İÇME SUYU ARITMA TESİSLERİ HAKKINDA TAVSİYELER

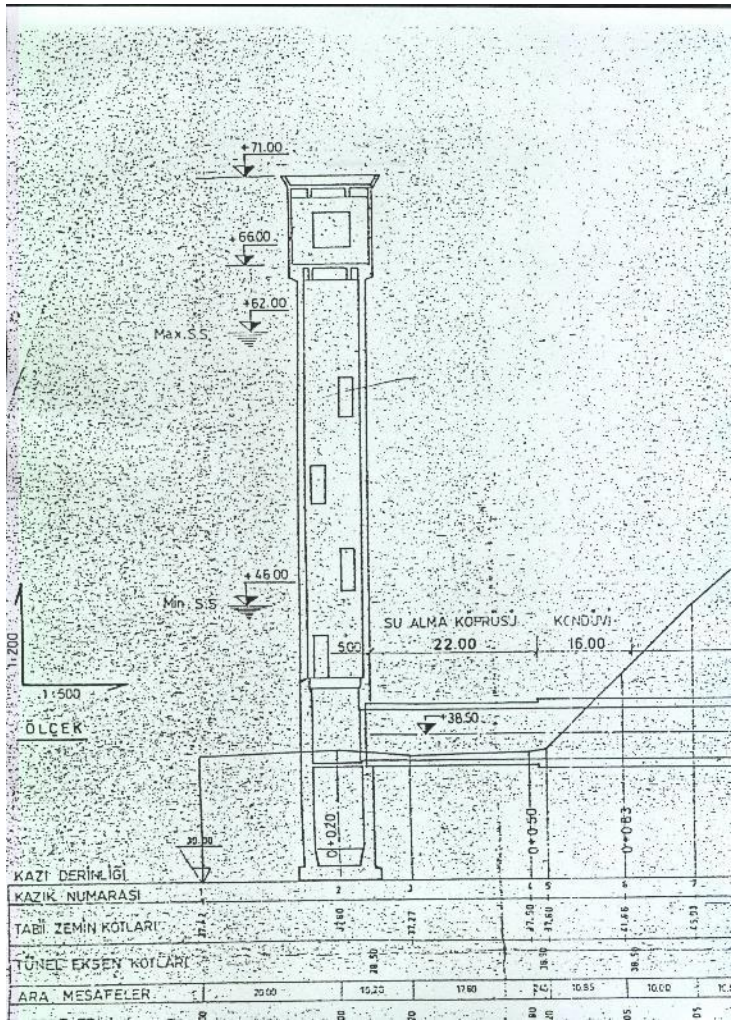
Advises on Water Treatment Plants

Prof. Dr. A. Saatçı

ARITMA ALIŞ AĞZINDA BAŞLAR:
KADEMELİ ALIŞ AĞZI
Treatment Starts at the Source: Multiple Inlets

Ömerli Kademeli Alış Ağzı: Alış ağızları kademeli ve ulaşımı kolay yapılmalıdır.

Ömerli Intake Tower: Intake towers should have multiple level inlets and easy to reach.



KASKAT HAVALANDIRMA
Cascade Aeration

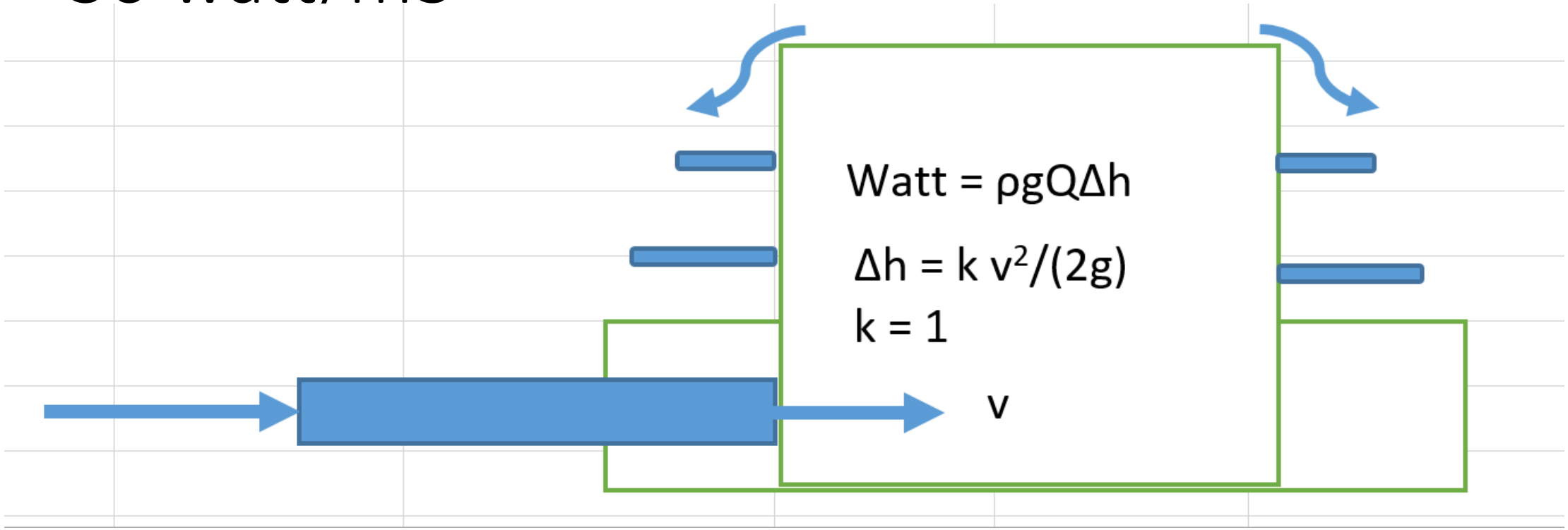
UÇUCU ORGANİKLER (VOCs) GİDERİLEBİLMESİ İÇİN SU DÜŞÜŞ ALANININ ARTTIRILMASI GEREKİR.

The surface area should be maximized to strip the VOCs

UÇUCU ORGANİKLER (VOCs) GİDERİLEBİLMESİ İÇİN SU DÜŞÜŞ ALANININ ARTTIRILMASI GEREKİR.

The surface aerea should be maximized to strip the Volatile Organic Compounds

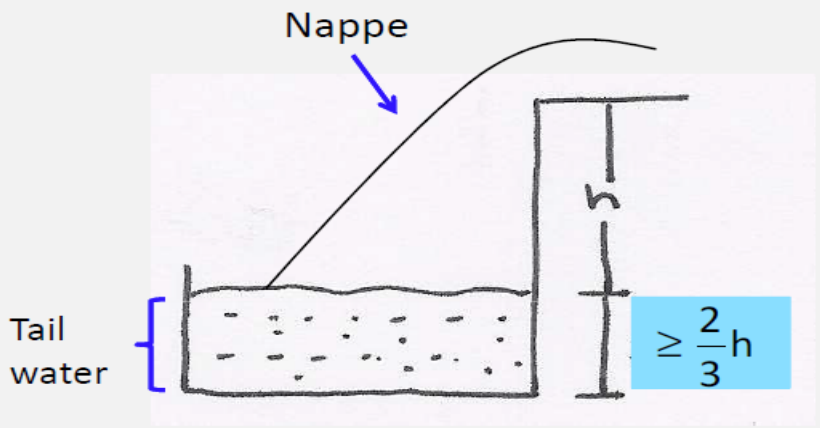
Kaskat Havalandırma-Giriş Tank Hacmi
< 30 watt/m3



Pipe D=	1	m
v=	1.3	m/s
watt=	810.6	
Vmin=	27.0	m3

SUDAKİ ÇÖZÜLMÜŞ OKSİJENİN ARTTIRILMASI İÇİN SU DERİNLİĞİNİN >2/3 h OLMASI LAZIM.

2nd Mechanism
(effective for gasification, e.g., oxygenation)



$$h = \frac{v^2}{2g}$$

$$v = \sqrt{2gh}$$

When the nappe submerge into the receiving body of water

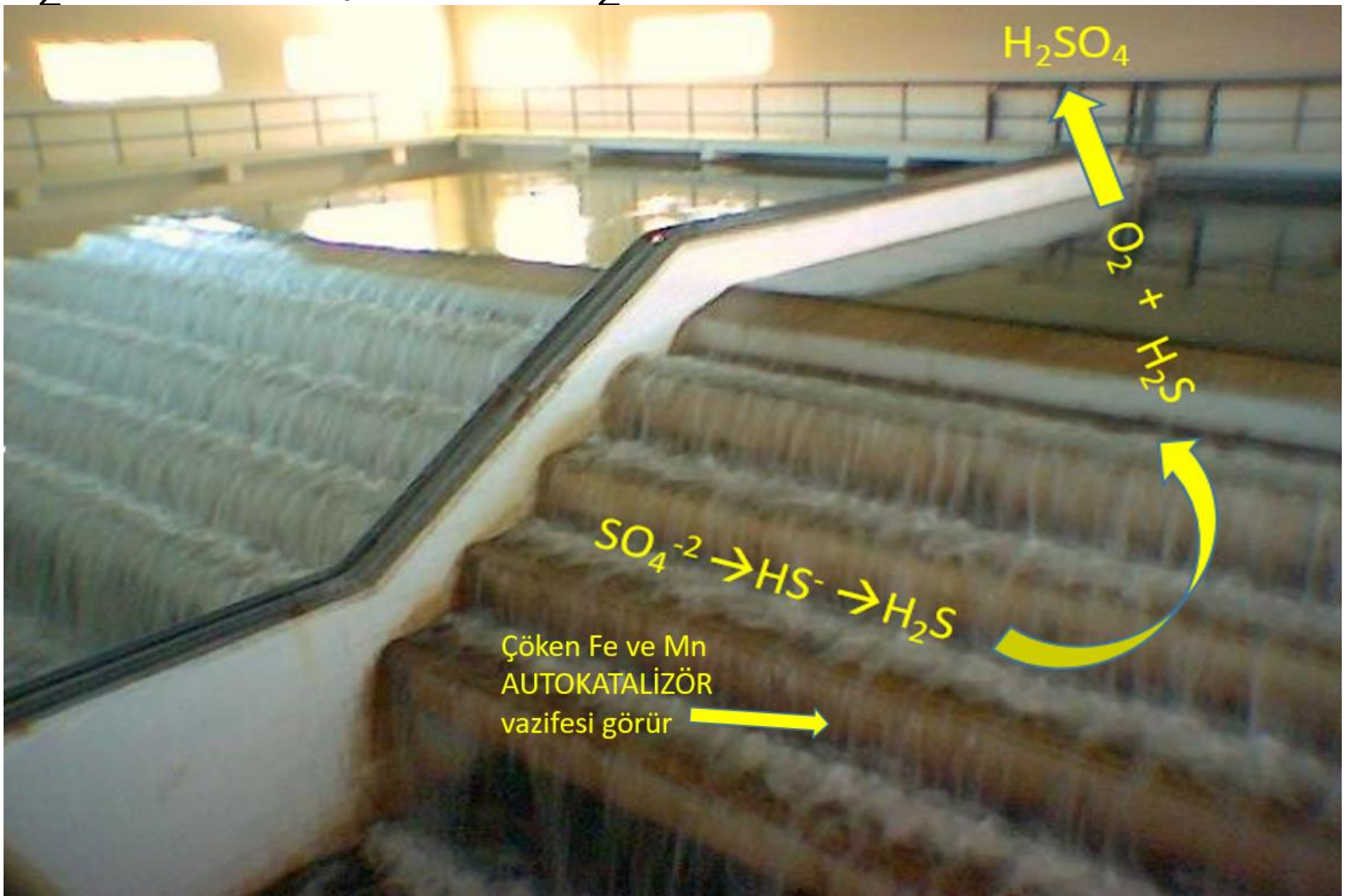
significant amounts of air is entrained.

The entrained air is then dispersed in the form of bubbles throughout the receiving body of water, which leads to an intense transfer of gases.

KASKAT HAVALANDIRMALARIN KAPATILMASI GEREKMEZ.

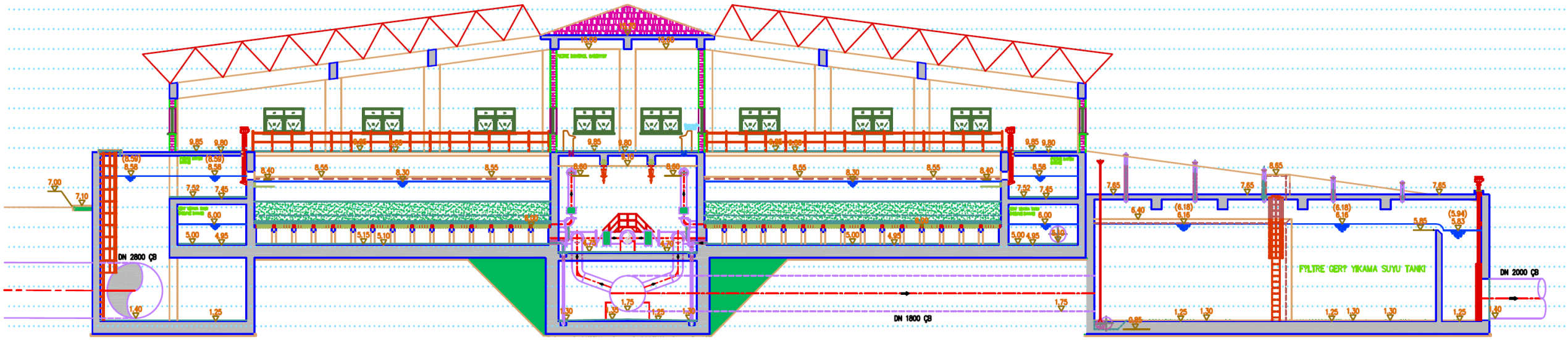
You do not need to close the cascade aerators. Running water does not freze.

H_2S Korrozyonu (H_2S CORROSION)



FİLTRELERİN ÜSTLERİ KAPATILIRSA DUVARLARDA YOĞUNLAŞAN SU İÇERİSİNDEKİ H_2S ELEKTRONİK ALETLERİN PASLANMASINA SEBEP OLUR.

Closing the filters may cause H_2SO_4 corrosion of electronics

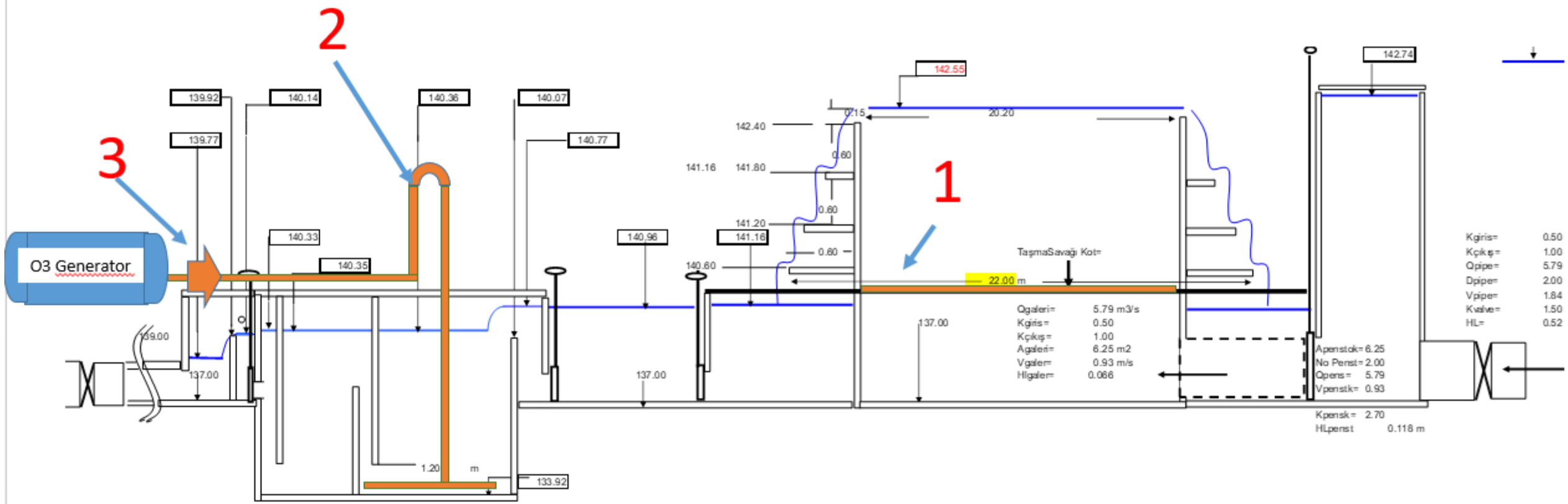


OZON TEMAS TANKLARI
Ozone Contact Chambers


O3 Temas T
Serbest Düşüş Karıştırma
O3 Jenratör Binası
Kaskat Havalandırma

Temas Tankındaki Suyun Ozon Jeneratörüne Geri Gelmemsi İçin Alınan 3 Tedbir

3 Precautions to stop the backflow of water from the Contact tank to the ozone generator



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International Ozone Association

Computerized Continuous Monitoring And Analysis Of Ozone In Solution

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Abstract

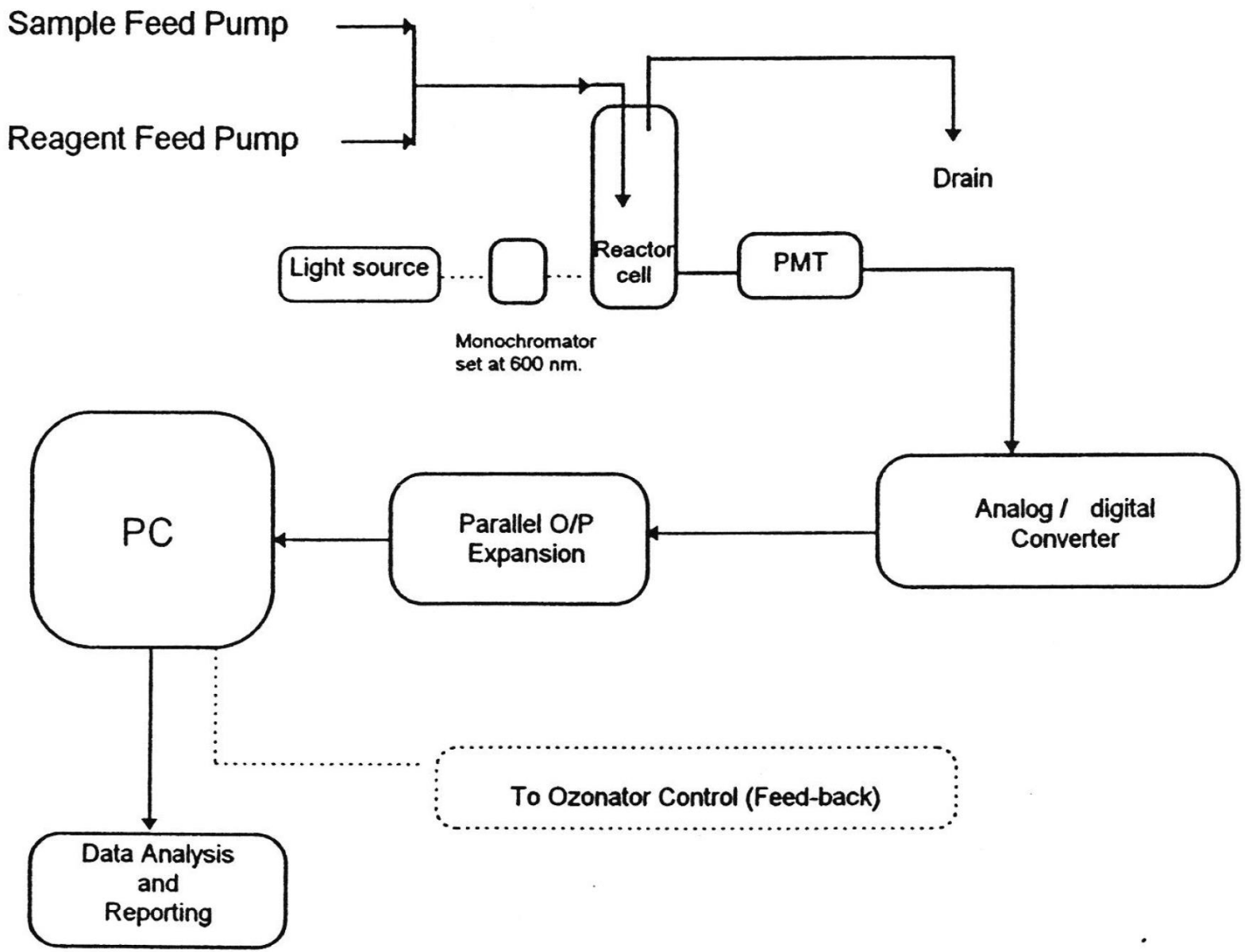
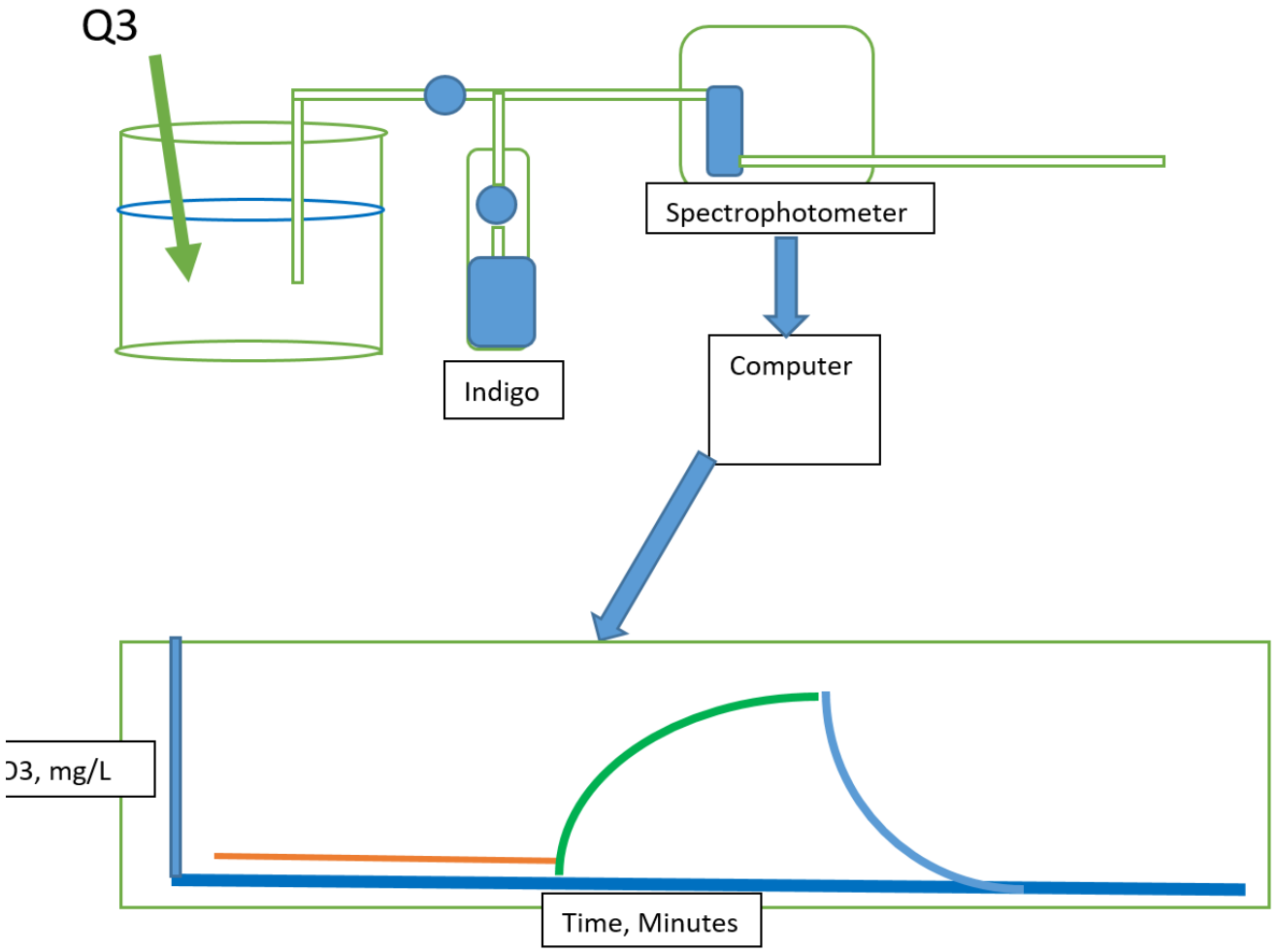


Figure 1. Computerized continuous ozone monitoring in aqueous phase (COMA).

