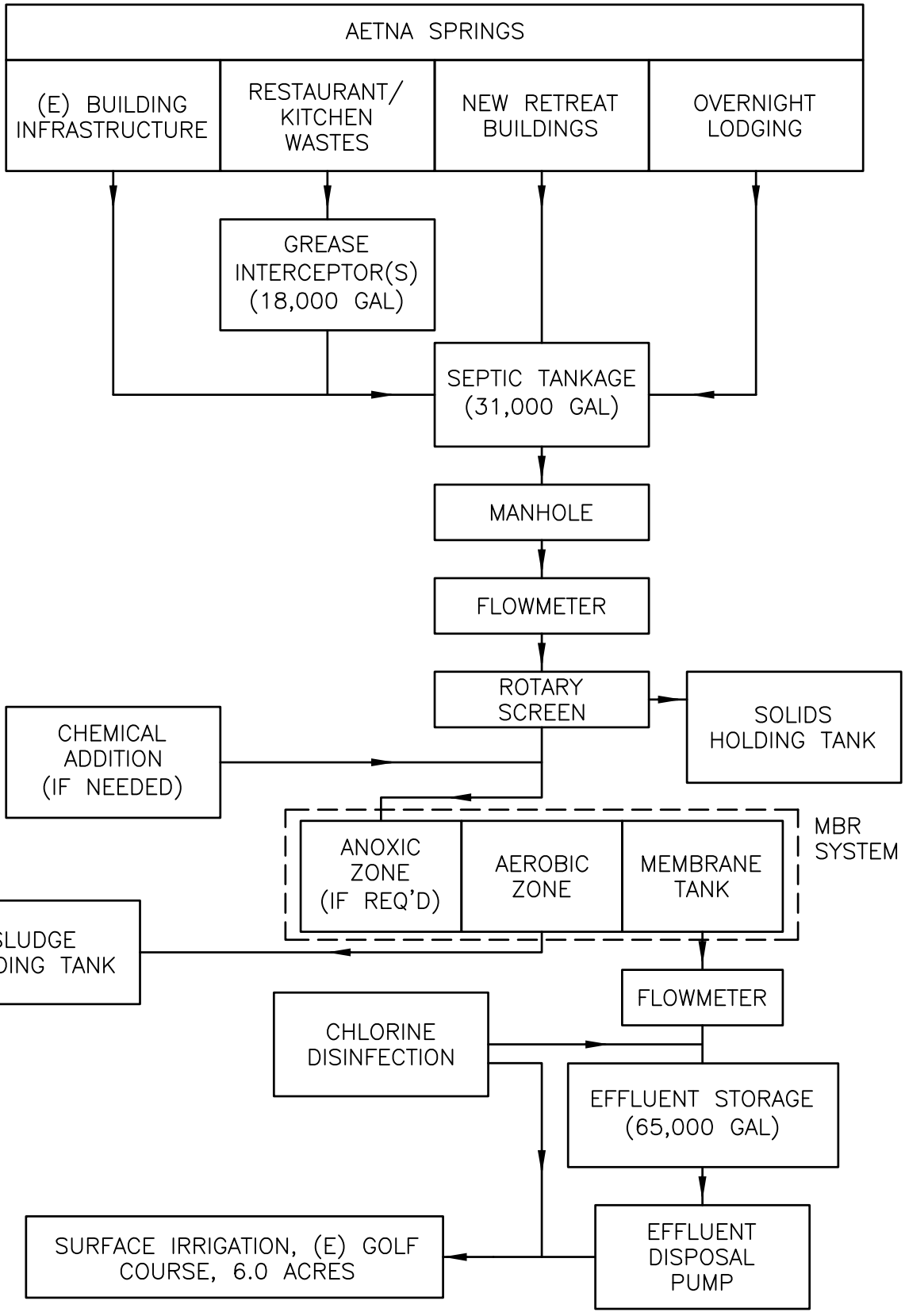
OPTION 3 FLOW SCHEMATIC

PROJECT NO. 2011084 DATE 07-01-2011
BY KO CHK RR SHT NO 1 OF 1



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707.527.0775
FAX 707.527.0212

AETNA SPRINGS

ENCLOSURE E

SANITARY SEWAGE WASTEWATER SYSTEM:

MBR SYSTEM CUT SHEETS

TITAN™ MBR

MEMBRANE BIOREACTOR FOR WASTEWATER TREATMENT

Flat Plate Membrane Technology!

