Oxic chamber

s.w.d. 3.2 m **Ejemplo # 1 Aireación Extendida**
CM tank model

			mgd			U.S. GPM
wastewater flow	3028	m3/day	0.800			555.6
BOD in (mg/L)	150			1000.8	lbBOD/day	1501.2 lbO2/day
TKN in (mg/L)	30			200.2	lbTKN/day	920.7 lbO2/day
					AOR	2421.9 lbO2/day 100.9 lbO2/hr

oxic cell data

					HP/mg	HP for mixing	if CFM for mixing
length	22	m			80	32.7	625 CFM
width	22	m	tank volume	residence (days)	90	36.8	
s.w.d.	3.2	m	1548.8 m3	0.51	100	40.9	
	10.496	(feet)	0.409 mg				

			lbBOD/day 1000 cu.ft.	18.3		MLSS	3000	hi speed low speed
			lbBOD/day acre	8368.3		f/m	0.098	57.7 44.4
total tankage volume		0.409	mg					
total residence time		0.51	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.
100.9	0.7	144.2	**57.7**	60.7	64.1	67.8	80	32.7	1.05
100.9	0.6	168.2	**67.3**	70.8	74.8	79.1	90	36.8	1.23
100.9	0.5	201.8	80.7	85.0	89.7	95.0	100	40.9	1.48

quick-and-dirty diffused aeration estimates

CFM for diffused aeration/oxygen tra	1631	CFM	AOR/SOR = .37	1.7% per feet	**2120** CFM	**3602 m3/h**
HP estimate for oxygen	59.3	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 **47.4** HP if low speed units
about **265** 1-m tubes at 8 CFM per tube with 1.3 safety fa or suitable disc make/model
77.1 HP blowers

other related calcs: area (m2)

secondary clarifier diameter at 300 gpd/sq.ft. **17.8** m 247.7 **5093** 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	0.0443	44303	30.8	1845.2	5.5	%	1.0772	134.7 %	11.5		6.6	5876
10	0.0198	19752	13.7	822.7	2.5	%	1.1386	142.3 %	5.1		4.4	2620
14.5	0.0121	12132	8.4	505.3	1.5	%	1.1577	144.7 %	3.2		3.5	1609
15	0.0116	11568	8.0	481.8	1.4	%	1.1591	144.9 %	3.0		3.4	1534
25	0.0050	5021	3.5	209.1	0.6	%	1.1754	146.9 %	1.3		2.2	666

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 681.2 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

5.7	3%	2726 gpd
4.9	3.5%	2336 gpd
4.3	4%	2044 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