Ozone Testi



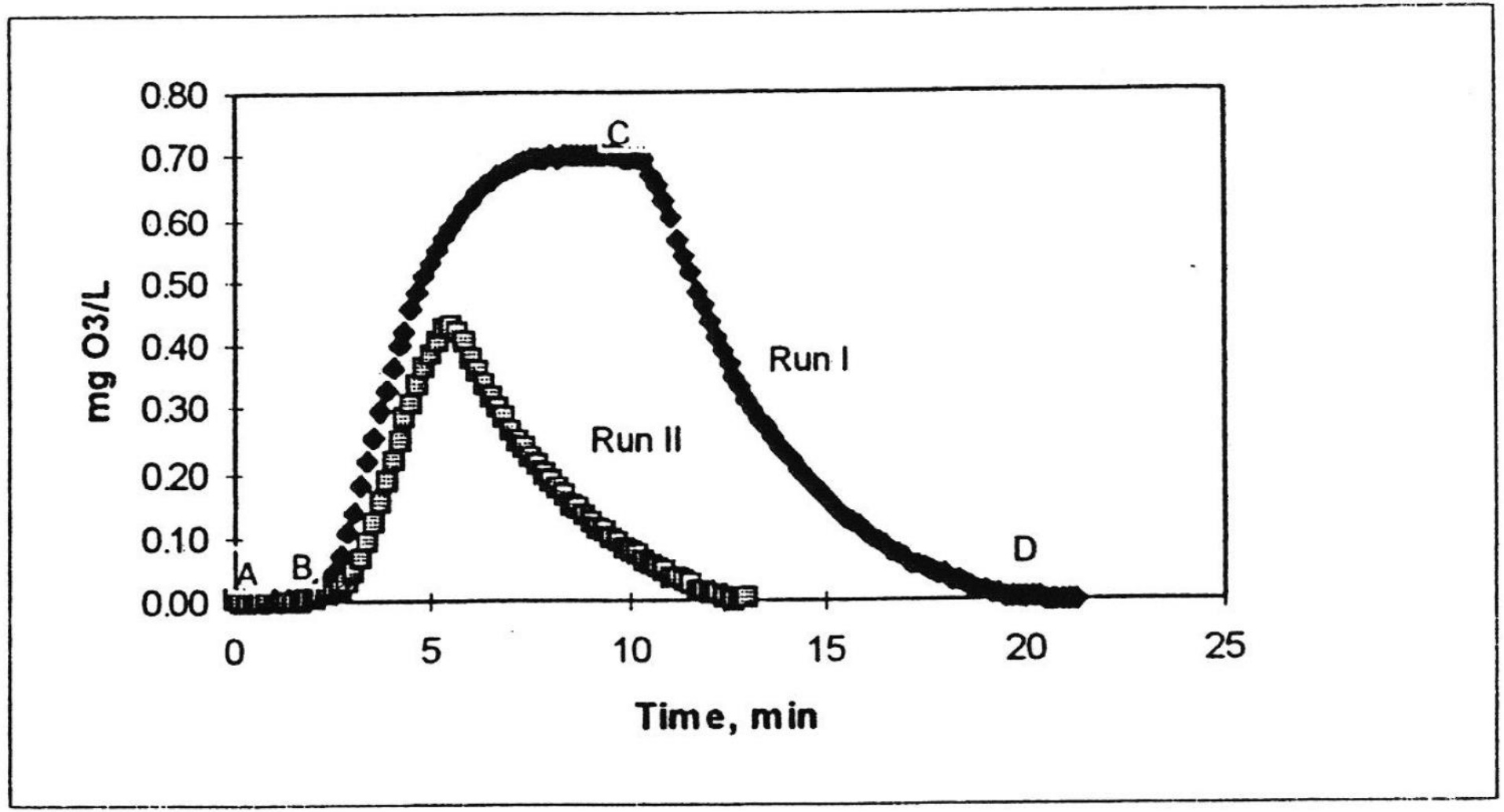


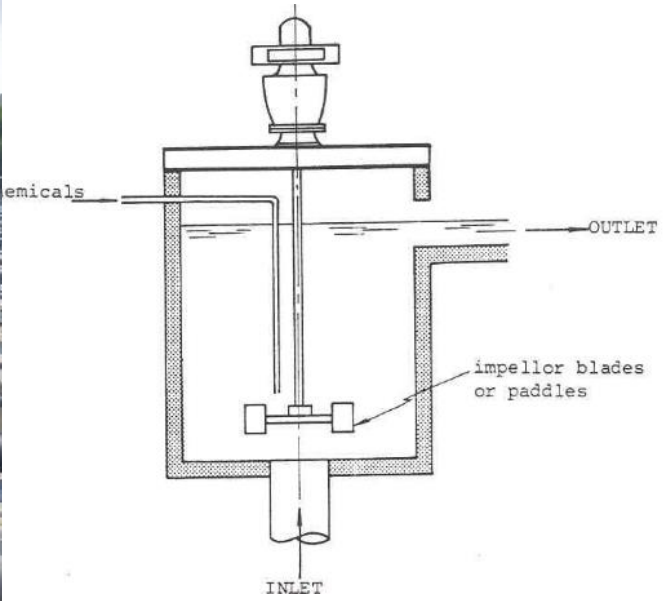
Figure 2. Typical Experimental Data Obtained Using COMA: (AB) Phase I: Ozone Demand Phase; (BC) Phase II: Ozone Accumulation Phase; (CD) Phase III: Ozone Decomposition Phase. At point C ozonation was terminated.

HIZLI KARIŞTIRMA

COAGULATION

ŞAYET GİRİŞTE YETERLİ TURBULANS VARSA MEKANİK HIZLI KARIŞTIRMA KULLANMAK YERİNE SERBEST DÜŞÜŞLE KARIŞTIRMA YAPILABİLİR (Orhaniye SAT)

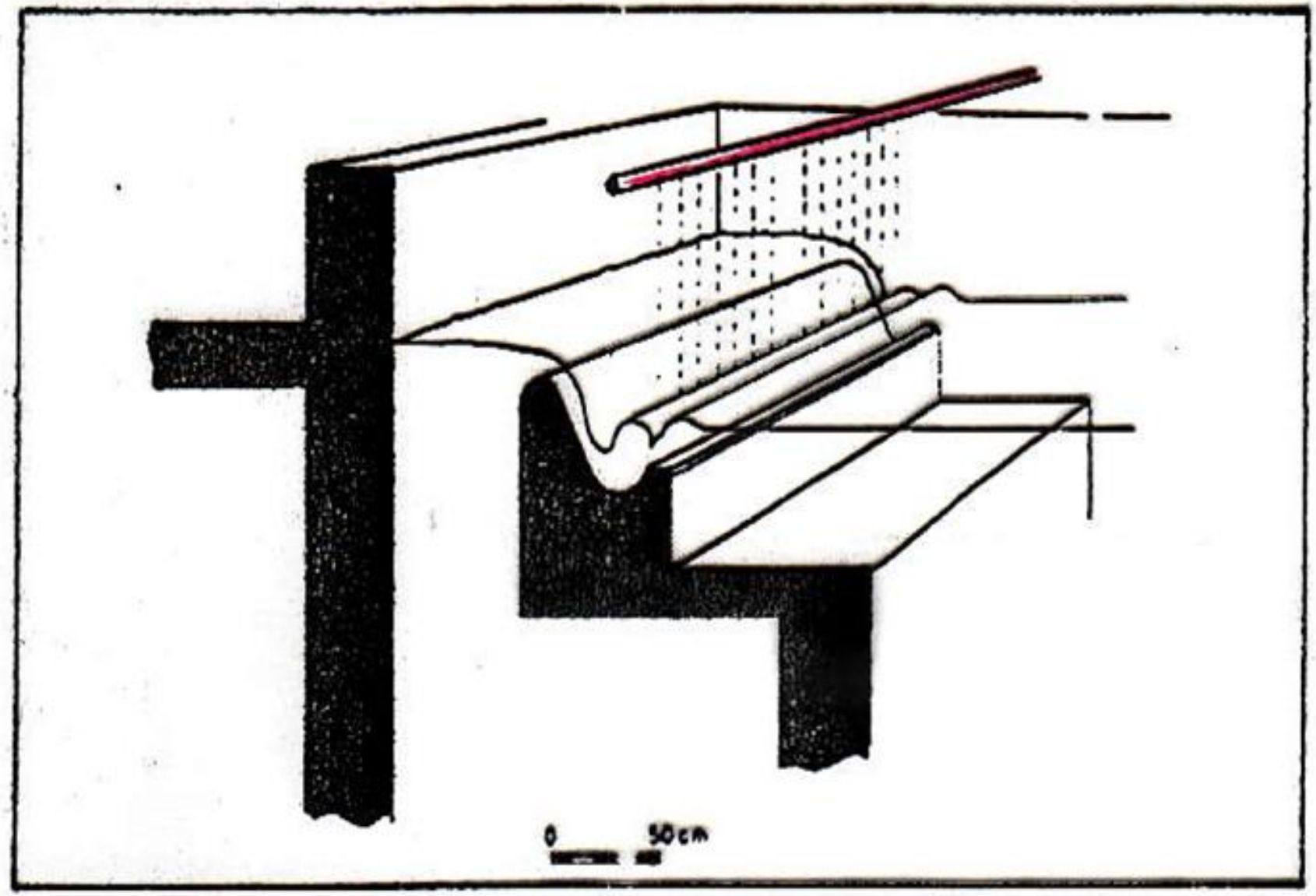
ıf you have enough turbulence, you may use free fall mixing.



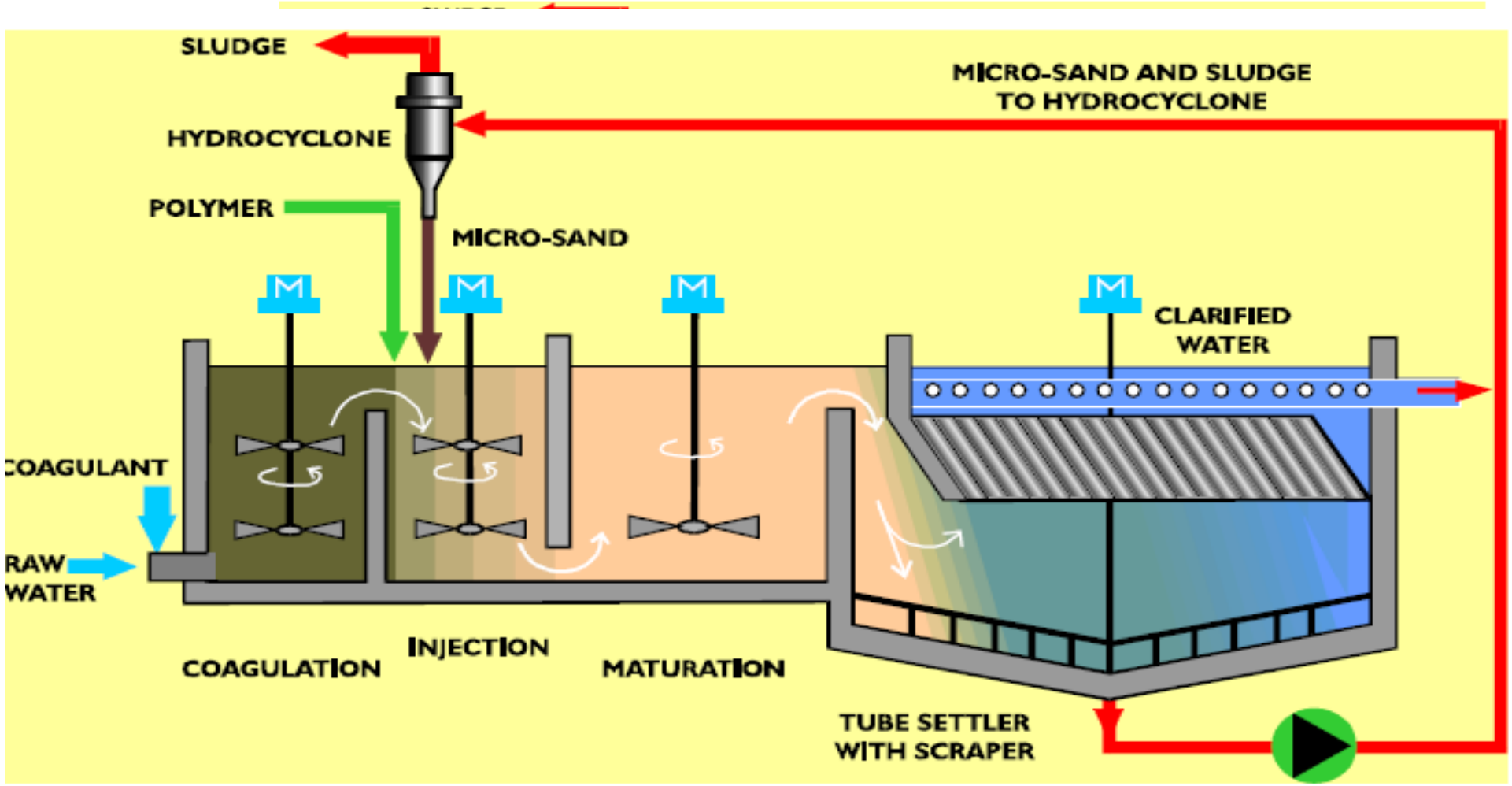
Serbest Düşüşle Hızlı Karıştırmada G Değerini Yükseltmek İçin Düşülen Hacmı Azaltmak Gerekebilir

Free Fall Rapid Mix:Decreasing the Mixing Volume to increase the G value

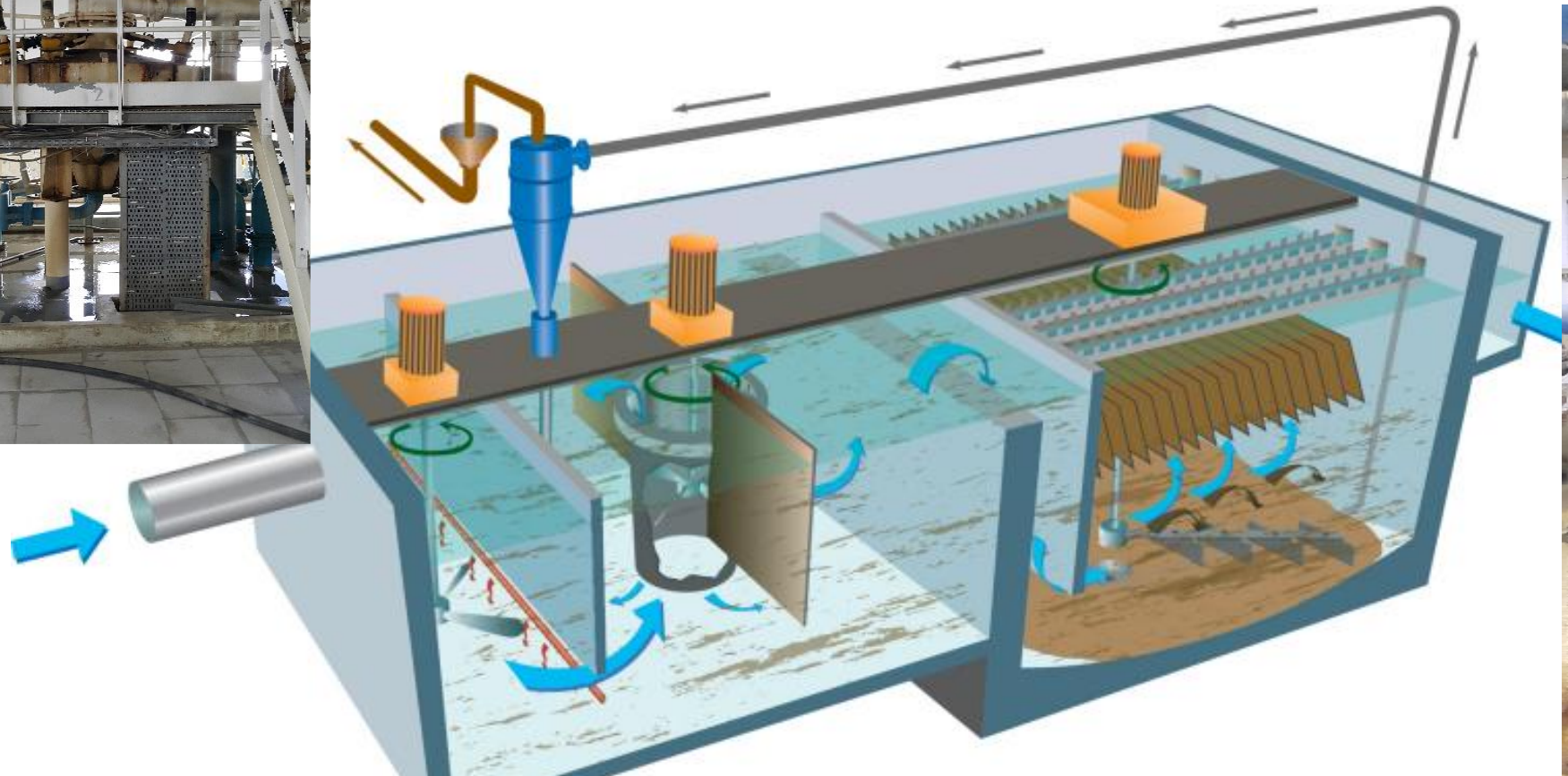
$$G = \sqrt{\frac{Pow}{\mu V}}$$



ÖMERLİ – MURADİYE İAT



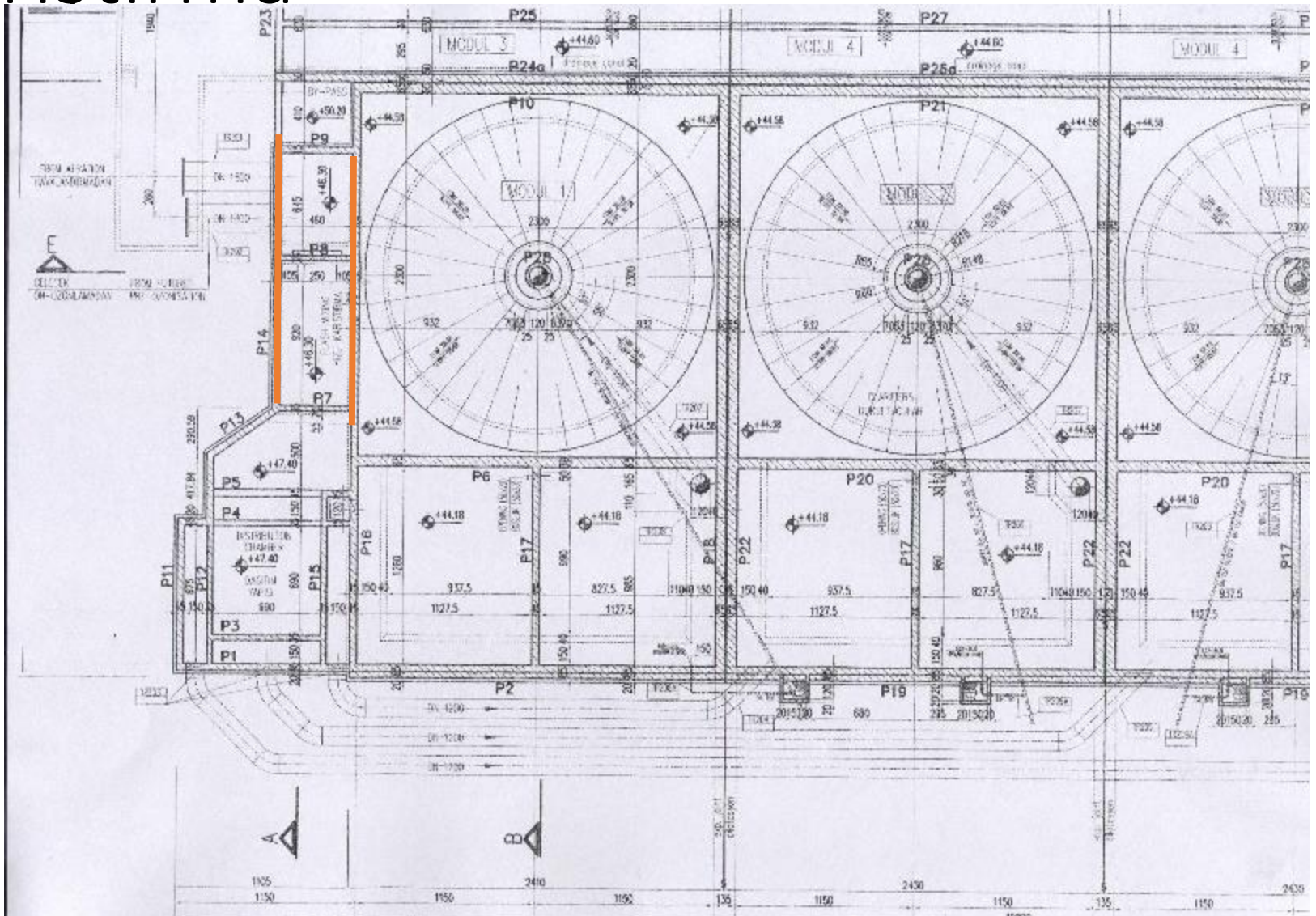
ÇÖKELTMEDE MİKROKUM KULLANILMASI (MURADIYE SAT VE BALIKESİR SAT)



