Oxic chamber

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

CM tank model

			mgd			U.S. GPM			
wastewater flow	200	m3/day	0.053			36.7			***biofabrics 3.5 - 8 g per kgBOD5/day***
BOD in (mg/L)	250			110.2	lbBOD/day	165.3	lbO2/day	3.5	***14278 m***
TKN in (mg/L)	0			0.0	lbTKN/day	0.0	lbO2/day		
					AOR	165.3	lbO2/day	6.9 lbO2/hr	

cell I

					HP/mg	HP for mixing	if CFM for mixing
length	10	m					
width	10	m	tank volume	residence (days)	80	6.3	129 CFM
s.w.d.	3	m	300.0 m3	1.50	90	7.1	
	9.84	(feet)	0.079 mg		100	7.9	

lbBOD/day 1000 cu.ft. 10.4 MLSS 3000

lbBOD/day acre 4458.6 f/m 0.056

	hi speed	low speed
	3.9	3.0

total tankage volume 0.079 mg

total residence time 1.50 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.
6.9	0.7	9.8	**3.9**	4.1	4.4	4.6	80	6.3	0.37
6.9	0.6	11.5	**4.6**	4.8	5.1	5.4	90	7.1	0.43
6.9	0.5	13.8	5.5	5.8	6.1	6.5	100	7.9	0.52

quick-and-dirty diffused aeration estimates

CFM for diffused aeration/oxygen transfer 120 CFM AOR/SOR = .37 1.7% per feet **155** CFM **264 m3/h**

HP estimate for oxygen 4.1 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 **3.2** HP if low speed units

about **19** 1-m tubes at 8 CFM per tube with 1.3 safety factor or suitable disc make/model

5.4 HP blowers

other related calcs: area (m2)

secondary clarifier diameter at 300 gpd/sq.ft. **4.6** m 16.4 **336** 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* *diam. (m)*	*thickener*
5	0.0092	9194	6.4	382.9	17.4 %	0.0555	105.0 %	2.4	3.0	1219 ft lb torque
10	0.0044	4439	3.1	184.9	8.4 %	0.0674	127.5 %	1.2	2.1	589 ft lb torque
14.5	0.0030	2963	2.1	123.4	5.6 %	0.0711	134.5 %	0.8	1.7	393 ft lb torque
15	0.0029	2853	2.0	118.8	5.4 %	0.0713	135.0 %	0.7	1.7	378 ft lb torque
25	0.0016	1585	1.1	66.0	3.0 %	0.0745	141.0 %	0.4	1.3	210 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 69.7 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

0.6	3%	279 gpd
0.5	3.5%	239 gpd
0.4	4%	209 gpd

sludge yield (lb/day dry / lbBOD/day) = 0.63

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