BACKED BY DECADES OF PROCESS DESIGN EXPERIENCE

SUPERIOR MEMBRANE CLEANING AND DURABILITY

EXTREMELY HIGH EFFLUENT QUALITY

BY SMITH & LOVELESS INC.®

Smith & Loveless Inc. proudly introduces **TITAN MBR**™, our latest pre-engineered wastewater treatment system for municipal and industrial applications. The innovative **TITAN MBR**™ marries the wastewater treatment engineering expertise of S&L with exciting submerged membrane technology. The combination yields a *dynamic* membrane biological reactor (MBR), a system that provides end-users with high-quality treatment performance, minimal operational requirements, and a robust design that will stand the test of time. **TITAN MBR**™ delivers results with value-added engineering experience available only from S&L.

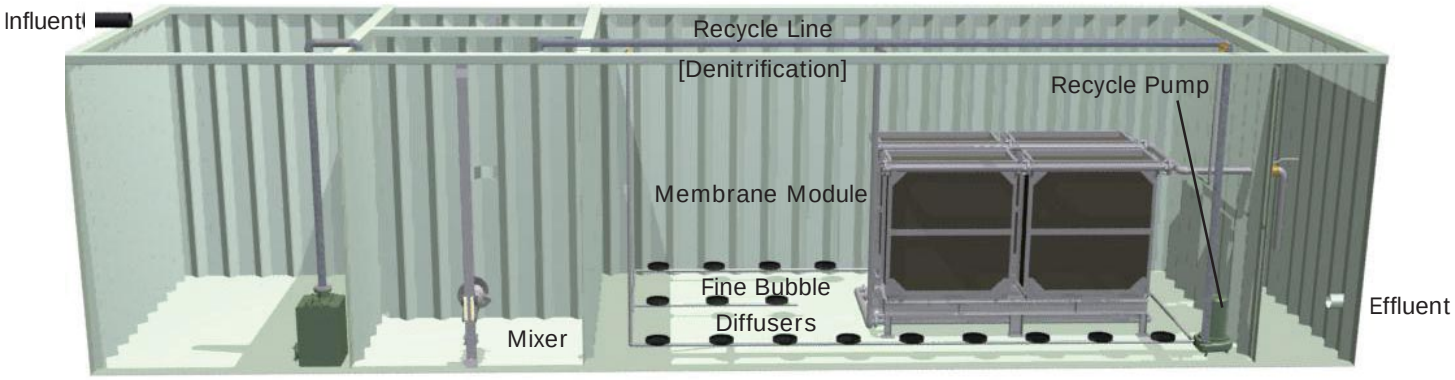
TITAN MBR™ *is the complete MBR package — developed by Smith & Loveless Inc., the company with 60 years of wastewater engineering and manufacturing experience.*

TITAN MBR™ System Overview & Diagram

Plants come in standard and custom designs, and result in smaller footprints than conventional systems. The submerged membrane eliminates clarifiers and sand filters while still producing *significantly better* effluent quality. Integral zones can be added to meet particular effluent goals, including nutrient removal, disinfection and post-aeration.

TITAN MBR™ Design & Technical Data

Flow Capacities:	5,000 GPD and larger
Effluent Quality:	< 3 mg/l BOD & < 1 mg/l TSS
Turbidity:	< 0.2 NTU
TKN	< 2 mg/l
NH_3	< 1 mg/l



Flow Equalization

Dual Anoxic Zones [Denitrification]

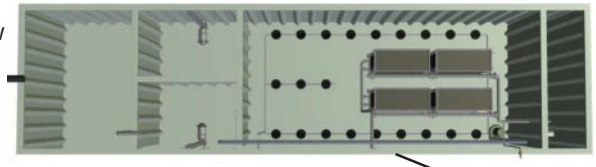
Aeration Zone with Submerged, Flat Plate Membrane Modules