Cumhuriyet SAT ve Muradiye SAT Hızlı Karıştırıcılarda Sallanma Problemleri

Muradiye and Cumhuriyet WTP Rapid Mix Units: Oscillation Problems

Cumhuriyet İAT: Seri Bağlanmış G= 45 sn^{-1} Hızlı Karıştırma

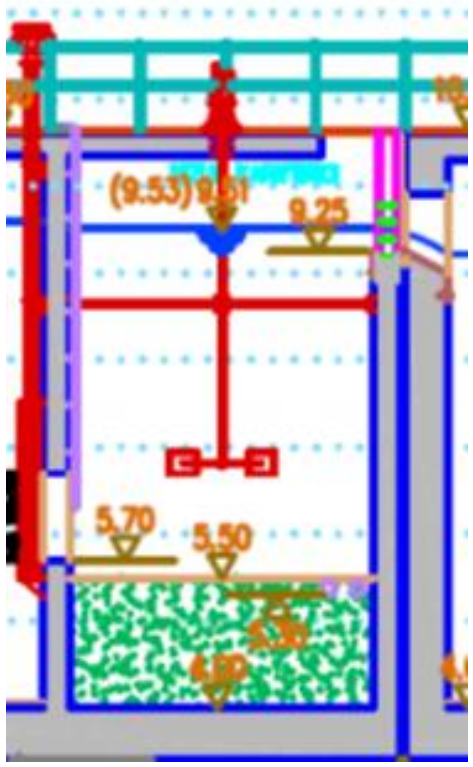


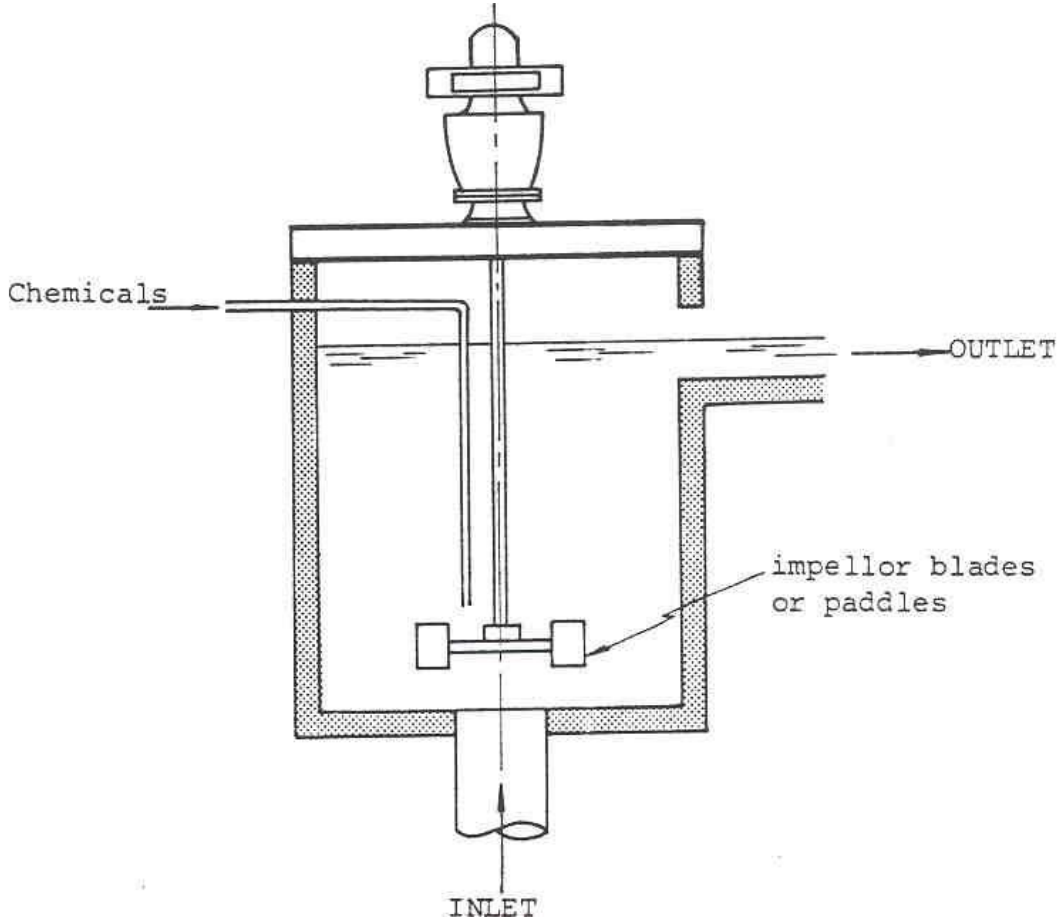
CUMHURİYET (SAT) HIZLI KARIŞTIRMA

2 adet 90 kW motor yerine 2 adet 30 kW motor koyulmuştur.

G in each rapid mix unit should be 900-1000 s^{-1}

G1: 450 s^{-1} + G2 : 450s^{-1} ≠ 900 s^{-1}

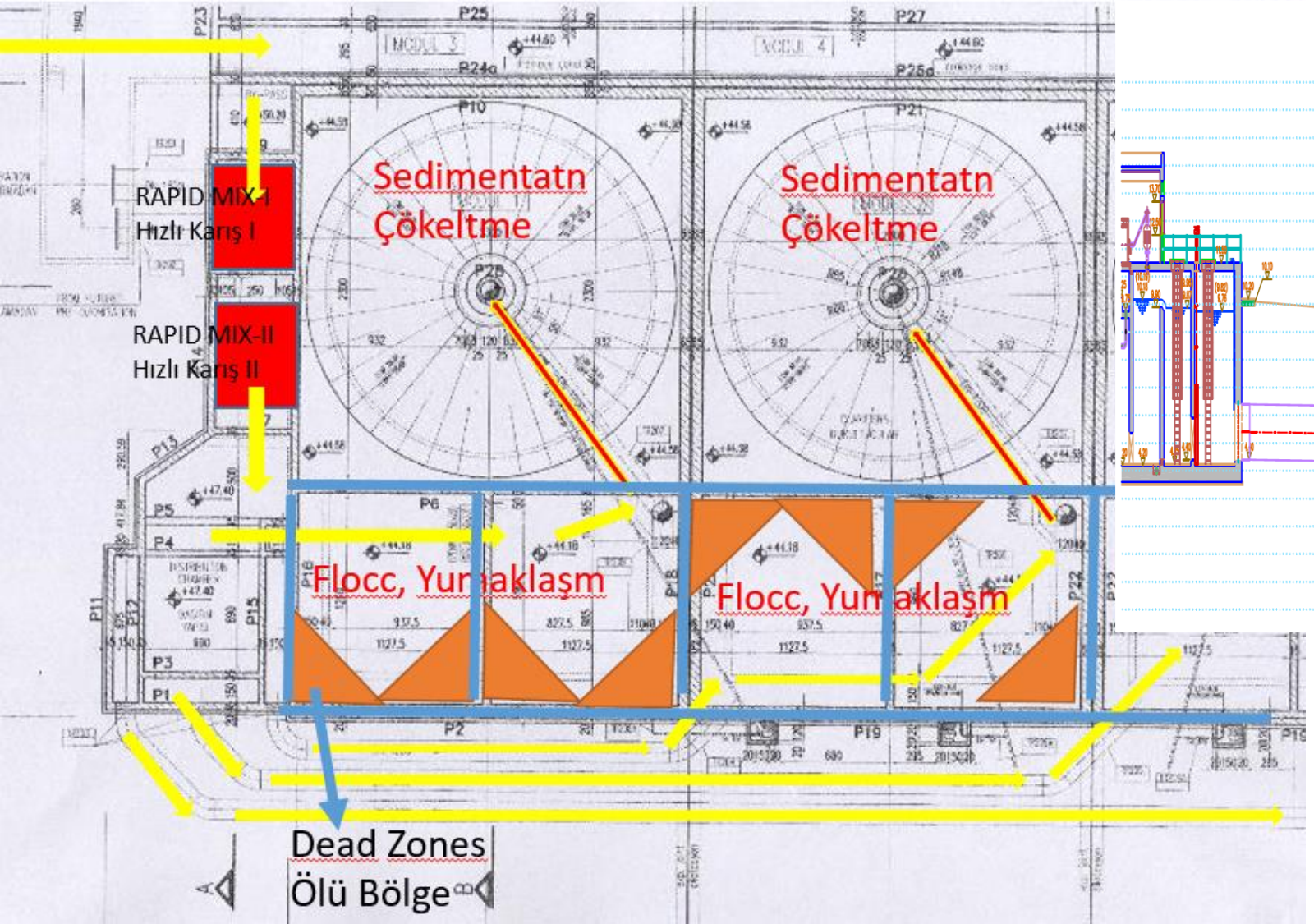


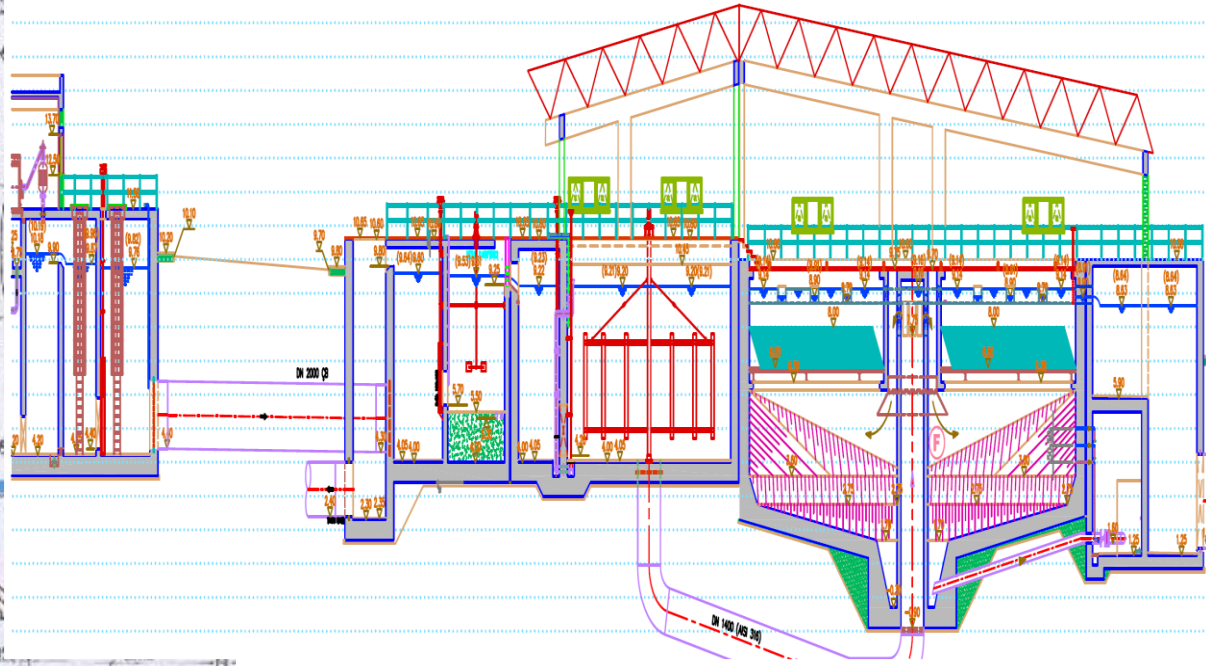


YAVAŞ KARIŞTIRMA

FLOCCULATION

CUMHURİYET SAT: Yumaklaşmada Ölü Bölgeler
Dead Zones in Flocculation Chambers



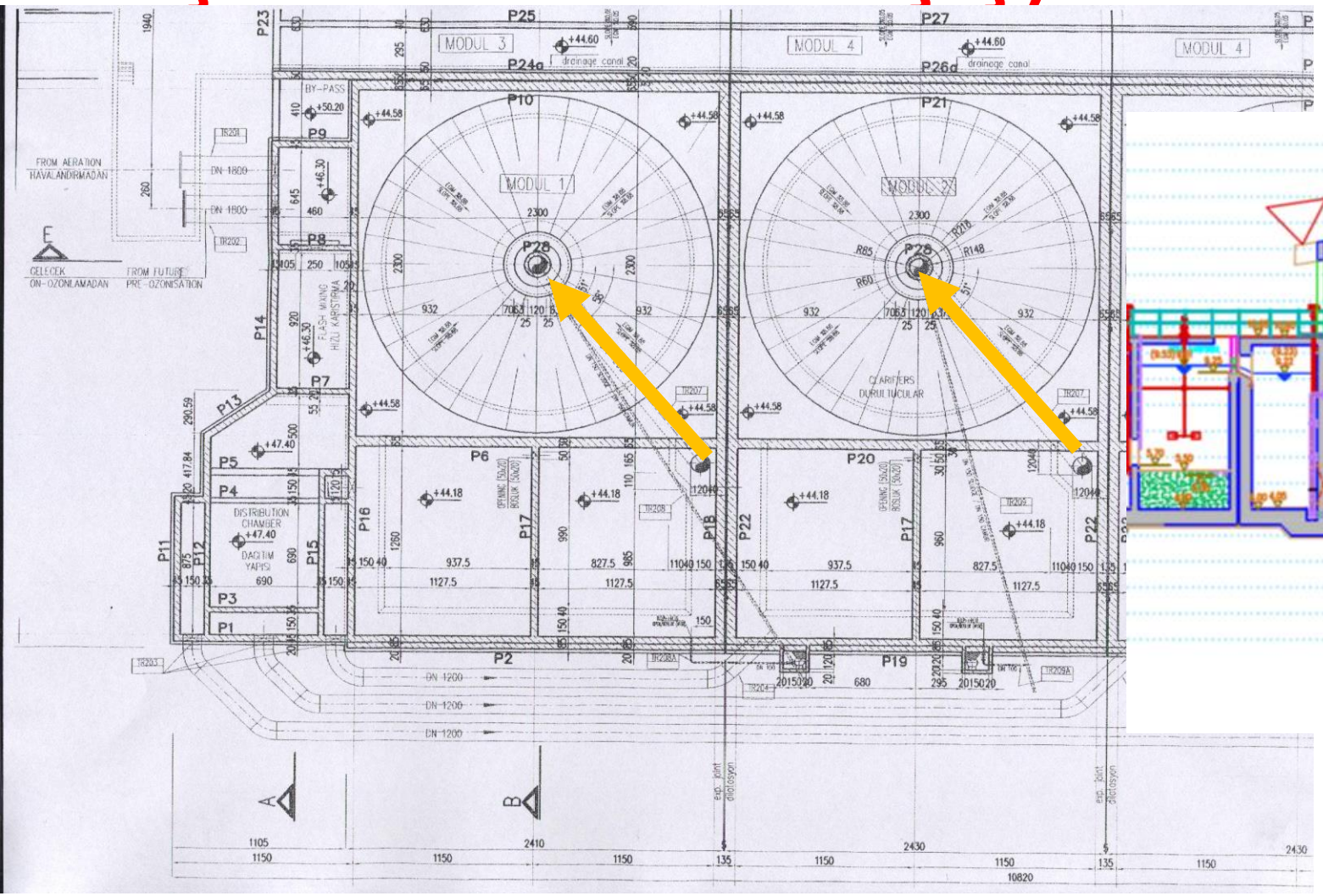


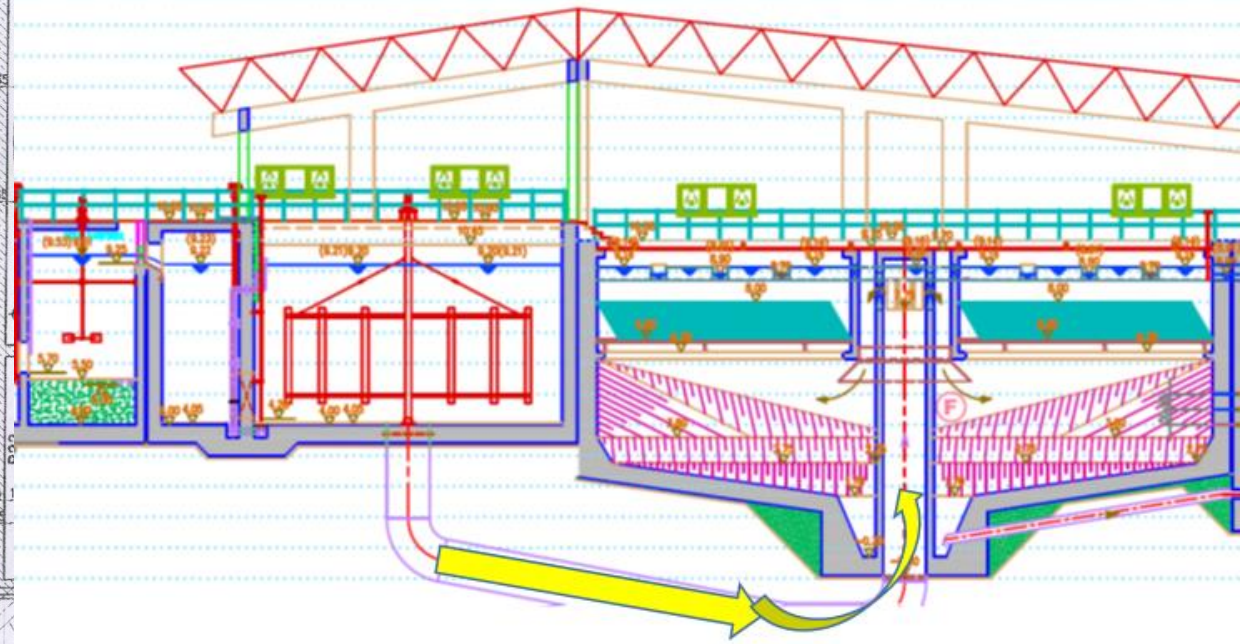
Cumhuriyet SAT:YAVAŞ KARIŞTIRMA ÖLÜ BÖLGELER
Dead Zones in Flocculation Chambers

YAVAŞ KARIŞTIRMA ÖLÜ BÖLGELERİN GİDERİLMESİ ÇALIŞMASI (Cumhuriyet SAT)

Preventing Dead Zones in Flocculation Chambers

CUMHURİYET SAT (YUMAKLAŞMADAN ÇÖKELTMEYE GEÇİŞ)

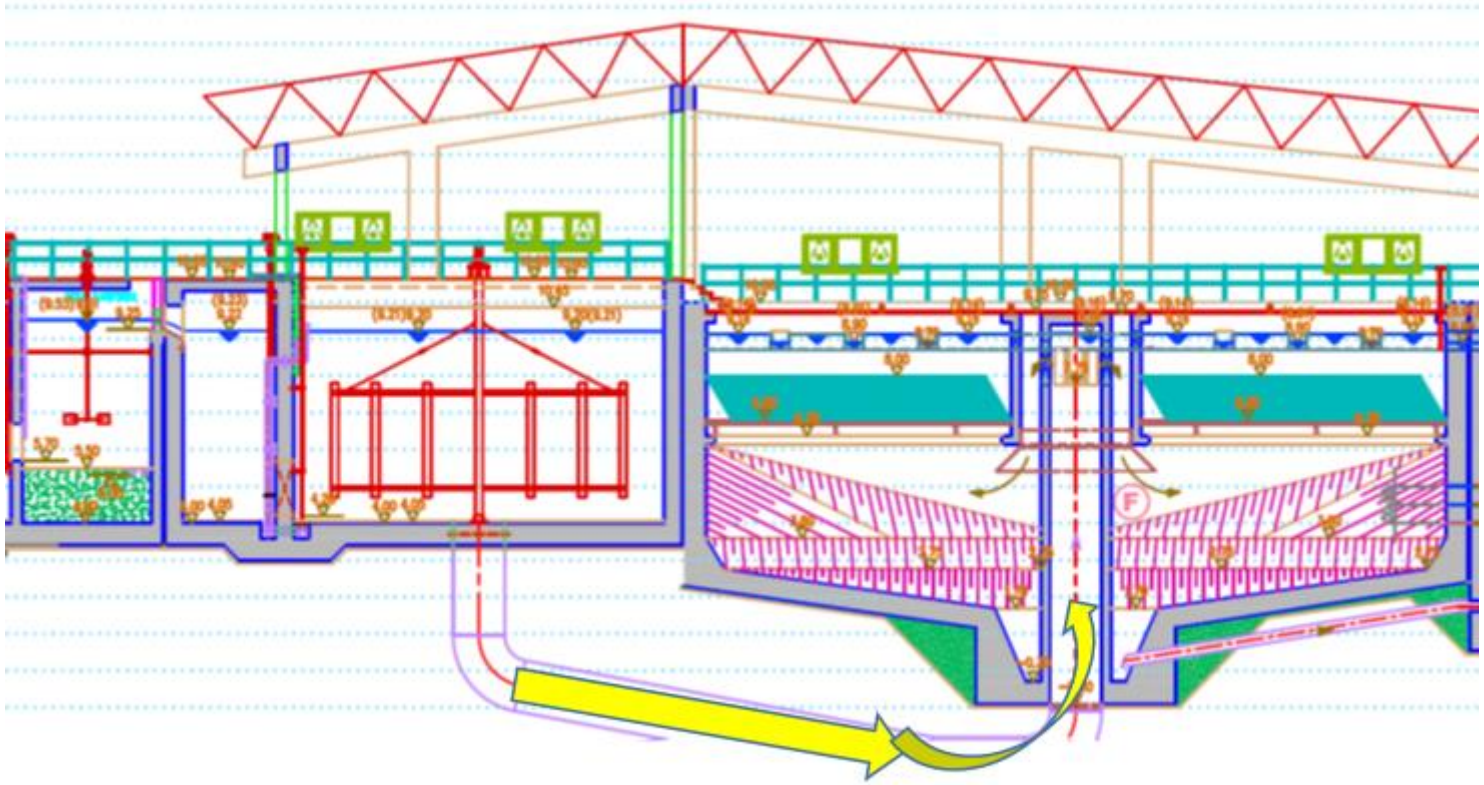




CUMHURİYET SAT: Yumaklaşma-Çökeltme Bağlantısı **Yumaklaşma Sonrası Yumakların Kırılması**

