Oxic chamber

s.w.d. 3.2 m **Ejemplo # 3 Aireación Extendida**
CM tank model

			mgd			U.S. GPM	
wastewater flow	5715	m3/day	1.510			1048.5	
BOD in (mg/L)	325			4092.6	lbBOD/day	6138.9	lbO2/day
TKN in (mg/L)	33			415.6	lbTKN/day	1911.6	lbO2/day
					AOR	8050.5	lbO2/day 335.4 lbO2/hr

oxic cell data

						HP/mg	HP for mixing	if CFM for mixing
length	45	m				80	137.0	2615 CFM
width	45	m	tank volume	residence (days)		90	154.1	
s.w.d.	3.2	m	6480.0	m3	1.13	100	171.2	
	10.496	(feet)	1.712	mg				

lbBOD/day 1000 cu.ft. 17.9 MLSS 3000 hi speed low speed
lbBOD/day acre 8179.1 f/m 0.096 191.7 147.4

total tankage volume 1.712 mg
total residence time 1.13 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.
335.4	0.7	479.2	**191.7**	201.8	213.0	225.5	80	137.0	0.84
335.4	0.6	559.1	**223.6**	235.4	248.5	263.1	90	154.1	0.98
335.4	0.5	670.9	268.3	282.5	298.2	315.7	100	171.2	1.17

quick-and-dirty diffused aeration estimates

CFM for diffused aeration/oxygen tra 5421 CFM AOR/SOR = .37 1.7% per feet **7047** CFM **11973 m3/h**
HP estimate for oxygen 197.1 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 **157.6** HP if low speed units for O2 trasner **171.2** HP min. p/CM
about **881** 1-m tubes at 8 CFM per tube with 1.3 safety fa or suitable disc make/model
256.2 HP blowers

other related calcs: area (m2)

secondary clarifier diameter at 300 gpd/sq.ft. **24.4** m 467.6 **9613** 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	0.1964	196383	136.4	8179.4	13.0 %	1.7513	116.0 %	51.1		13.9	26045
10	0.0937	93662	65.0	3901.0	6.2 %	2.0081	133.0 %	24.4		9.6	12422
14.5	0.0618	61783	42.9	2573.3	4.1 %	2.0878	138.3 %	16.1		7.8	8194
15	0.0594	59421	41.3	2474.9	3.9 %	2.0937	138.7 %	15.5		7.7	7881
25	0.0320	32029	22.2	1334.0	2.1 %	2.1621	143.2 %	8.3		5.6	4248

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 2775.1 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

23.1	3%	11105	gpd
19.8	3.5%	9519	gpd
17.4	4%	8329	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