Clearwell & Chlorination

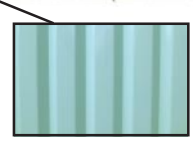
S&L® Design Benefits

- 60 years of S&L engineering & manufacturing expertise
- Easy-clean Flat-Plate membrane design
- S&L-exclusive epoxy-coated, V-Crimped tank walls
- Proven factory-built designs and quality-control
- Flexible process options with minimal operation required
- Process guarantees and full customer support

Top View



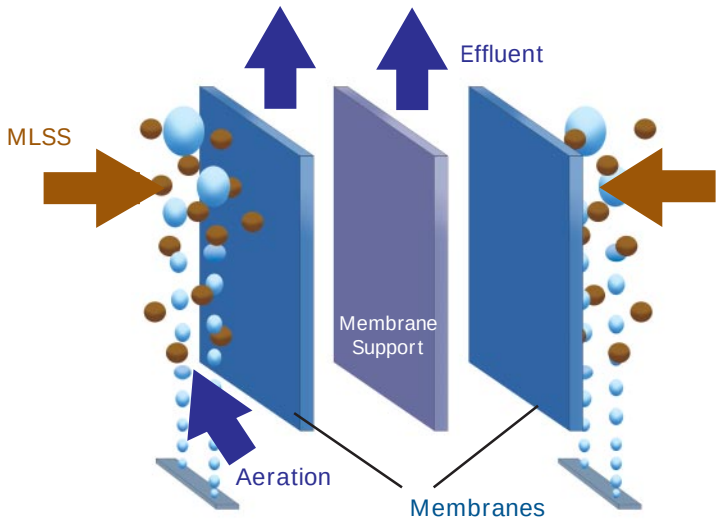
TITAN MBR™ *provides the benefits of long-term system durability with exclusive S&L V-Crimp wall design.*



Smith & Loveless Treatment... The Experience of System Innovation

TITAN MBR™ Flat-Plate Membrane Design Efficiently Delivers Results

TITAN MBR™ Flat-Plate Membranes—rated at the microfiltration level—maintain high permeability and flux rates even at peak-day rates.They stack within a fully submerged module inside the aeration zone. Sufficient transmembrane pressure created by gravity drives the flow through the membranes. Clean water discharges into a clearwell while blocked solids remain suspended in the aeration zone. Diffusers beneath the module scour the membranes *while also* providing air supply to the bacteria. Chemical cleaning occurs efficiently in-place—typically on a semi-annual basis*—with simple chemical injection.



TITAN MBR™ Membrane Advantages

Provides Long-Term Durability

Composed of PVDF [polyvinylidene fluoride] and a non-woven polyester fabric, the vertical membrane surfaces do not touch each other during operation. A robust design prevents breakage experienced in other designs and produces higher flux rates over time.

Effectively Combats Problem Constituents

TITAN MBR™ membranes eliminate clogging problems experienced in hollow fiber designs. The Flat-Plate design with its smooth, continuous surface prevents the build-up of solids that result from hollow fibers being bundled by stringy solids—like hair.

Offers More Economical Cleaning Methods

TITAN MBR™ membranes utilize less chemicals and equipment than other designs. No backpulsing is required, which eliminates associated pumping equipment. **TITAN MBR**™ membranes facilitate air scouring in the aeration zone much more effectively than hollow fiber designs by the simple fact of their flat surfaces.

TITAN MBR™ Membrane Data [Typical]

Type:	Submerged, PVDF+PET Flat-Plate
Design Flux:	15 gpd / sf
Pore Sizing:	.08 microns [MF]
TMP Range:	[Trans Membrane Pressure] 1.03 - 2.90 psi
Cleaning:	In-Place; Semi-annual cycle*; 4 hrs.