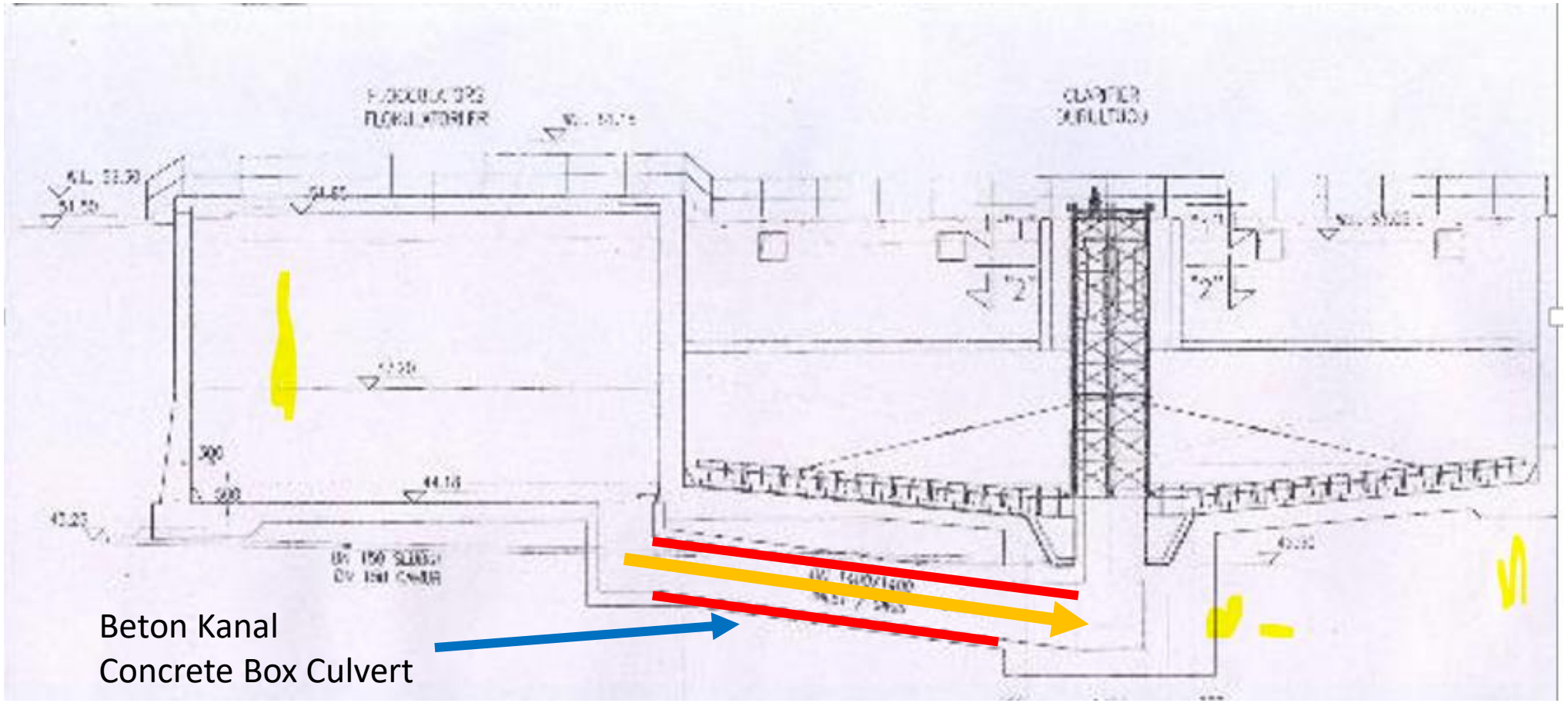
Yumakların kırılmaması için yumaklaşmadan sonra çökeltme tankına bağlanmada hızlar 0.3 m/sn civarında olmalıdır.

If you connect flocculaton tank to sedimentation tank, try not to use a pipe. If you use a pipe, the pipe should be big enough to have velocities ~ 0.3 m/s not to break flocs.



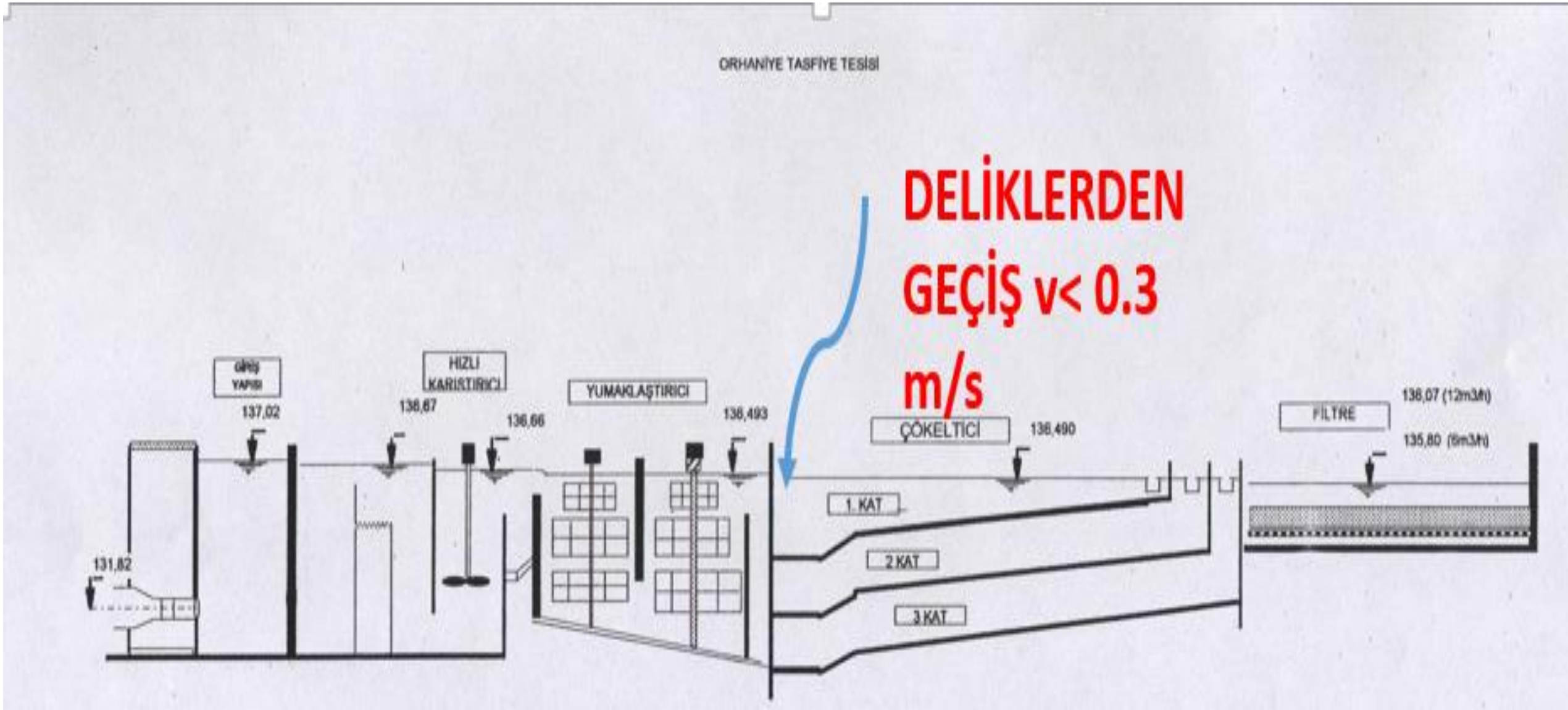
Boru Yerine Beton Kanalla Çökeltmeye Geçilmesi

Using Box Culvert Instead of Pipe to Reduce the Velocities



ORHANİYE SAT: Yumaklaşma Çökeltme Bağlantısı

Orhaniye WTP: Passage of flocs from slow mix units to the sedimentation tank yhrough perforated wall

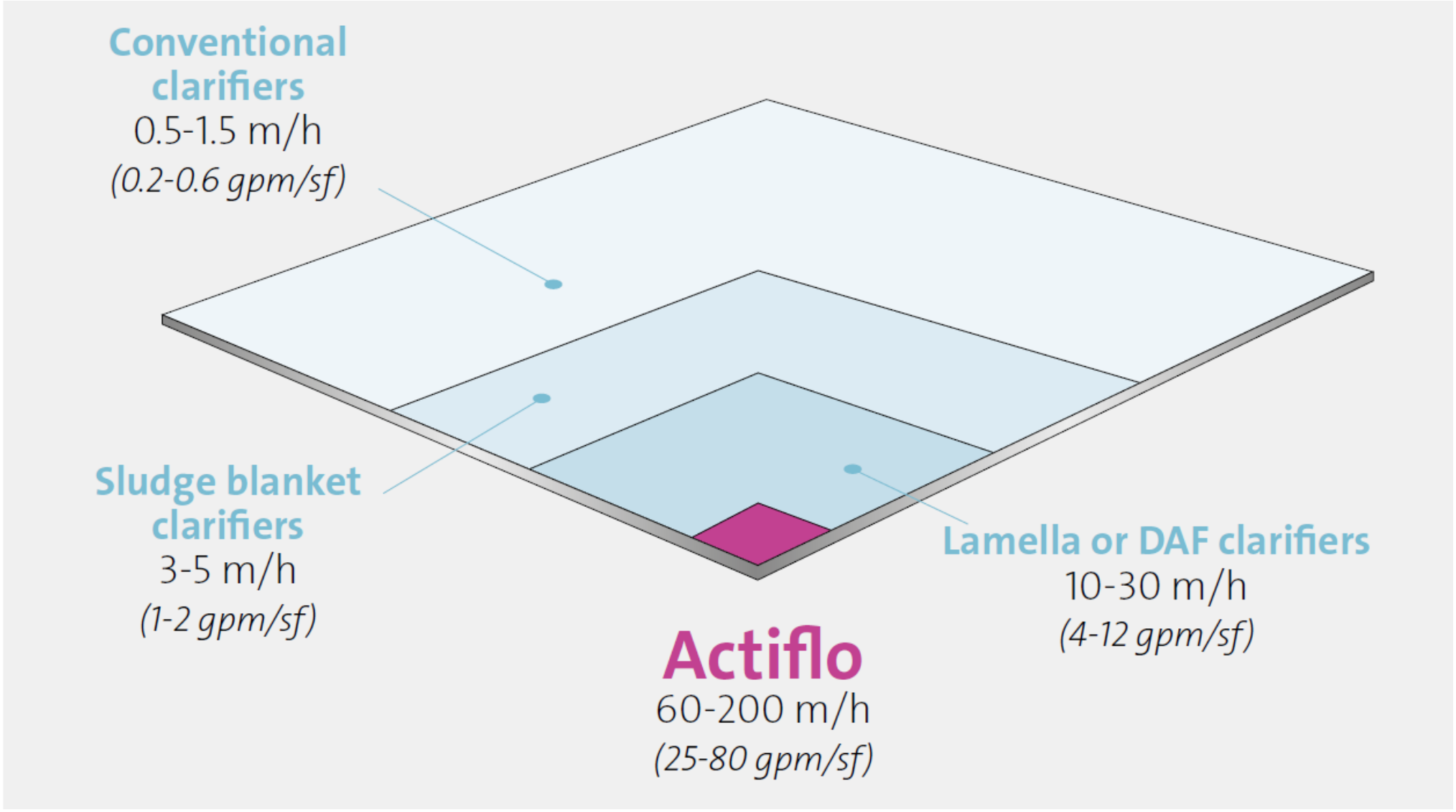


ÇÖKELTME
Sedimentation

Çöktürme TANKLARI YÜZEY YÜKLERİ

Çökelme Tankı	Yüzey Yükü (m/st)
Yatay Akışlı	0.8-2.5
Yukarı Akışlı-Daire	1.25-2.0
Akselatör (Ç.Yataklı)	2-3
Düz Taban Ç. Yatak	2-5
Pulsatör	4-8
Cyclofloc(Mikrokum)	8-9
Actiflo (Mikrokum)	38

ÇÖKELTME HIZLARI



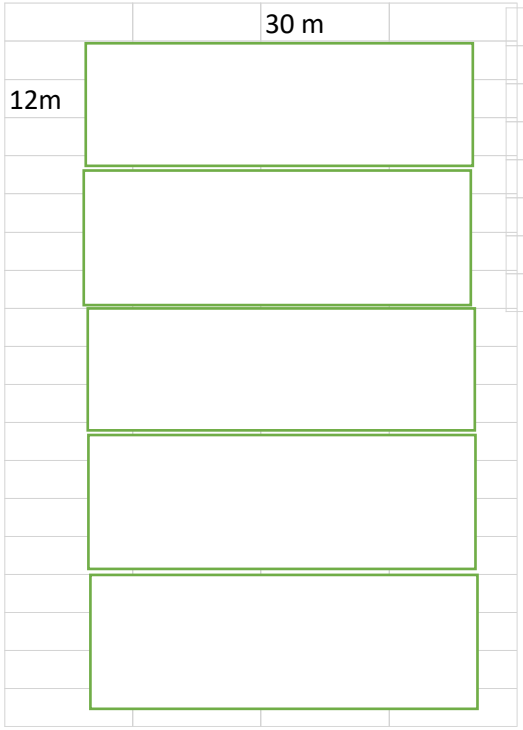
Çökeltme Tankı Seçimi

	m3/d	m3/st	m3/sn	L/şahıs/gün	Şahıs
Q =	86,400	3,600	1	200	432,000

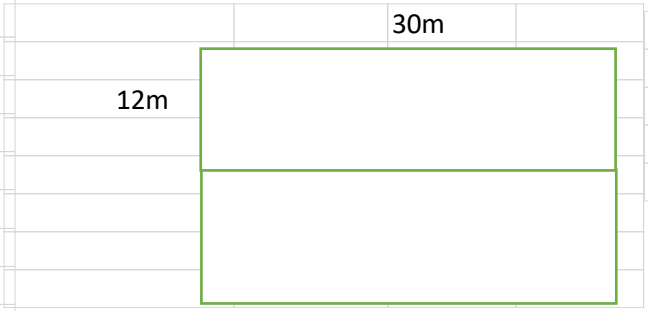
H, m	Savak Y:m3/st/m
4	10

Çökeltme	YüzYük, m/st	Sınırlar	A, m2	Hacim	Kalma Sure, dak	Savak, m
Konvansiyonel	2	(0.5 - 2.0)	1,800	7,200	120.0	360.0
Yuk Akış Çam Batt	5	(3-5)	720	2,880	48.0	360.0
Lamella	10	(10-30)	360	1,440	24.0	360.0
Mikrokum	40	(40-200)	90	360	6.0	360.0

DEĞİŞİK ÇÖKELTME TANKI SEÇİMLERİ

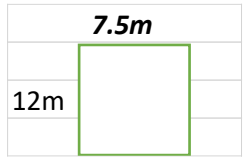


Konvansiyonel
Kalma S: 2 saat



Yukarı Akışlı Çamur
Battaniyesi
Yumaklaşma + Çökeltme
Kalma S: 48 dak

Lamella
Kalma S: 24 dak

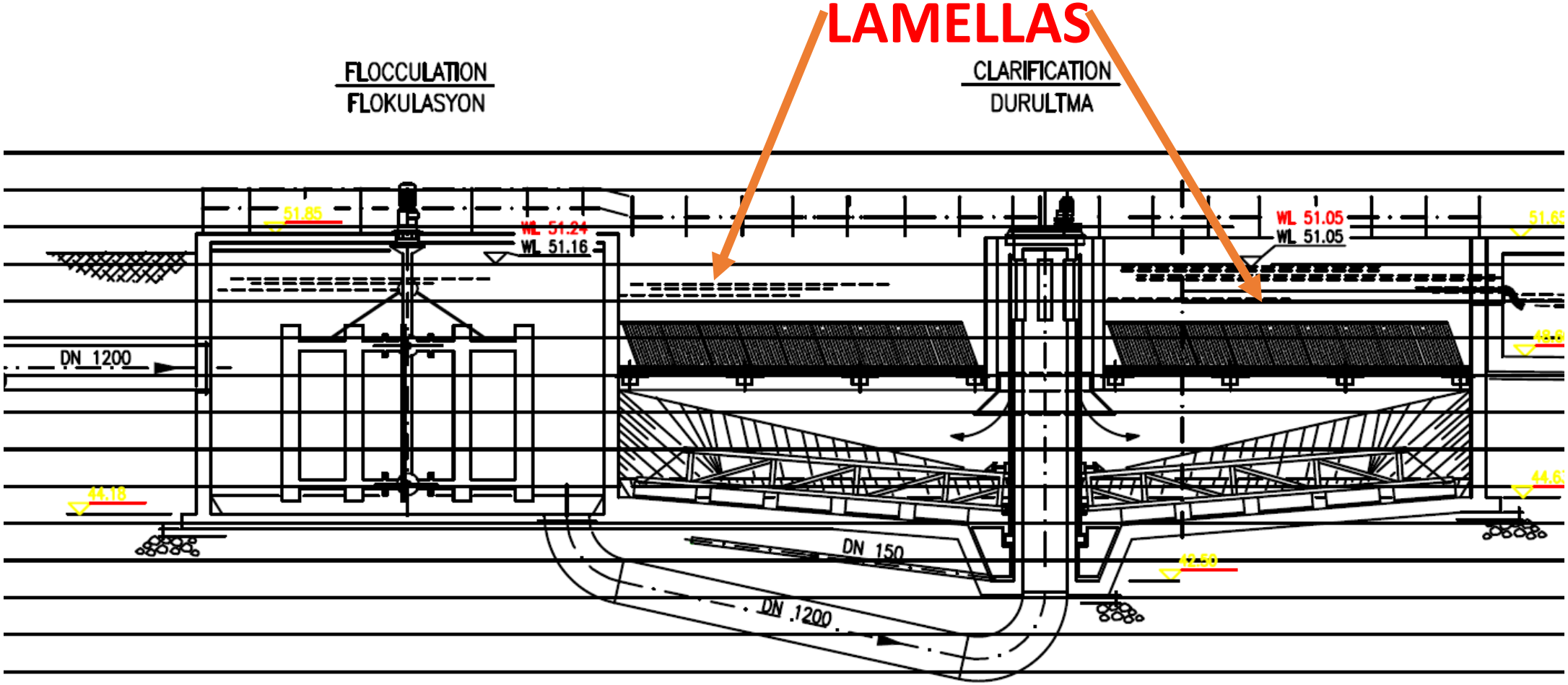


Mikro-kum
Ve Lamella

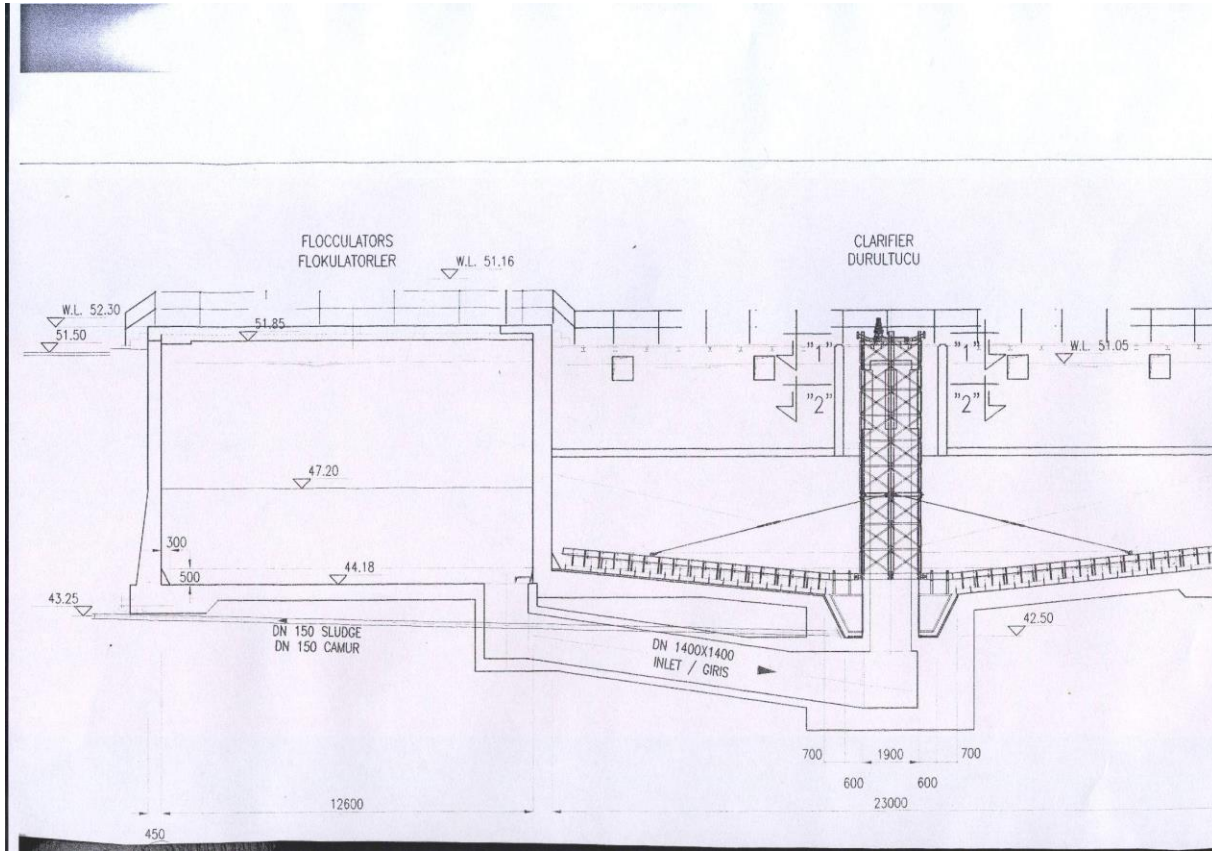
Kalma S: 6 dak

YAVAŞ KARIŞTIRICI VE LAMELLİ ÇÖKELTME

Slow Mix and Lamella Sedimentation



CUMHURİYET SAT ÇÖKELTME

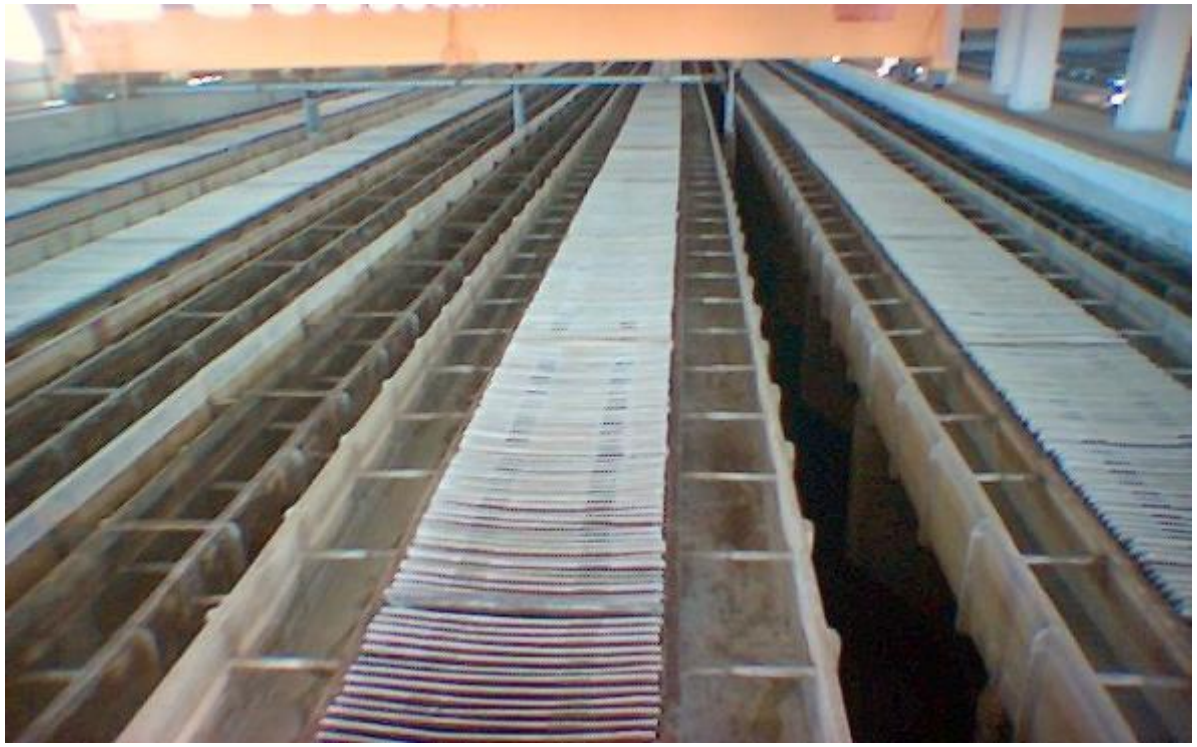


Cumhuriyet Sedimentation

YER PROBLEMİ YOKSA LAMELLA KULLANILMAMASI.

