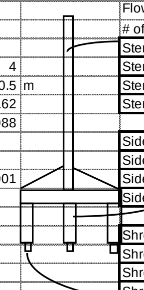
Buyuk Cekmece water treatment plant
Hydraulic calculations

Total flow	Qd	400000	m3/d
Total flow	Qt	4.6296	m3/s
# of clarifiers	NoClarif	3	
# of troughs	NoTrough	18	
# of collectors	NoColeect	8	
Design flow	Qdes	1.5432	m3/s
t (oC)	tC	15	
Kinem V'scos'ty	Visc	1.1424E-06	m2/s
Pipe Roughness Coeff	e	0.0003	m
g	m/sec2	9.81	
Density	kg/m3	999.1065989	

No of Aerat or Trays	4	
Height of Tray=	0.5	m
Cd of Orifice	0.62	
# of orifices in a cla	1088	
RoughnCoefofTride	0.001	



# Tridents=	216			
Flow per Trident	7.14E-03			
# of tridents/trough	12			
Stem L=	3.5	Stem f=	0.039	m
Stem D=	0.0994	Stem Hf=	0.059	m
Stem A=	0.0078	Stem Hm=	0.065	m
Stem V=	0.9207	Stem Ht=	0.124	m
Side Arm L=	1.5	Side arm f=	0.040	m
Side Arm D=	0.0994	Side arm Hf=	0.006	m
Side Arm A=	0.0078	Side arm Hm=	0.022	m
Side Arm V=	0.460	Side arm Ht=	0.028	m
Shroud L=	0.0500	Shroud f=	0.051	m
Shroud D=	0.05	Shroud Hf=	0.006	m
Shroud A=	0.0016	Shroud Hm=	0.157	m
Shroud V=	1.4842	Shroud Ht=	0.164	
		Total Ht=	0.316	m

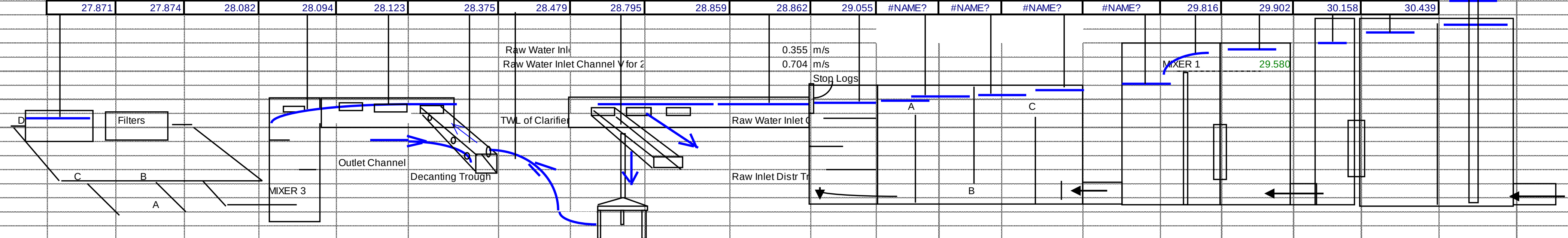
Connection=	ConnectnPipe
Concrete Top=	30.800
Difference=	#NAME?
TopWatLevel=	#NAME?

'Aerator
35.000
2.561
32.439

TWL Aerator 32.439

Filt->DC	Pipe CB	Pipe BA	Mixer 3A	Outlet Ch	Decantg Trough	TWL Inlet Ch	Inlet Trough	Distrib Pipe	Raw Watr Channel	Mixer 2	Submerg We	SubmerOrif	Submerg Weir	ConnectnPipe	Mixer1	Distr Ch	Pipe	CollChamber
28.700	28.700	28.700	28.700	28.700	28.700	28.700	29.500	29.500	29.600	30.800	30.800	30.800	30.800	30.800	30.800	30.800	30.800	31.200
0.829	0.826	0.618	0.606	0.577	0.325	0.221	0.705	0.641	0.738	1.745	#NAME?	#NAME?	#NAME?	#NAME?	0.984	0.898	0.642	0.761
27.871	27.874	28.082	28.094	28.123	28.375	28.479	28.795	28.859	28.862	29.055	#NAME?	#NAME?	#NAME?	#NAME?	29.816	29.902	30.158	30.439

