Oxic chamber

s.w.d. 3.2 m **Ejemplo # 2 Aireación Extendida**
CM tank model

			mgd			U.S. GPM		
wastewater flow	1990	m3/day	0.526			365.1		
BOD in (mg/L)	147			644.6	lbBOD/day	966.9	lbO2/day	
TKN in (mg/L)	35			153.5	lbTKN/day	706.0	lbO2/day	
					AOR	1672.8	lbO2/day	69.7 lbO2/hr

oxic cell data

					HP/mg	HP for mixing	if CFM for mixing
length	26	m			80	21.1	403 CFM
width	12	m	tank volume	residence (days)	90	23.7	
s.w.d.	3.2	m	998.4 m3	0.50	100	26.4	
	10.496	(feet)	0.264 mg				

		lbBOD/day 1000 cu.ft.	18.3	MLSS	3000	hi speed low speed
		lbBOD/day acre	8360.8	f/m	0.098	39.8 30.6
total tankage volume	0.264	mg				
total residence time	0.50	days				

AOR	AOR/SO	SOR	HP at 2.5 lb/h	per de-rate 5	de-rate 1	de-rate 15	HP/mg	HP for mixing	power density HP per 1,000 cu.ft.
69.7	0.7	99.6	**39.8**	41.9	44.3	46.9	80	21.1	1.13
69.7	0.6	116.2	**46.5**	48.9	51.6	54.7	90	23.7	1.32
69.7	0.5	139.4	55.8	58.7	62.0	65.6	100	26.4	1.58

quick-and-dirty diffused aeration estimates

CFM for diffused aeration/oxygen tra	1126	CFM	AOR/SOR = .37	1.7% per feet	**1464**	CFM **2488 m3/h**
HP estimate for oxygen	40.9	HP			with 1.3 safety factor	
					5.63	psig 388 mbar
notes:					6.13	psig(PeakOverdes 423 mbar

2. some presumed TKN is 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 **32.8** HP if low speed units
about **183** 1-m tubes at 8 CFM per tube with 1.3 safety fa or suitable disc make/model
53.2 HP blowers

other related calcs: area (m2)

secondary clarifier diameter at 300 gpd/sq.ft. **14.4** m 162.8 **3347** ft lb torque 8

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

	WAS (see footnote # 1)					*RAS (see foot note #2)*		*tentative at*	*hr/day*	*thickene*	*torque*
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)*	*ft lb*
5	0.0285	28499	19.8	1187.0	5.4 %	0.7095	134.9 %	7.4		5.3	3780
10	0.0127	12672	8.8	527.8	2.4 %	0.7491	142.5 %	3.3		3.5	1681
14.5	0.0078	7760	5.4	323.2	1.5 %	0.7614	144.8 %	2.0		2.8	1029
15	0.0074	7397	5.1	308.1	1.4 %	0.7623	145.0 %	1.9		2.7	981
25	0.0032	3176	2.2	132.3	0.6 %	0.7728	147.0 %	0.8		1.8	421

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 dr 438.6 2 * K * mgd * 8.33 * BOD5 mg/L differ considerably if industrial ww
tentative BFP gpm for possible inlet SS settin ballpark/alternate figures at above specified net BFP hours per day

3.7	3%	1755 gpd
3.1	3.5%	1505 gpd
2.7	4%	1316 gpd

sludge yield (lb/day dry / lbBOD/day) 0.68

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