FAZLA BULANIKLIK GELDİĞİ ZAMAN, LAMELLALI ÇÖKELTME TANKI HACMİ KÜÇÜK OLDUĞU ZAMAN, KALMA SURESİ AZ OLDUĞU İÇİN TAM ÇÖKELTME SAĞLANAMAZ.

You may avoid using lamellas if you have enough land area. Lamellas need cleaning and decreasing the volume of the sedimentation tank and decreasing the residence time may cause problems when high turbidity raw water comes.



Ani Bulanıklık Geldiği Zaman Çökeltme Tankında Kalma Suresi Önem Kazanır.

Sedimentation Tank Residence time becomes important when high turbidity water is received.

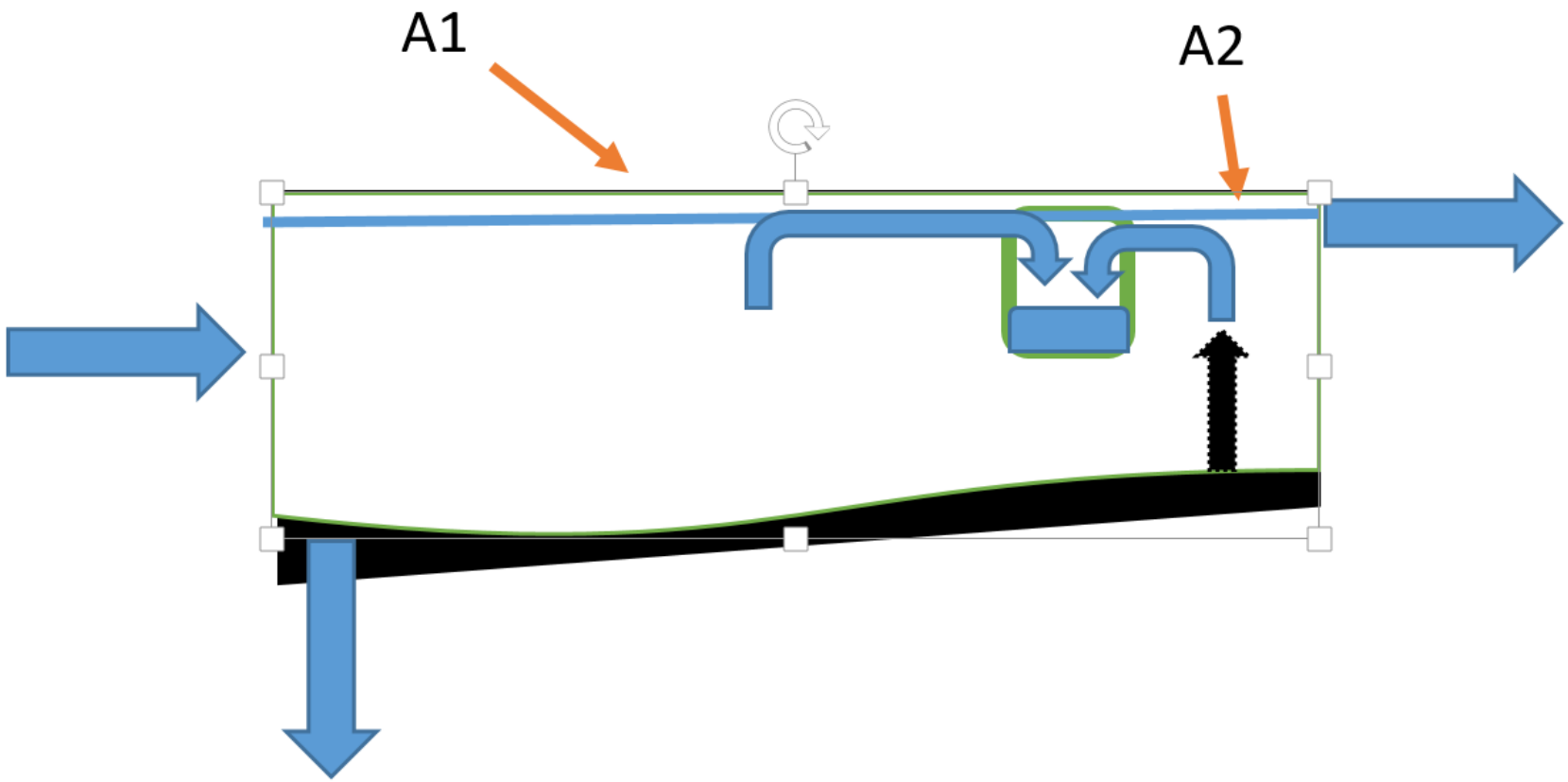
Alan küçüldüğü için savak yüklerini azaltmak için savaklar asılı olarak yapılır. (Savak titremesi)

Since the surface area is reduced, the effluent weirs have to be suspended (weir shaking)

Lameller ve Asılı Savaklar Tank Altına Ulaşılmasını Zorlaştırır

Lamellas and suspended weirs make it difficult to reach the bottom equipment

Savakların Arasındaki Mesafe Yukarı Akış Hızını Etkiler v = Q/A



Değer katılmış teknolojiler (value added technologies) MİKROKUM ve SÜPERPULSATÖRLER


Google Earth
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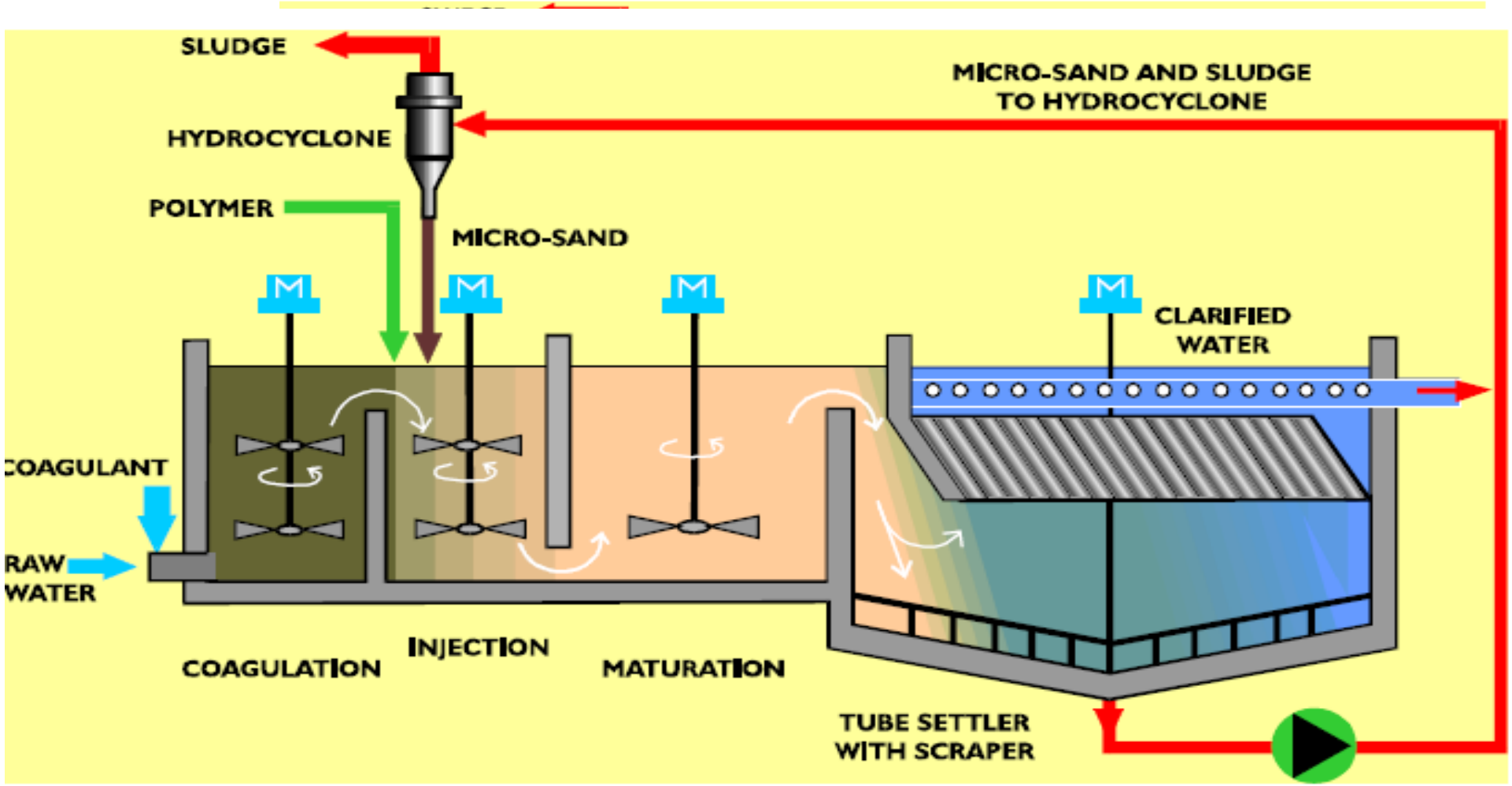
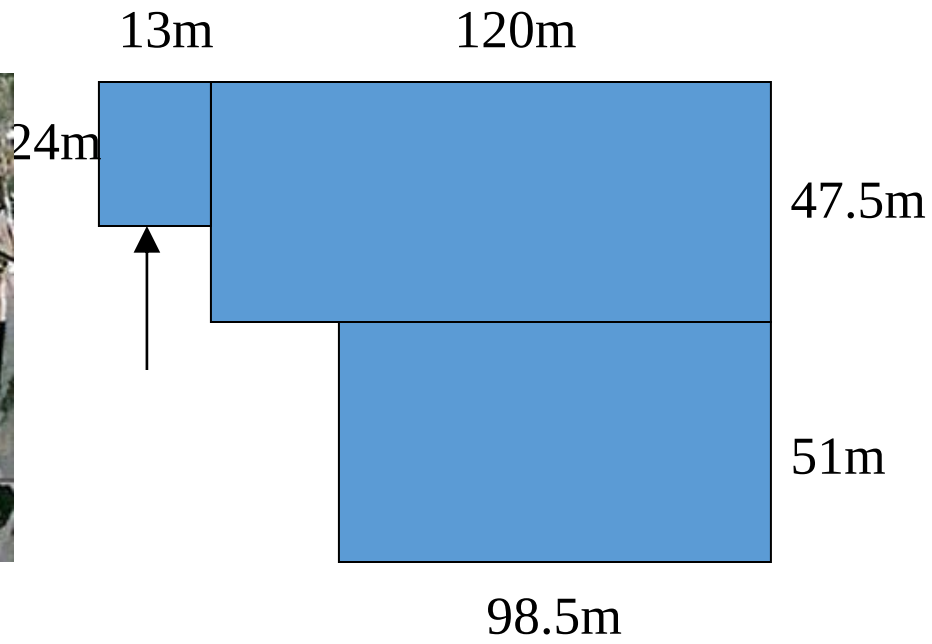
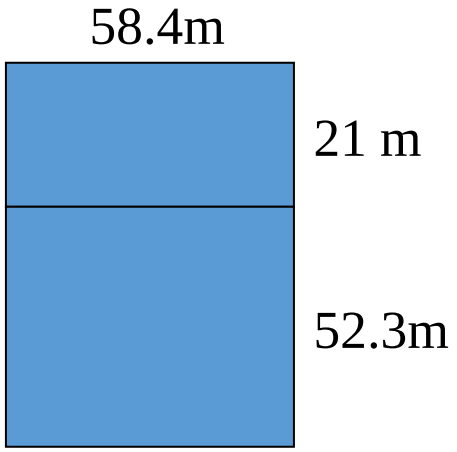
N
200 m


SLUDGE
MICRO-SAND AND SLUDGE
TO HYDROCYCLONE
HYDROCYCLONE
POLYMER
MICRO-SAND
CLARIFIED
WATER
COAGULANT
RAW
WATER
COAGULATION
INJECTION
MATURATION
TUBE SETTLER
WITH SCRAPER





Orhaniye SAT-Ömerli

Q, Debi= 300-378 000 (550 000) m^3/gün

Area: Alan = 11000 m^2

Q/A: Debi başına alan = 0,029m^2/m^3/gün

Muradiye SAT-Ömerli

Debi= 300 000 m^3/gün

Alan = 4300 m^2

Debi başına alan = 0,014m^2/m^3/gün

EMİRLİ - I : SAT YAPIM YILI: 2001, TESİS GİRİŞ DEBİSİ: 525.000 m3/gün, TESİS ÇIKIŞ DEBİSİ: 500.000 m3/gün

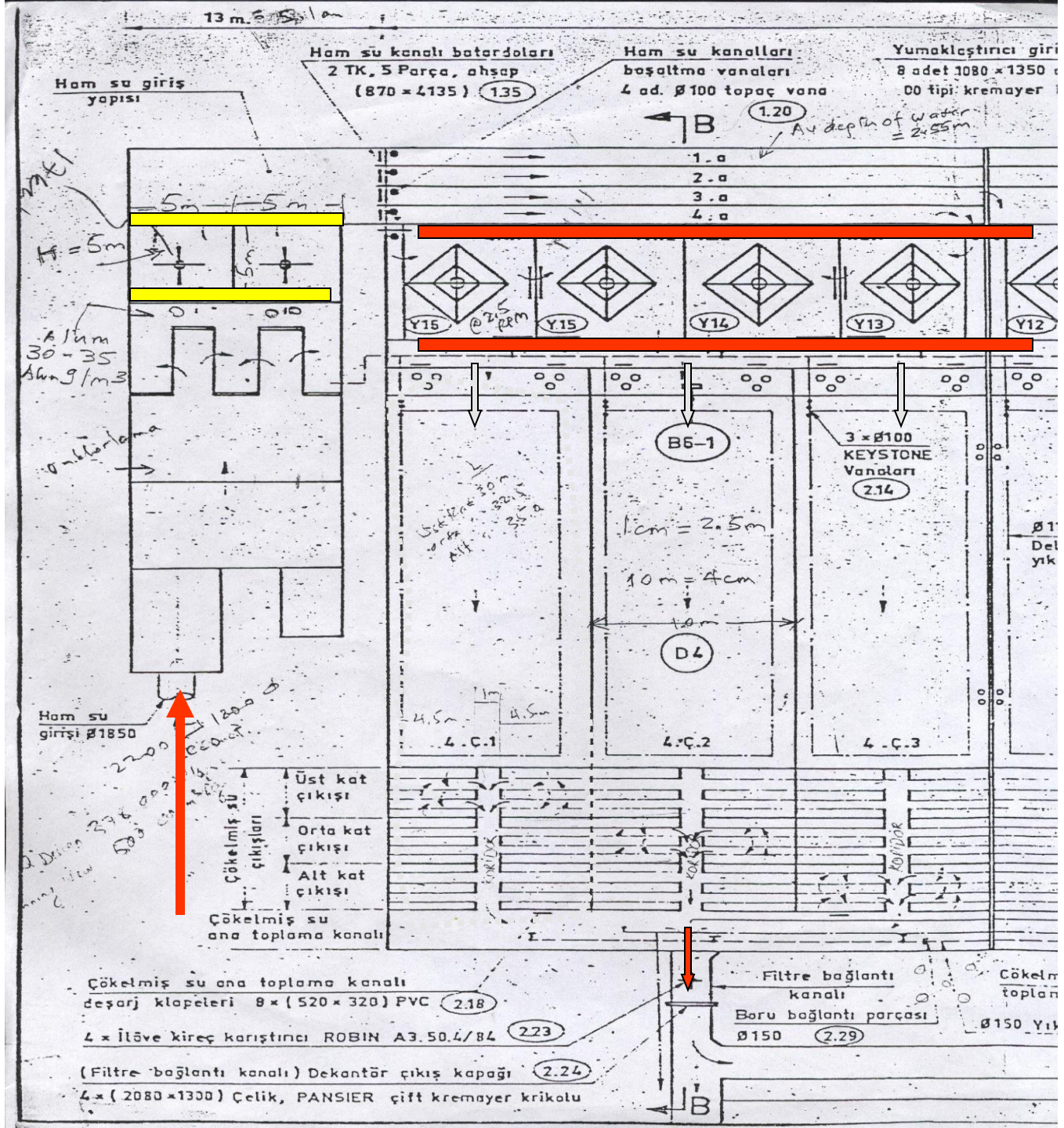
Emirli I WTP Qin: 525 000 m3/d, Qeff: 500 000 m3/d, Construction 2001

EŞİT DAĞITIM

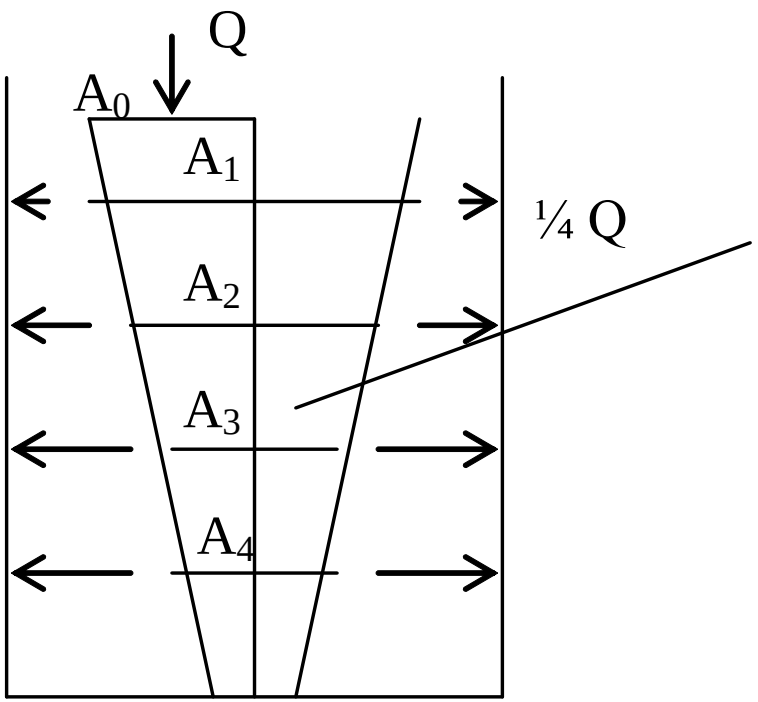
EQUAL DISTRIBUTION

Kağıthane ÇMH SAT


'97 6 18


13 m.
Ham su kanalı bataryoları
2 TK, 5 Parça, ahşap
(870 × 4135) 1.35
Ham su kanalları
boşaltma vanaları
4 ad. Ø100 topaç vana
1.20
Yumaklaştırıcı giri
8 adet 1080 × 1350
00 tipi kremayer
Ham su giriş
yapısı
B
1. a
2. a
3. a
4. a
Y15
Y15
Y14
Y13
Y12
B6-1
3 × Ø100
KEYSTONE
Vanaları
2.14
1cm = 2.5m
10m = 4cm
10m
D4
4.5m
4.5m
4. Ç.1
4. Ç.2
4. Ç.3
Ham su
girişi Ø1850
Üst kat
çıkışı
Orta kat
çıkışı
Alt kat
çıkışı
Çökelmiş su
çıkışları
Çökelmiş su
ana toplama kanalı
Çökelmiş su ana toplama kanalı
deşarj klapeleri 8 × (520 × 320) PVC 2.18
4 × İlâve kireç karıştırıcı ROBIN A3.50.4/84 2.23
(Filtre bağlantı kanalı) Dekantör çıkış kapağı 2.24
4 × (2080 × 1300) Çelik, PANSIER çift kremayer krikolu
Filtre bağlantı
kanalı
Boru bağlantı parçası
Ø150 2.29
B