** Depending upon the application*

TITAN MBR™ Test Data

*S&L R&D operates two full-scale **TITAN MBR**™ demonstration systems, including a 10,000 GPD unit at this Kansas WWTP. See sampling results below.*

Actual Plant Data	Influent			Effluent			
Weekly Sample	BOD mg/l	TSS mg/l	TKN mg/l	BOD mg/l	TSS mg/l	TKN mg/l	NH_3 mg/l
Sam. 1	276	148	36	NA	BDL	NA	0.30
Sam. 2	270	224	36	NA	BDL	0.90	0.40
Sam. 3	359	178	53	1.2	BDL	0.80	1.30
Sam. 4	228	204	28	1.7	BDL	0.71	0.03
Sam. 5	275	157	43	0.6	BDL	0.38	0.05
Sam. 6	246	157	37	0.0	BDL	0.53	0.03
Sam. 7	126	244	21	4.0	BDL	0.15	0.65
Sam. 8	195	244	47	4.0	BDL	0.64	0.10
Sam. 9	330	139	58	2.0	BDL	0.69	0.87
Sam. 10	70	202	29	0.9	BDL	0.81	0.02
Sam. 11	294	230	34	0.0	BDL	0.62	0.02
Sam. 12	35	196	47	0.0	BDL	0.39	0.12
Sam. 13	336	127	47	0.0	BDL	0.34	0.07
Sam. 14	360	210	34	0.0	BDL	0.19	0.02
Sam. 15	265	174	31	1.5	BDL	0.00	0.22
AVG.	**243**	**189**	**39**	**1.2**	**BDL**	**0.51**	**0.28**

NA = Results Not Available
BDL = Below Detectable Limits

The Experience of Innovation.

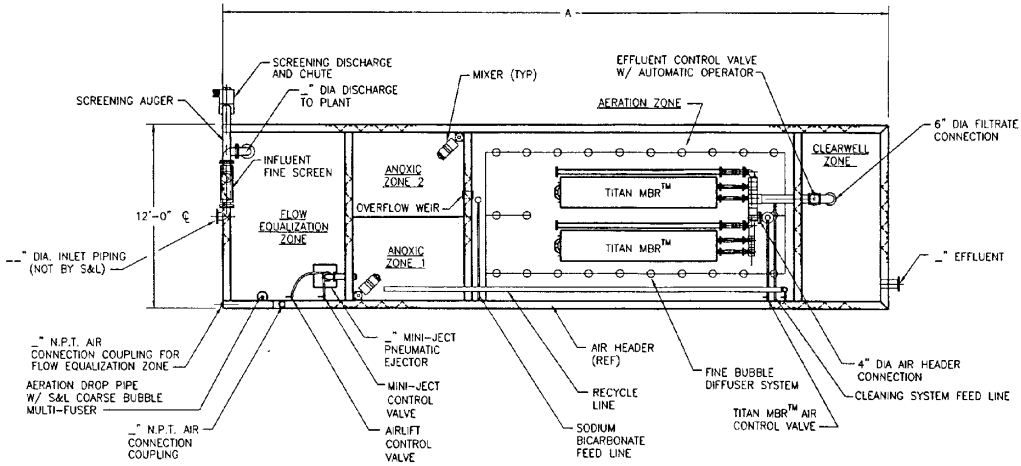
Smith & Loveless Inc. knows wastewater treatment systems. Backed by 60 years of engineering, manufacturing, erecting and servicing thousands of pre-engineered biological treatment systems, we understand your preferences for performance, minimal operational costs, and long-term durability. We're proud of the knowledge and experience we bring to the table to help solve your wastewater needs. With TITAN MBR™, you receive the finest in system innovation backed by the value-added experience of Smith & Loveless.