Raw Water Inl	0.355	m/s
Raw Water Inlet Channel V for 2	0.704	m/s



From (downstream):		FILTERS			MIXER -3A	OUTLET CH	DECANT TROUGH	TWL OF CLARI	INL TROUGH	DIST PIPE	RAW WATCH	MIXER 2	CONTACT TANK			INLET PIPE	MIXER 1	Distribution ch	Pipe betw dis	Collect Ch	Aerators
		D	C	B	Bottom	Outlet	Weir Outlet	Decanting Trou	Dead end	Raw Channel	Dead end	top	A	A	C			Outlet	and aerators		
		pipe	pipe	pipe	Channel	Channel	Channel	Orifice	channel	pipe	channel		Subm Weir	Subm Orif	Subm Weir	pipe	free fall	Sluice Gate	pipe		
To (upstream):		C	B	A	Top	Dead end	Dead end	TWL of Clarifier	Inlet	Raw Dist Trough	Inlet	bottom	Mixer 3	B	B			Inlet			
I . PROCESS CALCULATIONS																					
Flow	(m3/s)	2.315	0.772	1.543	1.543	0.686	0.086	0.001	0.086	0.086	0.772	0.772	0.772	0.772	0.772	1.543	1.543	1.543	4.630	4.630	4.630
Volume	m3	201.062	84.446	16.933																	
Residence tR	min	1.448	1.824	0.183																	
G	sec-1	#NAME?	#NAME?	#NAME?	0.012																
G* tR	-	#NAME?	#NAME?	#NAME?																	
II PARAMETERS	**units**																				
Length	m	100.000	42.000	11.000	2.000	45.000	16.100		18.000	1.100	45.000	0.800	0.800			65.000	1.500	4.500	29.000	8.000	30.000
Width	m	-	-	-	2.000	1.500	0.600		0.500		1.200	2.500	2.500	2.500	2.500		8.000	4.500		8.000	30.000
Diameter	m	1.600	1.600	1.400	-	-	-	0.045	-	0.350						1.600			1.870		
Area	m^2	2.011	2.011	1.539	4.000	1.265	0.105	0.002	0.397	0.096	1.931	2.000	2.000			2.011	12.000		2.746		900.000
Velocity	m/s	1.151	0.384	1.002	0.386	0.542	0.819	0.884	0.216	0.891	0.400	0.386	0.386			0.768	0.129		1.686		0.005
IIILEVELS																					
Concrete top upstream	m	28.700	28.700	28.700	28.700	28.700	28.700	28.700	29.500	29.500	29.600	30.800	30.800	30.800	30.800	30.800	30.800	30.800	30.800	31.200	35.000
Downstream	m	27.650	27.871	27.874	28.082	28.094	28.123	28.375	28.479	28.795	28.859	28.862	29.055	#NAME?	#NAME?	#NAME?	#NAME?	29.816	29.902	30.158	30.439
Calculated upstream	m	27.871	27.874	28.082	28.094	28.123	28.375	28.479	28.795	28.859	28.862	29.055	#NAME?	#NAME?	#NAME?	#NAME?	29.816	29.902	30.158	30.439	32.439
Selected upstream	m	27.871	27.874	28.082	28.094	28.123	28.375	28.479	28.795	28.859	28.862	29.055	#NAME?	#NAME?	#NAME?	#NAME?	29.816	29.902	30.158	30.439	32.439
Security	m	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	#NAME?	#NAME?	#NAME?	#NAME?	0.000	0.000	0.000	0.000	
Overflow security	m	0.829	0.826	0.618	0.606	0.577	0.325	0.221	0.705	0.641	0.738	1.745	#NAME?	#NAME?	#NAME?	#NAME?	0.984	0.898	0.642	0.761	2.561
Concrete bottom	m	27.500		27.500	27.500	27.250	28.000	23.850	28.000	28.000	27.250	23.850	27.250	27.250	27.250	27.250	27.250	27.250	27.250	27.250	27.250
Overflow weir level	m												28.250		28.250		29.580				
IV. LOSSES		(Coolebrook - White)																			
A. FRICTION LOSS																					
a.pipe loss																					
Reynold's number		1612457.	537485.732	1228538.816						273008.626						1074971.464			2759285.		
Hf (Colebrook)	m	#NAME?	#NAME?	#NAME?						#NAME?						#NAME?			#NAME?		
Lambda (Simplified)		0.018	0.019	0.019	-	-	-	-	-	0.027						0.018			0.018		
Hf(Simplified)	m	0.077	0.004	0.008	0.000	0.000	0.000			0.003	0.000	0.000	0.000			0.023	0.000	0.000	0.039	0.000	
Rh	m						0.110														
Hf(Mann'ngs)	m						0.031														
Total friction loss		0.077	0.004	0.008	0.000	0.000	0.031	0.000	0.000	0.003	0.000	0.000	0.000			#NAME?	0.000	0.000	0.039	0.000	0.000
B. MINOR LOSS																					
	Km																				
Entry loss	0.5			0.500	0.500					0.500						0.500			0.500		
Exit loss	1	1.000				1.000				1.000						1.000			1.000		
B/F valve	0.7			0.700																	
Gate valve	0.19			1.500																	
90° elbow /turn	0.5	1.000			1.000							2.000				0.500					
45° elbow /turn	0.3															0.300					
T elbow	0.12	0.120		1.200																	
Cross	1																				
Contraction	0.1																				
Allowed Velocity Head	m					1.000															
Baffle	0.5				0.060							16.800									
Submerged Orifice								2.601													
Hm	m	0.143	0.000	0.200	0.012	0.030		0.104		0.061		0.143				0.069			0.217		
3. Overflow weir																					
Weir length	m						0.600										8.000				
dc=	m						0.128										0.236				
Yo (1 Sided or 2 Sided Flow)	1						0.221														
4.Pen Sock/Stop Log/Submerged Orifice/Submerged Weir																					
Height											1.609	0.500	0.805	0.600	#NAME?			1.400			
Width	m										2.000	2.500	2.500	2.500	2.000			1.400		1.800	
Area	(m2)										3.218	1.250	2.012	1.500	#NAME?			1.960		3.240	
Flow	(m^3/s)										0.772	1.250						1.543		4.630	
Velocity	m/s										0.240	0.617						0.787		1.429	
km											1.000	2.601						2.700		2.700	
Hm penstock/weir											0.003	0.051	#NAME?	0.035	#NAME?						
Total minor loss	m	0.143	0.000	0.200	0.012	0.030	0.221	0.104	0.244	0.061	0.003	0.193	#NAME?	0.035	#NAME?	0.069	0.236	0.085	0.217	0.281	0.000
TOTAL LOSS	m	0.221	0.004	0.207	0.012	0.030	0.252	0.104	0.244	0.064	0.003	0.193	#NAME?	0.035	#NAME?	#NAME?	0.236	0.085	0.257	0.281	0.000