EQUAL DISTRIBUTION USING TAPERED CHANNEL



Method:

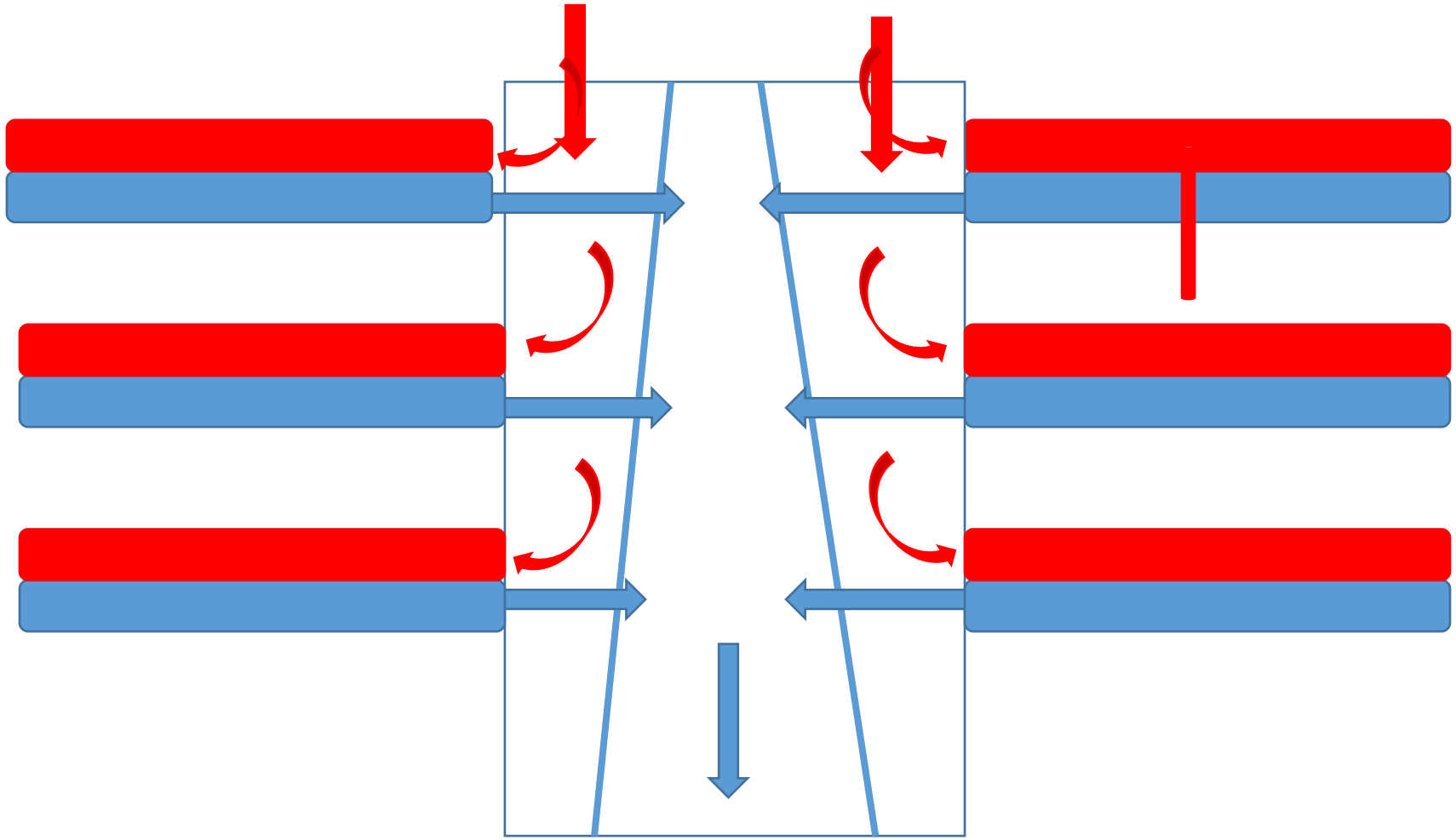
Assume A_3 Calculate $V_3 = \frac{Q_{remaining}}{A_3}$

Calculate the Froude Number

$$Fr = \frac{V_3}{\sqrt{gh}}$$

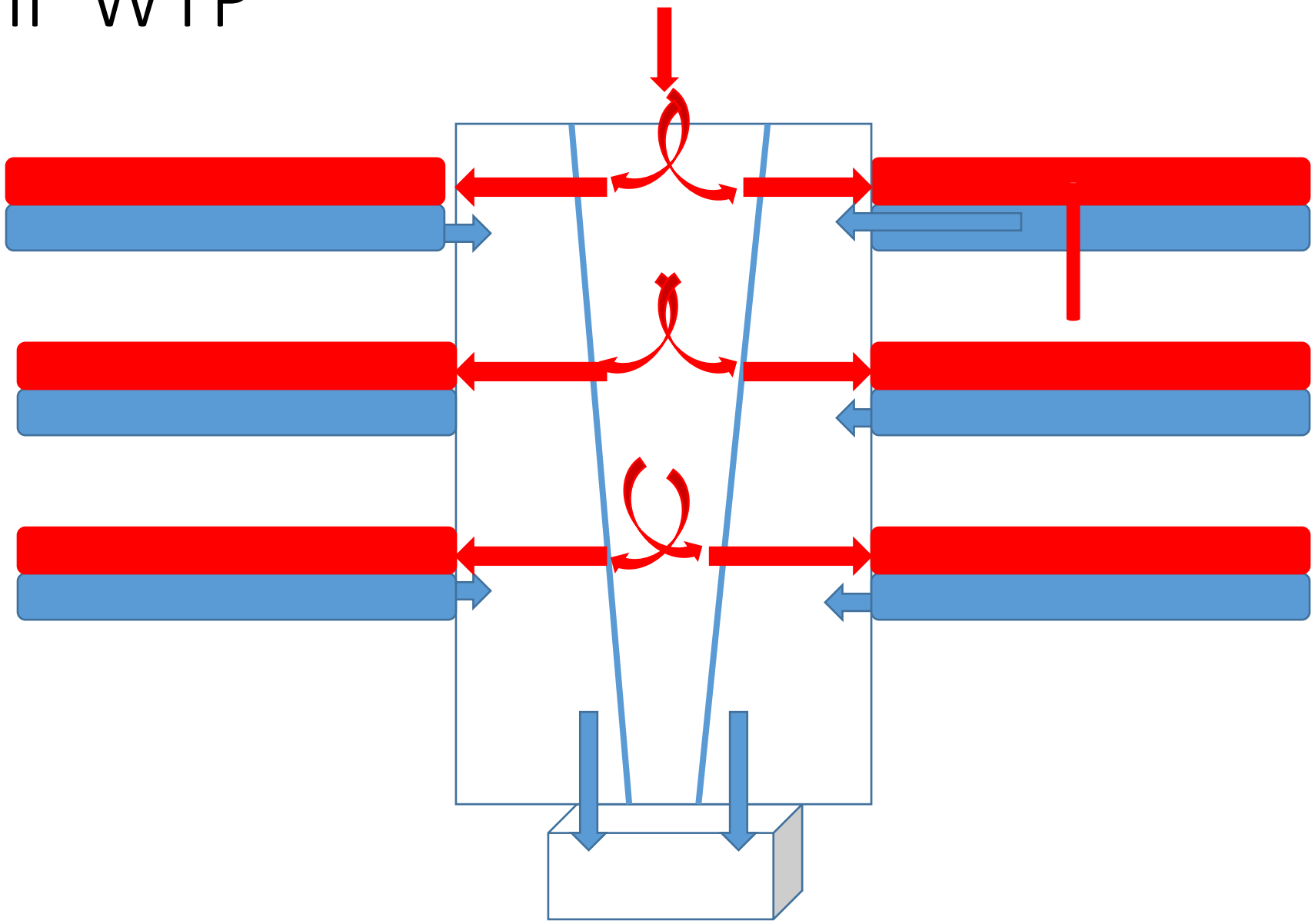
A_3 (or velocity) that gives equal Froude numbers along the decreasing channel area is required for equal distribution.

Eskisehir WTP

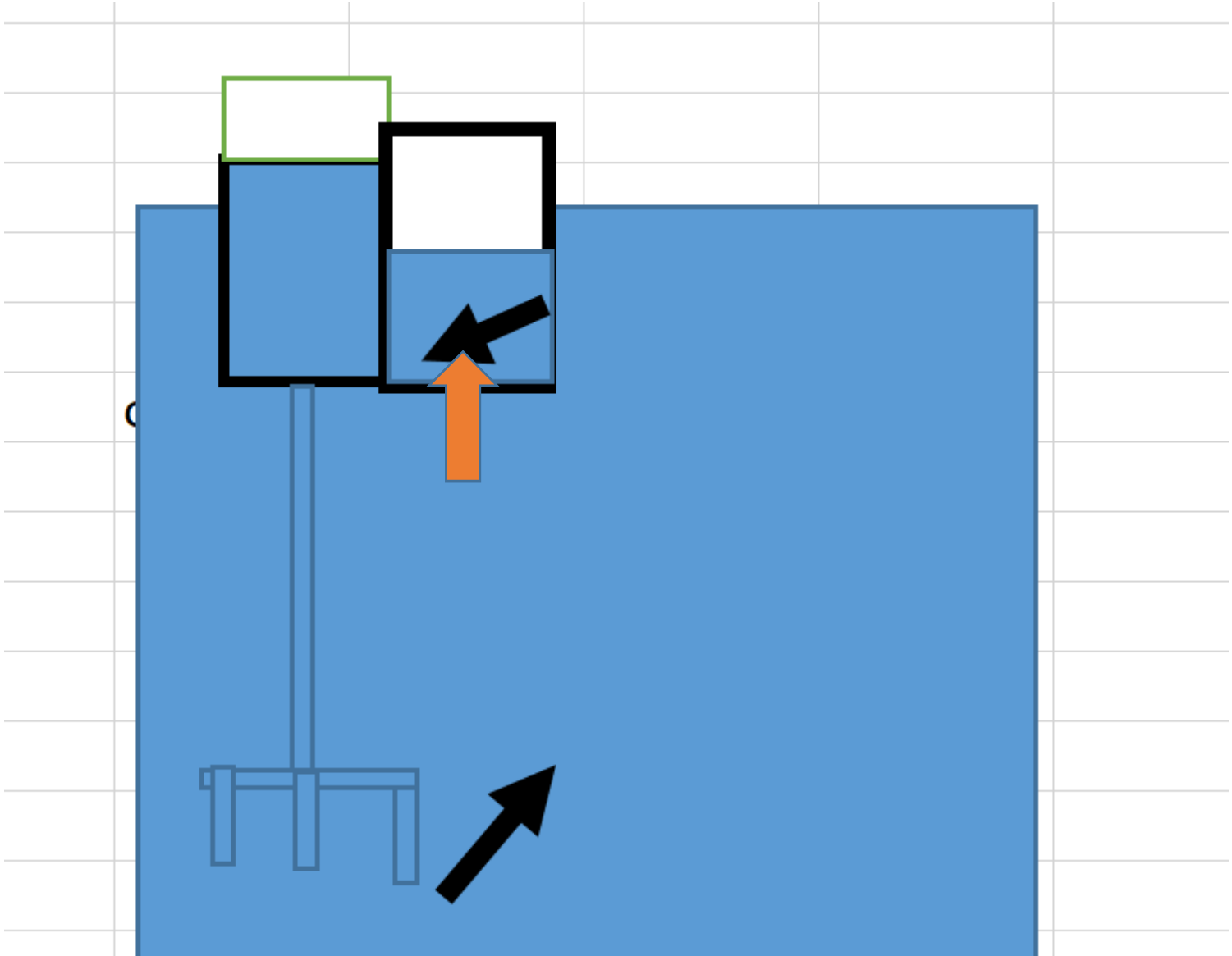


İkitelli SAT

İkitelli WTP



YUKARI AKIŞLI ÇAMUR BATTANİYESİ TEMİZ SI KANALI GİRİŞİ ALTTAN OLMAMALI (İvedik İAT)



KALİBRE ORİFİSLERLE DAĞITIM

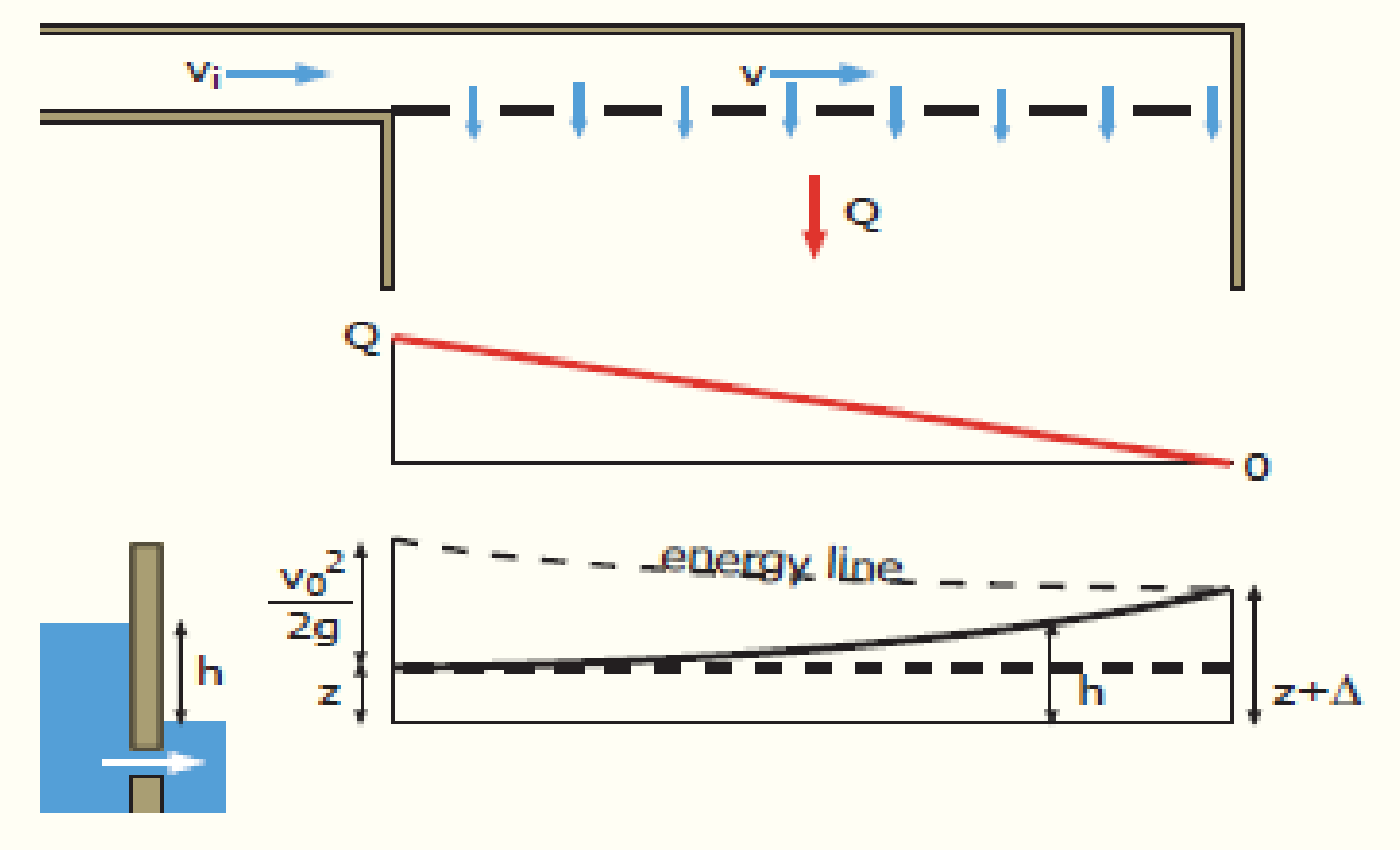
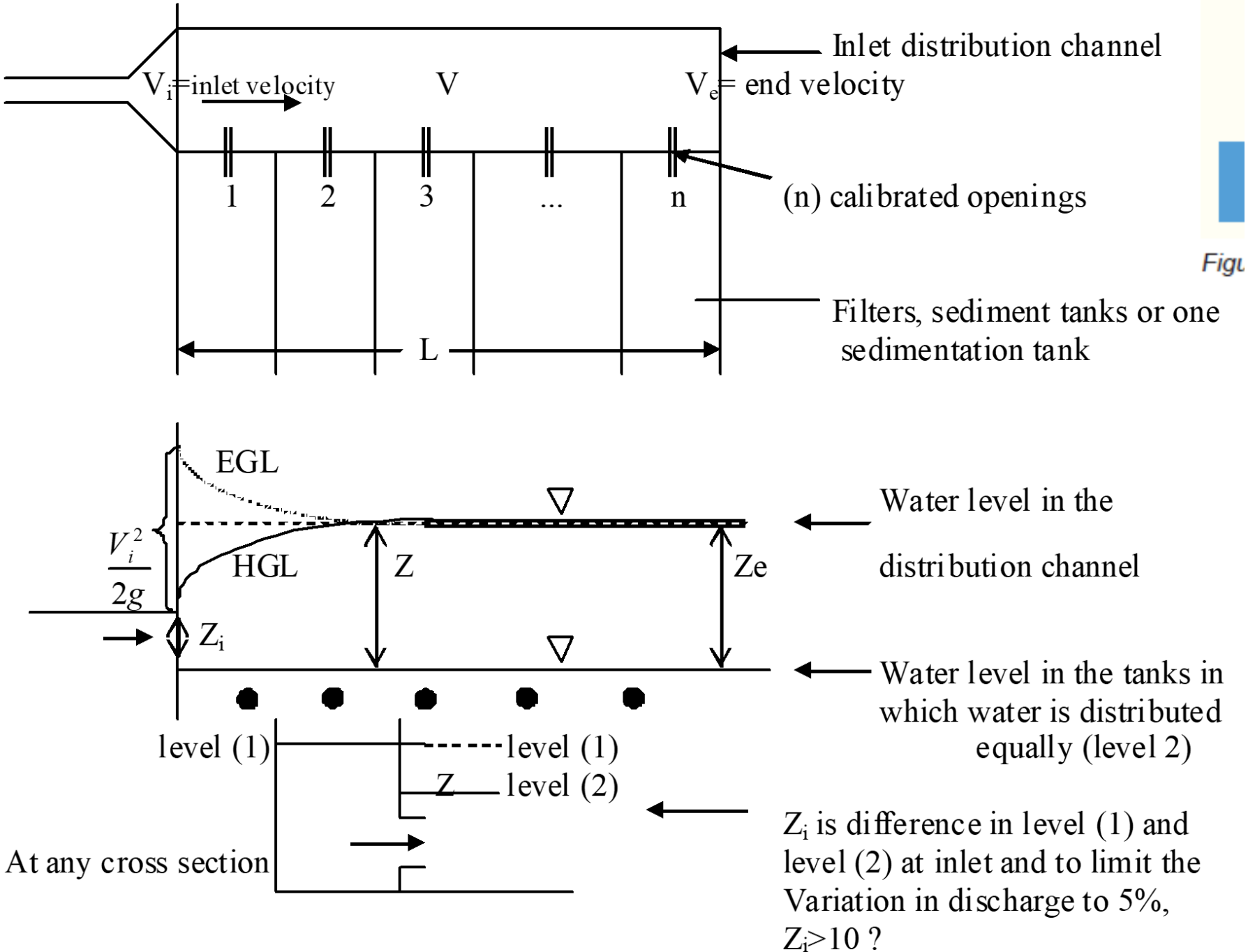


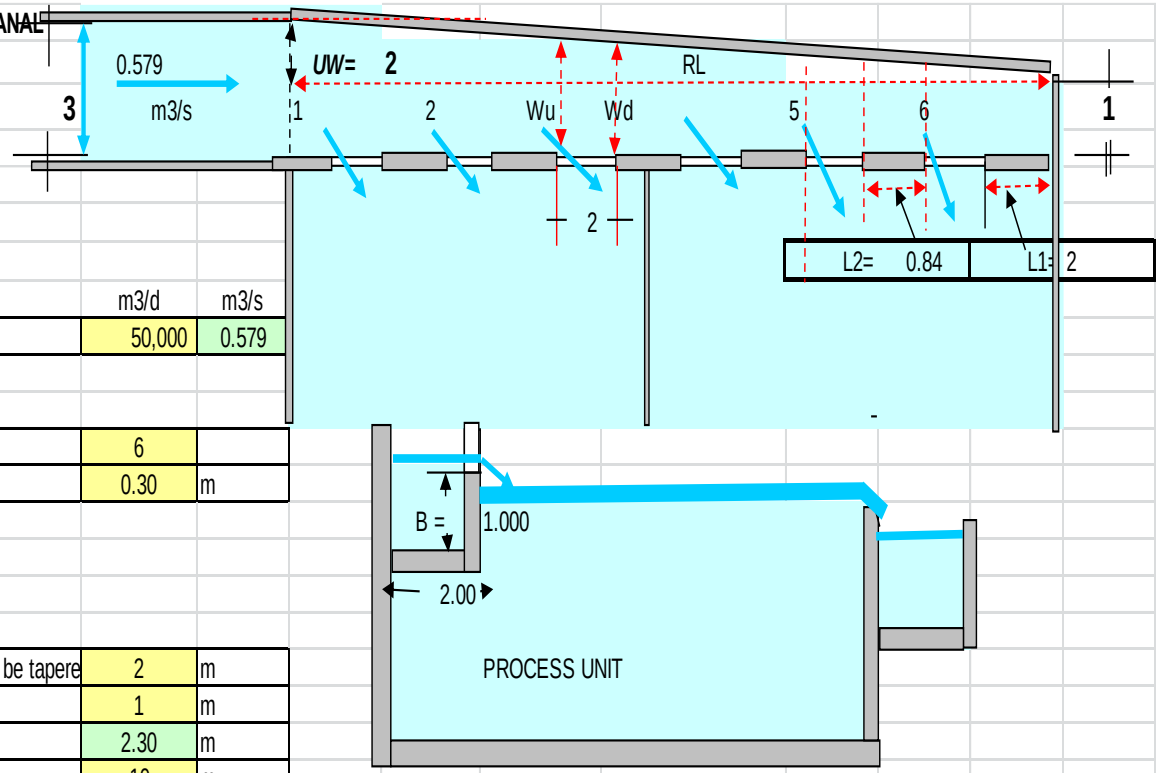
Figure 22 - Diffuser wall


Inlet distribution channel
V_i=inlet velocity
V
V_e= end velocity
1
2
3
...
n
(n) calibrated openings
Filters, sediment tanks or one sedimentation tank
L
EGL
$\frac{V_i^2}{2g}$
HGL
Z
Ze
Water level in the distribution channel
Z_i
Water level in the tanks in which water is distributed equally (level 2)
level (1)
level (1)
Z
level (2)
At any cross section
Z_i is difference in level (1) and level (2) at inlet and to limit the Variation in discharge to 5%, Z_i>10 ?

