Oxic chamber

s.w.d. 3 m **C-1446**

CM tank model

			mgd			U.S. GPM		
wastewater flow	7570	m3/day	2.000			1388.9		
BOD in (mg/L)	200			3336.0	lbBOD/day	5004.0	lbO2/day	
TKN in (mg/L)	0			0.0	lbTKN/day	0.0	lbO2/day	
					AOR	5004.0	lbO2/day	208.5 lbO2/hr

cell I

						HP/mg	HP for mixing	if CFM for mixing
length	42	m				80	79.9	1627 CFM
width	30	m	tank volume	residence (days)		90	89.9	
s.w.d.	3	m	3780.0 m3	0.50		100	99.9	
	9.84	(feet)	0.999 mg					

lbBOD/day 1000 cu.ft. 25.0 MLSS 3000

lbBOD/day acre 10714.9 f/m 0.134

	hi speed	low speed
	119.1	91.6

total tankage volume 0.999 mg

total residence time 0.50 days

AOR	AOR/SOR	SOR	HP at 2.5 lb/h per HP	de-rate 5	de-rate 10	de-rate 15	HP/mg	HP for mixing	HP per 1,000 cu.ft.
208.5	0.7	297.9	**119.1**	125.4	132.4	140.2	80	79.9	0.89
208.5	0.6	347.5	**139.0**	146.3	154.4	163.5	90	89.9	1.04
208.5	0.5	417.0	166.8	175.6	185.3	196.2	100	99.9	1.25

quick-and-dirty diffused aeration estimates

CFM for diffused aeration/oxygen transfer 3619 CFM AOR/SOR = .37 1.7% per feet **4705** CFM **7994 m3/h**

HP estimate for oxygen 125.4 HP with 1.3 safety factor

5.34 psig 369 mbar

notes: 5.84 psig(PeakOverdesign) 403 mbar

2. I'm adding some token TKN, used at full value for HP calculation, although some nitrogen would be used up for normal biological/BOD processes

3. approach would be extended/activated sludge alternative using f/m= c. 0.1 and 300 gpd/sq.ft. for a secondary clarifier

4. Possible preliminary quote:

about **98.0** HP if low speed units

about **588** 1-m tubes at 8 CFM per tube with 1.3 safety factor or suitable disc make/model

163.0 HP blowers

other related calcs: area (m2)

secondary clarifier diameter at 300 gpd/sq.ft. **28.1** m 619.4 **12733** ft lb torque

waste sludge flow Qw for various sludge age values, 30 mg/L SSout, underflow SS at 0.5 % Hammer.412

	WAS (see footnote # 1)					*RAS (see foot note #2)*		*tentative at* 8 *hr/day*	*thickener*	
age days	Qw mgd	Qw gpd	Qw gpm	lb/day dry	Qw/flow in	Qr mgd	Qr/Q	BFP gpm at 4%	*regime*	*thickener diam. (m)*	*thickener*
5	0.1078	107841	74.9	4491.6	5.4 %	2.7004	135.0 %	28.1		10.3	14302 ft lb torque
10	0.0479	47921	33.3	1995.9	2.4 %	2.8502	142.5 %	12.5		6.9	6355 ft lb torque
14.5	0.0293	29325	20.4	1221.4	1.5 %	2.8967	144.8 %	7.6		5.4	3889 ft lb torque
15	0.0279	27947	19.4	1164.0	1.4 %	2.9001	145.0 %	7.3		5.2	3706 ft lb torque
25	0.0120	11968	8.3	498.5	0.6 %	2.9401	147.0 %	3.1		3.4	1587 ft lb torque

dry weight sludge as predicted by Hammer.440 Figure 11-40 as a function of f/m known to be "reasonable" for municipal but may

lb/day dry 2406.8 2 * K * mgd * 8.33 * BOD5 mg/L differ considerably if industrial ww

tentative BFP gpm for possible inlet SS settings ballpark/alternate figures at above specified net BFP hours per day

20.1	3%	9631 gpd
17.2	3.5%	8255 gpd
15.0	4%	7223 gpd

sludge yield (lb/day dry / lbBOD/day) = 0.72

dewatering block subject to review/actual operating regime

foot note # 1 Assuming treated wastewater exits clarifier with say 30 mg/L SS and using entered/calculated tank MLSS,V
solving for Qw in sludge age equation (11-12- Hammer.412) for various age settings results in WAS estimates as shown

foot note # 2 Tentative Qr's result from performing somewhat crude mass balance around secondary clarifier (solving for RAS):
(Q+Qr) * MLSS = Q * 30 mg/L + (Qw+Qr) * underflow SS in mg/L
Return sludge rates to be fine tuned as will probably operate in an A2/O fashion - more later
(It all depends how lucky we are with underflow SSs: 0.5 - 2%)

Although not shown, it is assumed some thickener/DAF is used to concentrate settler underflow up to 4%
(Hammer.443: "As a general rule, the solids content must be at least 4 percent for feasible dewatering")

quotables/summary (tentative)

surface aerators

retrievable tubes & blowers local sourcing of PE/PVC pipe/panel/other