TITAN™ MBR

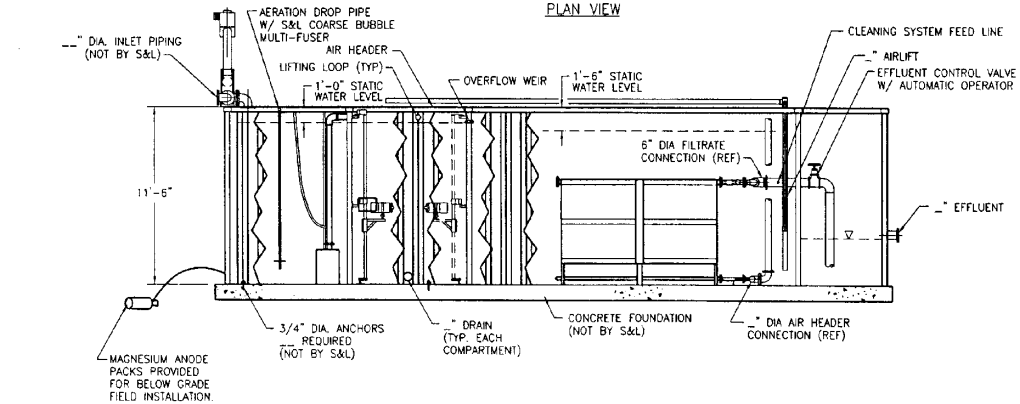
BY SMITH & LOVELESS INC.

S&L®

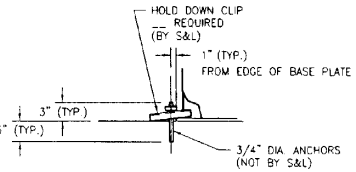
 • P: 913.888.5201 • F: 913.888.2173 • web: smithandloveless.com



PLAN VIEW



SECTIONAL SIDE ELEVATION



ANCHOR DETAIL

(SEE NOTE 1)

SIZING CHART FOR TITAN MBR (TM) TREATMENT PLANT W/ ANOXIC ZONE

THE SIZING CHART IS BASED ON TYPICAL DOMESTIC WASTEWATER, WITH THE FOLLOWING MAXIMUM WASTE CONCENTRATIONS:

BOD 250 mg/L
TSS 250 mg/L
TKN 45 mg/L

CAPACITY	"A" DIM	NOMINAL VOLUME PER ZONE (GALS)				BLOWER HP	
(GPD)	(FT)	EQ. ZONE	ANOXIC ZONE	AERATION ZONE	CLEAR WELL	EQ. ZONE	PROCESS
5,000	12'-0"	1,700(1)	3,400	1,700(1)	4,230	0.5	2.0
10,000	16'-0"	3,400	3,400	3,400	4,230	0.5	3.0
20,000	27'-0"	6,900	5,700	6,900	4,230	1.0	7.5
50,000	56'-0"	17,100	12,600	14,800	4,230	2.0	15.0
100,000(2)	107'-0"	33,100	25,100	29,700	4,230	5.0	30.0

(1) ZONE WIDTH IS 6'-0"
(2) PLANT WILL BE PROVIDED IN TWO SEPARATE SECTIONS THAT WILL REQUIRE FIELD WELDING OF TANKS AND FIELD PIPING TO INSTALL

NOTES:

1. WHEN TANK IS DEWATERED, WATER TABLE MUST BE BELOW SLAB. IF NOT, ADDITIONAL BOTTOM REINFORCEMENT AND ANCHORS ARE REQUIRED--CONSULT FACTORY.
2. DRAWING DEPICTS TWO TITAN MBR™ UNITS FOR REFERENCE ONLY. THE PLANT SIZE AND WASTE LOAD WILL DEFINE THE ACTUAL NUMBER OF UNITS TO BE INSTALLED.
3.

53B1072

				DRAWN BY: KWC	DATE: 8/22/05	ALLOWABLE TOLERANCES	FOR
				CHECKED BY: JLC	DATE:	FRACTIONS -	FACTORY-BUILT TITAN MBR™ TREATMENT SYSTEM WITH ANOXIC ZONE PLAN & ELEVATION VIEW
				APPROVED BY: CGM	DATE:	DECIMALS -	SIZE: U/M EA WT:
LET	ECN NO	DATE	BY APP'D	SCALE: NTS	CODE: 9	ANGLES -	FILE NAME: S:\ECN\53B1072 PLOT SCALE: 1=64.000
ORIGINAL ISSUE							SERIAL NO: DWG NO: 53B1072 REV

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

Smith & Loveless, Inc

SHEET 1 OF 1