Equal Distribution: Tapered Channel

EŞİT DAĞITIM: SAVAK KULLANILMASI: DARALAN KANAL

TAKSIM



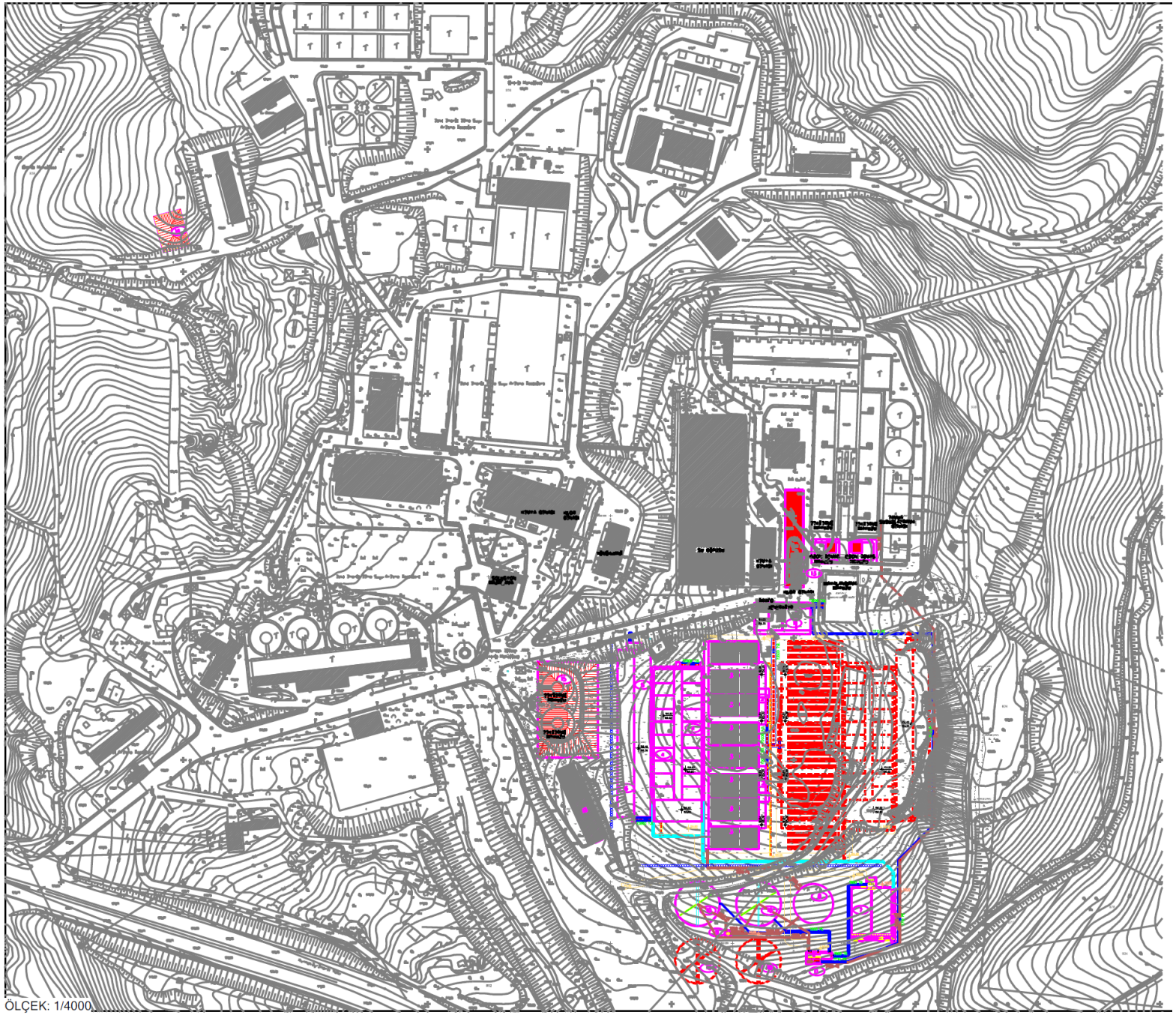
	m3/d	m3/s
Qdes	50,000	0.579

Savaklar		
N = Number of all weirs : Savak Sayısı=	6	
WL: Weir Length: Savak Uzunluğu,m	0.30	m

Distribution Channel		
UW = Width of the rectangular raw waterchannel that will be tapere	2	m
B: The distance from weir crest to the channel bottom=	1	m
CL: Kanal sonundan ilk savak sonuna uzaklık	2.30	m
RL= Length of the channel: Daralan Kanal Uzunluğu	10	m
We=Daralan Kanal Sonundaki Kanal Genişliği	1	m
L1= Girişten veya kanal sonundan ilk savağa olan duvar uzaklığı	2	m
L2= savaklar arası duvar boyu	0.84	m

(qlast-qin)/qin* 100=	-0.382	<5 % OK

Width at the orifis n = (UW/RL) *CL



ÖLÇEK: 1/4000


ÖMERLİ EMİRLİ 2. KADEME İÇME SUYU ARITMA TESİSİ AÇILDI
İstanbul Büyükşehir

İÇME VE ATIKSU HİDROLİĞİNDE KULLANILAN 16 DENKLEM

FINDIK KABUĞUNDA HİDROLİK TATBİKATI- Applicaton of Hydraulics in a Nut Shell

VERİLER

Q: Flowrate,Debi, m3/s,		0.1	eps: Roughness Coefficient,, I	eps=	0.001	
D: Diameter,Çap, m		1	K: minor loss coefficient	K=	2	
L: Lenghth of channel,Kanal uzunluğu, m,		15	T: Temperature,Sıcaklık, C	T=	20	C
B= Width of rectangular channel,Savak genişliği veya açık kanal genişliği,ı		1	e:porosity	e=	0.4	
A: Area of orifice (orfis alanı)		1	n: number of orifices	n=	30	
S: Slope		0.001	n-Manning:	n-Manning	0.015	
h: Submerged weir downstream height over the weir, Batıksavak mansap savak üstü su s		0.3				
hD: The h/D ratio in partially flowing sewer		0.6				
v: velocity	v=	0.002778				
dp: particle diameter	dp=	1.00E-03				

SONUÇLAR

1	***sweir(Q,B,H)*** : Submerged Weir (Batık Savak)			**0.3115**		
2	***rweir(Q,B)*** : Rectangular weir (Dikdörtgen Savak)			0.1462		
3	***hKanal(Q,B,L,h):*** Kanaldaki yük kaybının Manning Denklemiyle hesaplanması (n=0.015). h kanaldaki ortalam su			0.302329548		
4	***hf(Q,D,L,eps,T)*** : Friction Losses in pipes (Borularda sürtnme kayıpları)			0.000269025		
5	***orificeh (Q,A)*** : Submerged Orifice Headlloss (Batık orifis Yük Kaybı)			0.00136975		
6	***hm(Q, D, K):*** **Minor losses, Yersel yük kayıpları**			0.001652537		
7	***dc(Q,B)*** : Critical Depth (Kritik derinlik)			0.100641476		
8	***hup(Q,B,L)*** : Height of Water Upstream of a channel (Kanal içerisindeki suyun Menba kısmında ki su yi			0.197510966		
9	***vwier(Q)*** : V-weir (V-savağı)			0.341746466		
10	***HKozeny(L, v, dp, e, T)***			4.31766055	m	
11	***EDOrificeA(Q, B, L, n)***	Equal Distribution (ED) to n tanks using calibrated orifices of Area A		0.003825902	m2	
12	***hDManning(Q;D; S; n)***	Calculate h/D in a partially flowing sewer	Saatci Eqn ---->	0.271496183	0.27	<--Trail
13	***QManning(hD;D; S; n)***	Known: h/D, D,S, n Calculate: Q		0.441404009		
14	***DManning(Q;hD; S; n)***	Known:Q, h/D, S ,n Calculate: D		0.573041926		
15	***SManning(Q;D;hD; n)***	Known: Q, D, h/D, n Calculate: S		5.13248E-05		
16	***Function VManning(Q, D, hD)***			0.090043298		

FİLTRASYON

Fe ve Mn la Kaplanan Filtre Kumu üzerindeki Fe ve Mn Auto-Katalizör dür.

The filter sand covered with Mn and Fe acts as an autocatalyzer

FİLTRE GİRİŞLERİ İÇİN ELEKTRO-MEKANİK SİSTEME İHTİYAÇ DUYMAYAN BASİT GİRİŞLER KULLANILABİLİR. (MURADİYE SAT)

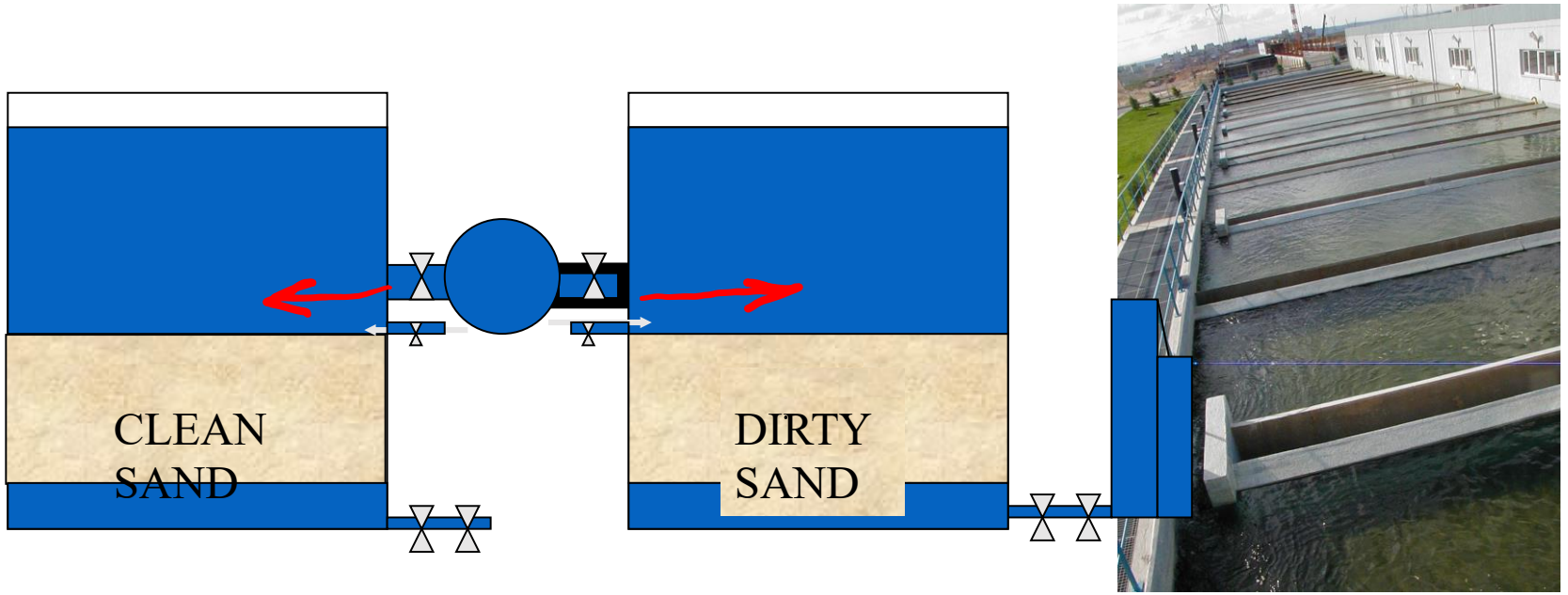
There are simple solutions to filter inlet gates. Filter raw water inlets without any electro-mechanical devices. Air may be distributed without air pipes.

FİLTRELERDE HAVANIN DAĞITILMASI İÇİN FİLTRE ALTININ PASLANMAZ ÇELİK BORUYLA KAPLANMASI GEREKMEZ.

Air can be distributed evenly under the filters without the use of statinless steel pipes

FİLRE GİRİŞLERİ MİNİMUM SU SEVİYESİ ALTINDAN YAPILIRSA KİRLİ FİLTRENİN YÜKÜ TEMİZ FİLTREYLE PAYLAŞILIR.

Enter a filter below the minimum water level so that the dirty filter shares its load with the clean filter

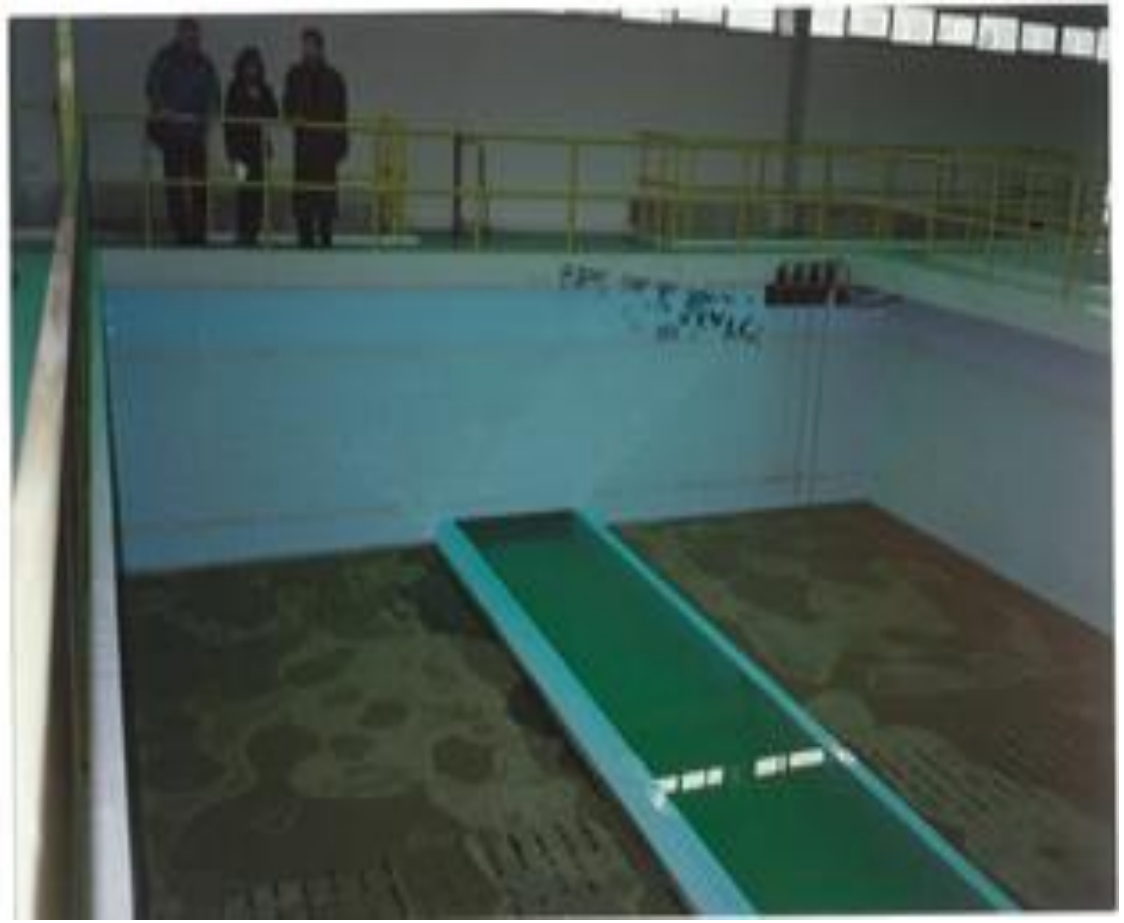


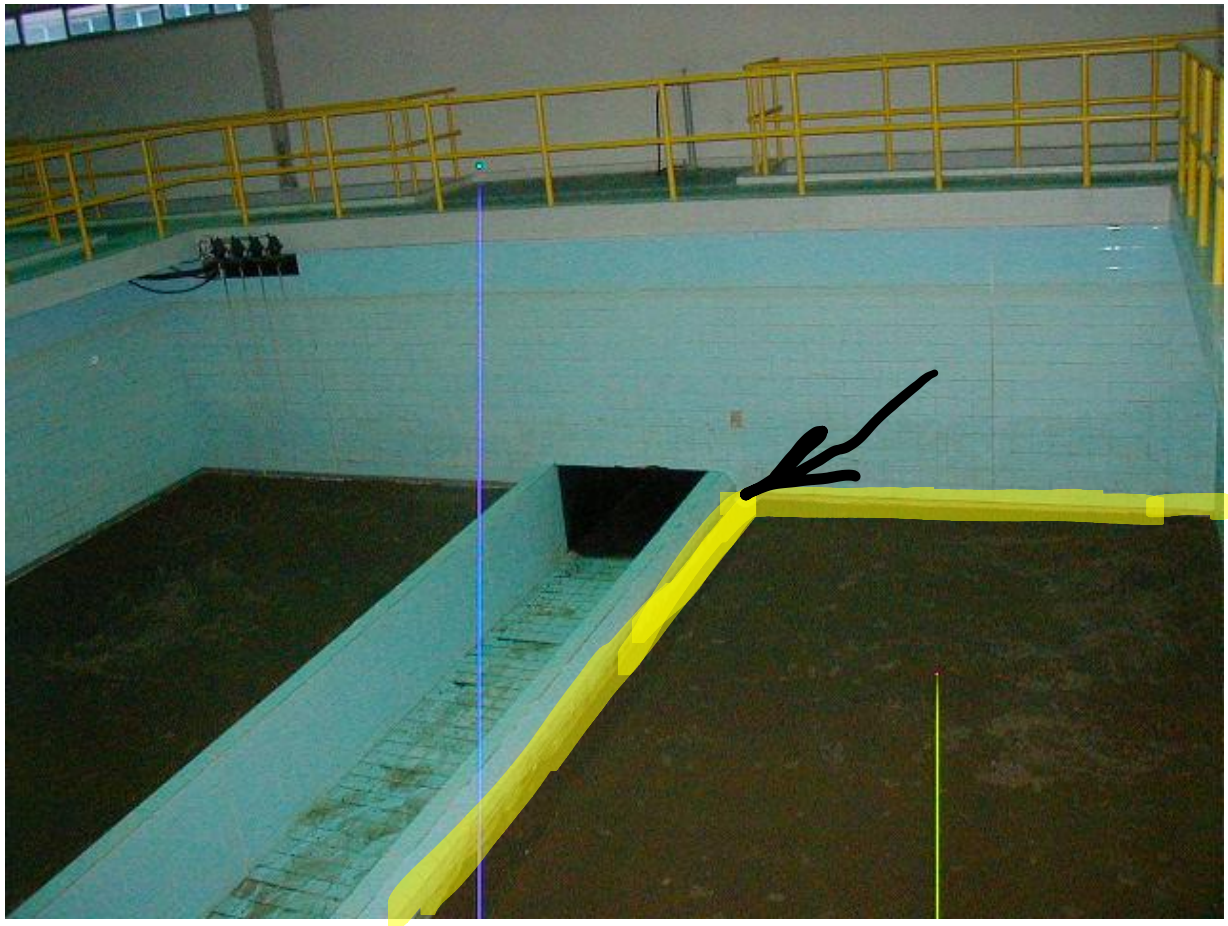
AZALAN DEBİLİ FİLTRE KULLANARAK BULANIKLIK SIÇRAMALARI GİDERİLEBİLİR VE PAHALI ÇIKIŞ KONTROL VANALARINA İHTİYAÇ KALMAZ

Use minimum automation. Declining rate filters. Filter effluent can be an on-off valve.

GERİ YIKAMA SAVAĞI KUM TUTUCU OLARAK KULLANILABİLİR. KUM ÜST SEVİYESİYLE GERİ YIKAMA SAVAĞI ARASINDA KUM KAÇMAMASI İÇİN YETERLİ SEVİYE BIRAKILMALIDIR.

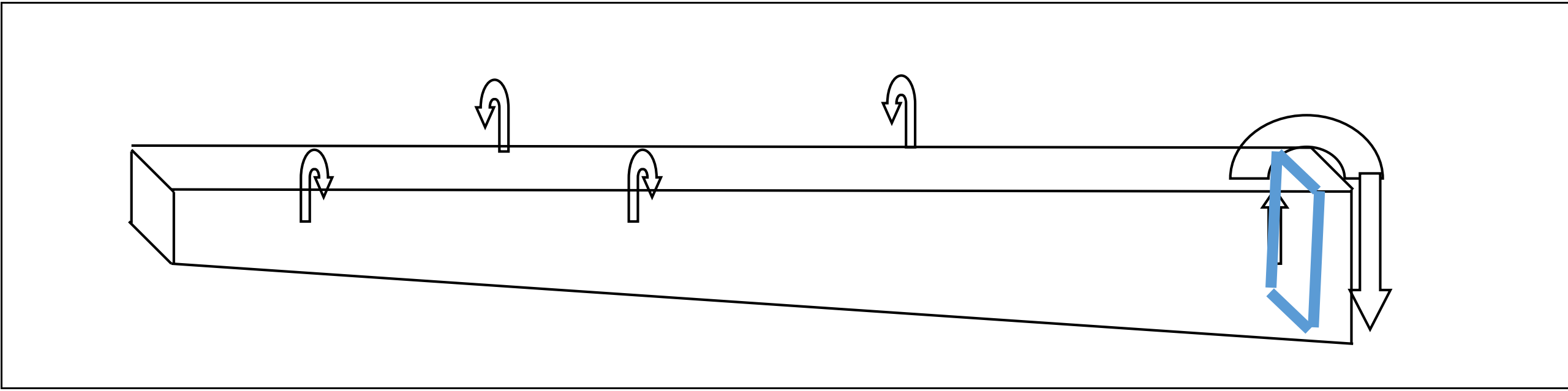
Leave enough height between the backwash trough and the top of the sand not to loose sand during backwash. The backwash water trough can be used as a sand trap





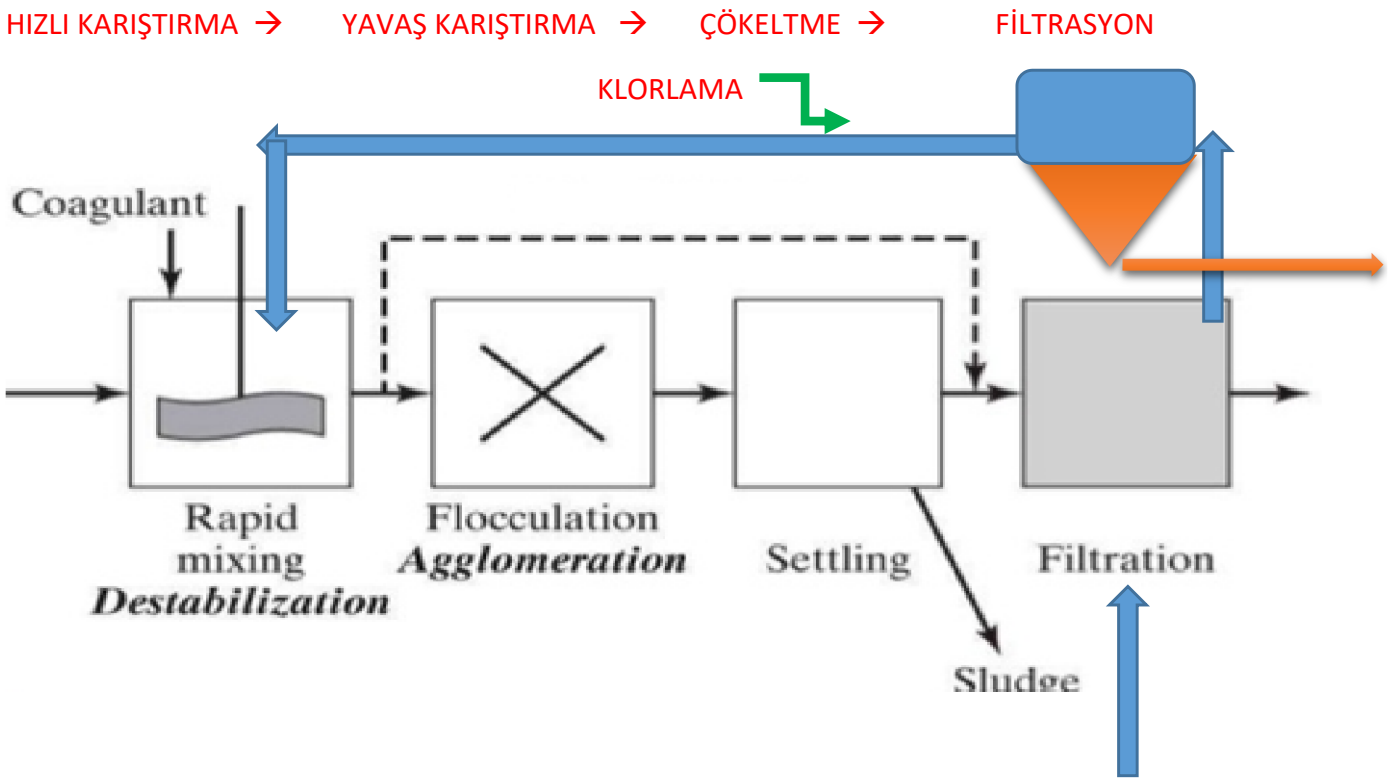
Geri Yıkama Savaklarının Kum Tutucu Olarak Kullanılması

Use of Backwash Troughs as Sand Trap.



FİLTRASYON GERİ YIKAMA SUYU ÇÖKELTİLİP DEZENFEKTE EDİLİP TESİSİ BAŞINA GERİ ÇEVRİLMELİDİR.

The filter backwash water should be settled and the supernatant should be disinfected before sending back to the inlet of the plant.



Filtrelerde Negatif Yük Kaybı Oluşmaması İçin Filtre Kontrol Savağı Kumun Altında Olmamalıdır.

Filter effluent control weir should not be below the sand level not have negative headloss in filters

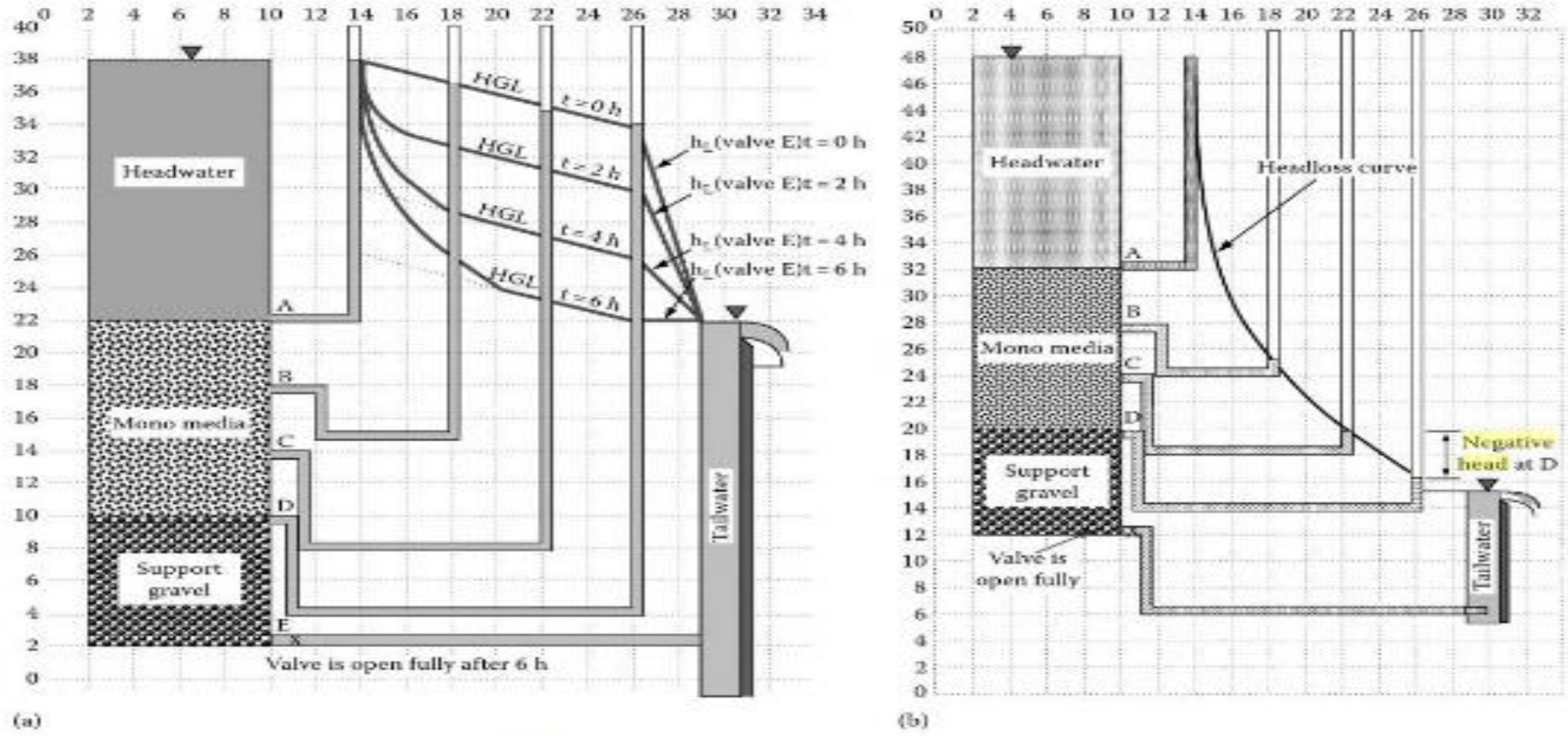


FIGURE 12.40 Effect of media clogging filter bed on hydraulic gradient for two conditions. (a) Tailwater at level of bed surface. (b) Tailwater below level of bed surface (Equation E.6). (Reprinted from Mackay, D. J., *Opflow*, 14(11), 1, 1988b. With permission. Copyright © 1988, American Water Works Association.)

FİLTRE ÇIKIŞ KANALINA KLOR EKLENDİĞİ DURUMLARDA, KLOR GAZI TEMİZ SU GİRİŞ BORUSU ETRAFINDAN SIZIP, ALETLERİN PASLANMASINA SEBEP OLABİLİR.

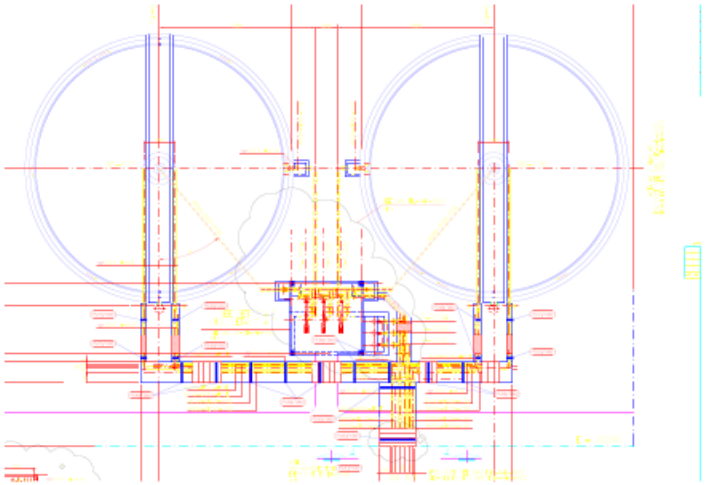
When the filter effluent channel is chlorinated the Cl_2 gas escapes into the pipe gallery (during B/W) and causes corrosion.

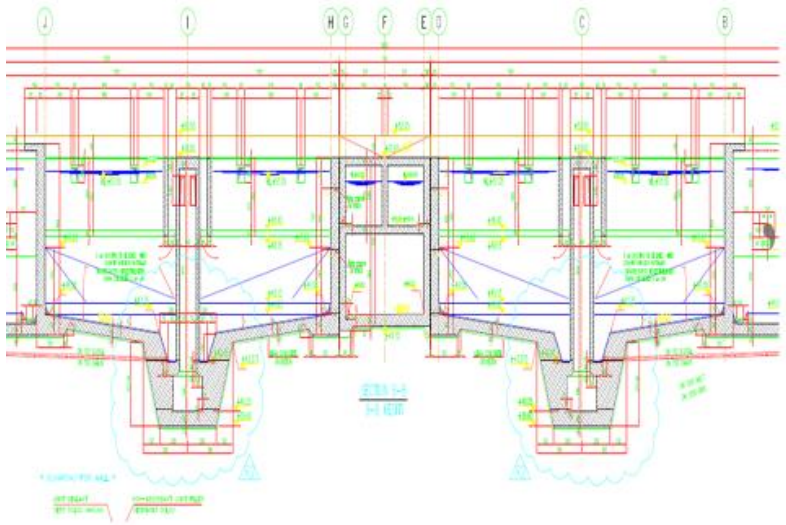
ÇAMUR UZAKLAŞTIRMA

Çamur Yoğunlaştıma Tankı Katı Madde Yükü 25-30 kg/m^2/gün olmalıdır.
Solid Loads to Gravity Thicheners should be (25-30 kg/m^2/day)
Cumhuriyet WTP:

	2 adet Yoğunlaştırıcı çapı, m	Alan, m^2	KM yükü kg/m^2/gün
Eski Raporda Kullanılan	22.5	795	126
İnşaa Edilen Değerler	27.5	1188	84
Olması Gereken	46	1662	30 (25 – 30)

CUMHURİYET CAZİBELİ ÇAMUR YOĞUNLAŞTIRICILARI

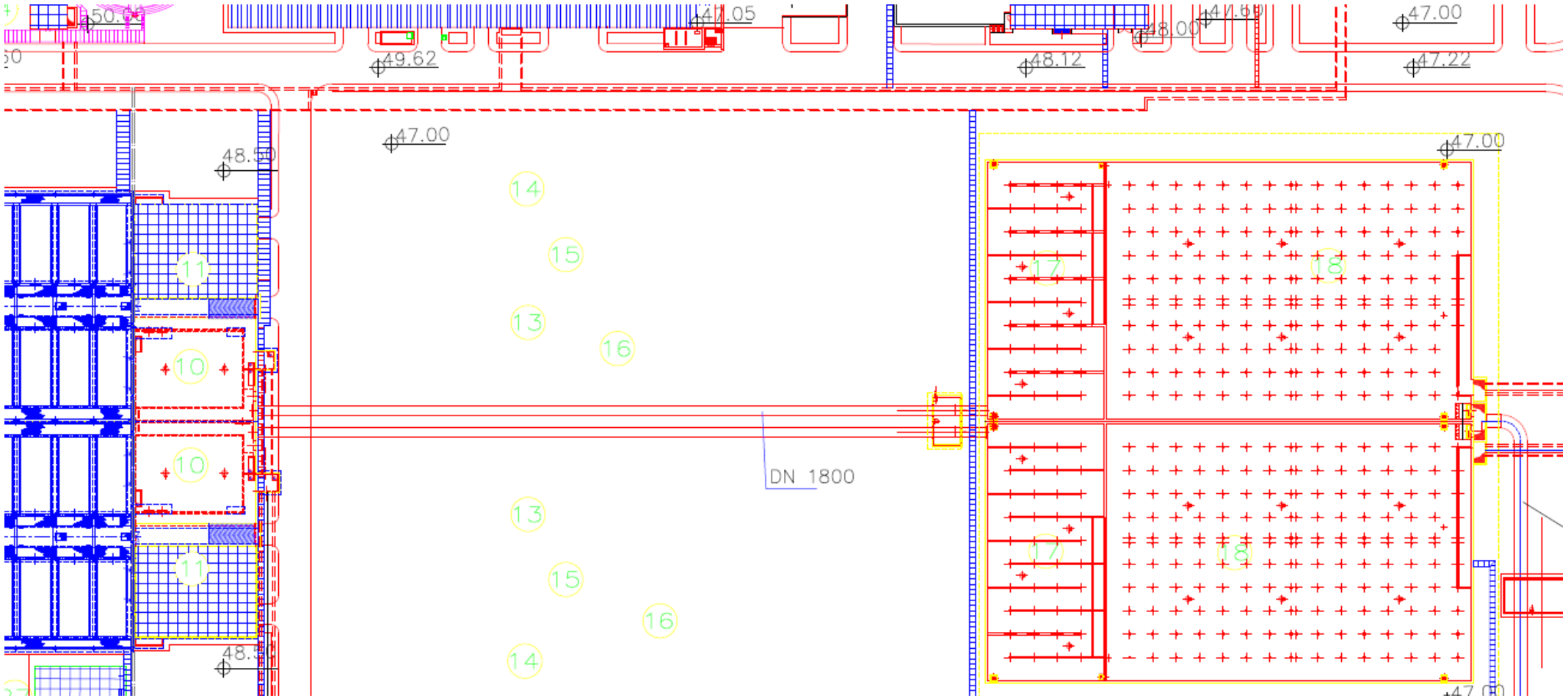




DEZENFEKSİYON (KLORLAMA)

CUMHURİYET SAT KLORLAMA TANKI

Cumhuriyet WTP Chlorination



PERDE SAYISI ARTTIKÇA ÖLÜ BÖLGELER AZALIR

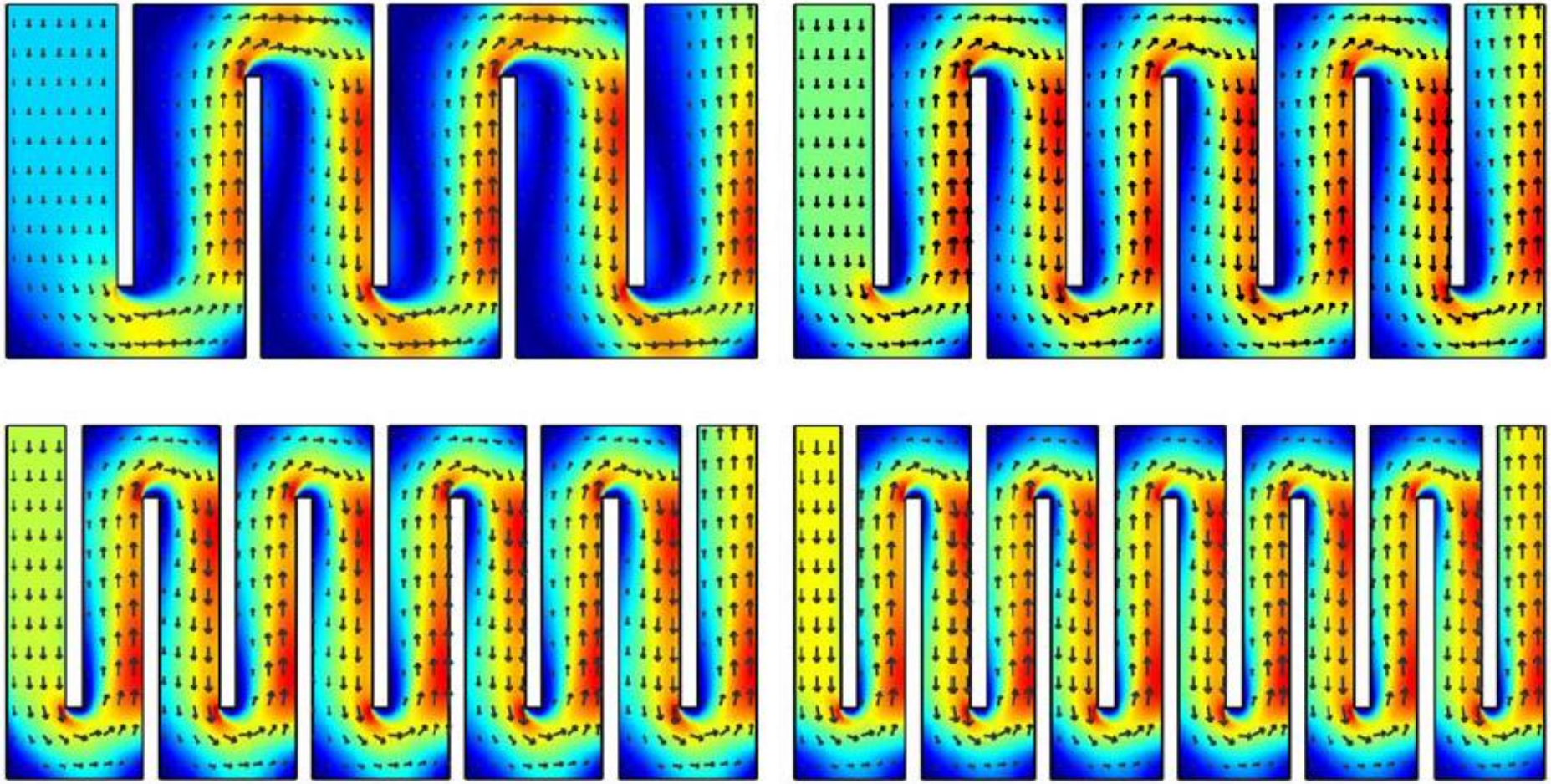


Figure.2. Simulated flow field and velocity vectors in the tanks with 5, 7, 9 and 11 baffles

10 000 VİRÜSÜ 1 VİRÜSE İNDİRMEK İÇİN (4 log kill) GEREKLİ KLOR DOZAJI x KALMA SURESİ TABLOSU

Table B-2 – CTreq values for 4-log virus inactivation of viruses by free chlorine in mg/L•min

Temperature (°C)	pH	
	6-9	10
0.5	12	90
5	8	60
10	6	45
15	4	30
20	3	22
25	2	15

PERDE FAKTÖRÜ (EPA)

Table 3-2 – Baffling Factors

Factor	Description
0.1	None, agitated basis, very low length to width ratio, high inlet and outlet flow velocities. Enclosed circular or rectangular tank with single inlet and outlet line. Enclosed circular or rectangular tank with inlet on top and outlet on the bottom, either directly below or on the same side as the inlet line.
0.3	Single or multiple unbaffled inlets and outlets, no intra-basin baffles. Enclosed circular or rectangular tank with inlet on top and outlet on the bottom on the opposite wall.
0.5	Baffled inlet or outlet with some intra-basin baffles.
0.7	Perforated inlet baffle, serpentine or perforated intra-basin baffles, outlet weir or perforated launders.
1	Very high length to width ratio (pipeline flow), perforated inlet, outlet, and intra-basin baffles.

İÇME SUYU ARITMA TESİSLERİ HAKKINDA TAVSİYELER

1. Alış ağızları kademeli ve ulaşımı kolay yapılmalıdır.
2. Kaskat havalandırma su düşüş yüzey alanı mümkün olduğu kadar fazla olmalıdır.
3. Kaskat havalandırma ve filtrelerin üstünün kapatılması H_2SO_4 oluşturup elektronik alete zarar verebilir.
4. Ozon temas tankı suyunun ozon jeneratörüne geri gelmemesi önlemleri alınmalıdır.
5. Serbest düşüşle hızlı karıştırma yapılabilir. İstenen G değerlerini elde etmek için düşüş hacmi küçültülebilir.
6. Yumaklaşma, klorlama vb. tanklarda ölü bölge bırakılmamalıdır.
7. Yumaklaşma çıkışı hızlar, yumakların kırılmaması için 0.3 m/s civarında olmalıdır.
8. Lamel ve mikro-kum çökeltmeleri ancak çok yer sıkıntısı varsa tercih edilmelidir.
9. Filtre hamsu girişi minimum su seviyesi altında olduğu zaman, kirli filtrenin yükü temiz filtrelerce paylaşılır.
10. Filtrelerin çıkış suyu bulanıklık sıçramaları kontrol edilmelidir. Azalan debili filtrelerin kontrol sistemi daha basittir ve bulanıklık sıçramalarına sebep olmaz.
11. Filtrelerin değişik katmanlarındaki yük kayıpları ölçülerek filtrelerin ne kadar derin yatay filtresi olarak kullanılabildiği izlenmelidir. Filtrelerde Negatif Yük Kaybı Oluşmaması İçin Filtre Kontrol Savağı Kumun Altında Olmamalıdır.
12. Çamur çökeltme ve filtre geri yıkma suları çökeltilmeli ve üst suları dezenfekte edilip geri verilmelidir.
13. Çamur yoğunlaştırıcıları KM yükleri 25-30 kg/m2/gün arasında olmalıdır.


drink
more
water!

Questions?