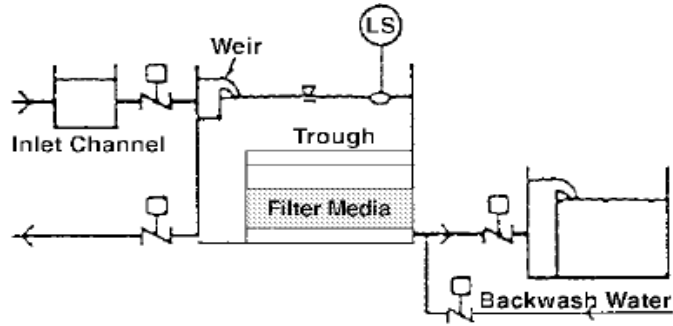


Filtration: Rate Control

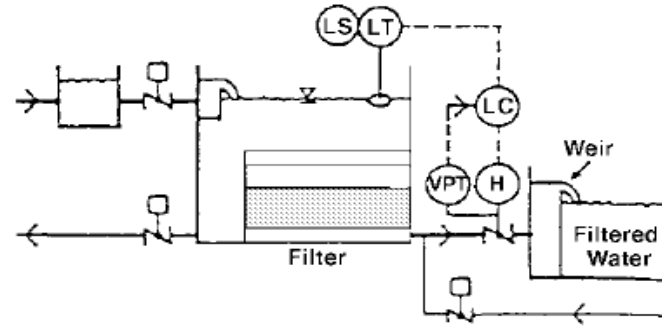
Filtrasyon Hız Kontrol Metodları

Dr. A. Saatci

Filtre Çıkış Suyu Kontrolü



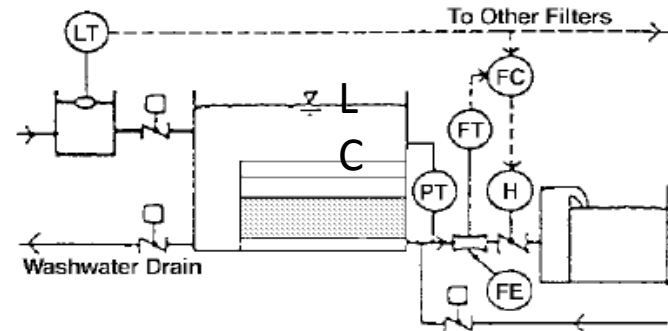
Variable Level Influent Flow Splitting



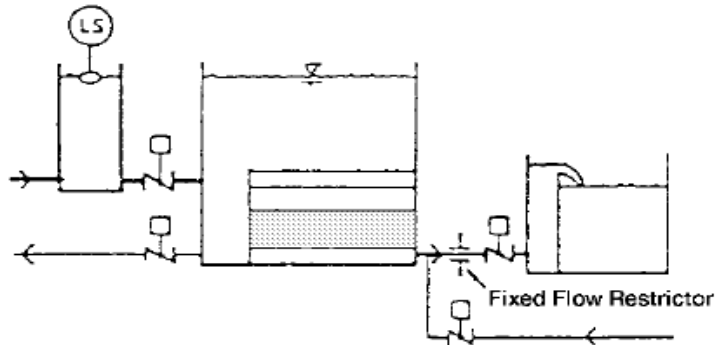
Proportional Level Influent Flow Splitting

LEGEND

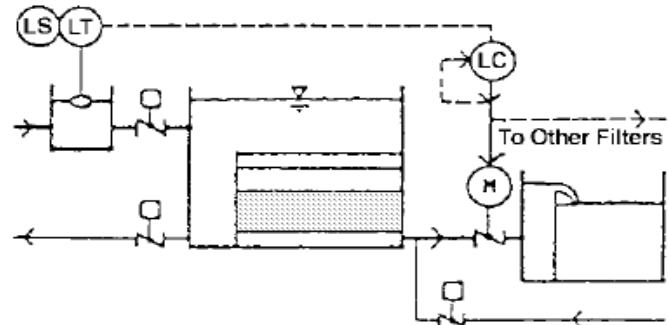
- FC Flow Controller
- FE Flow Element
- FT Flow Transmitter
- LC Level Controller
- LS Level Switch
- LT Level Transmitter
- M Modulating Actuator
- PT Pressure Transmitter
- VPT Valve Position Transmitter



Proportional Level Equal Rate



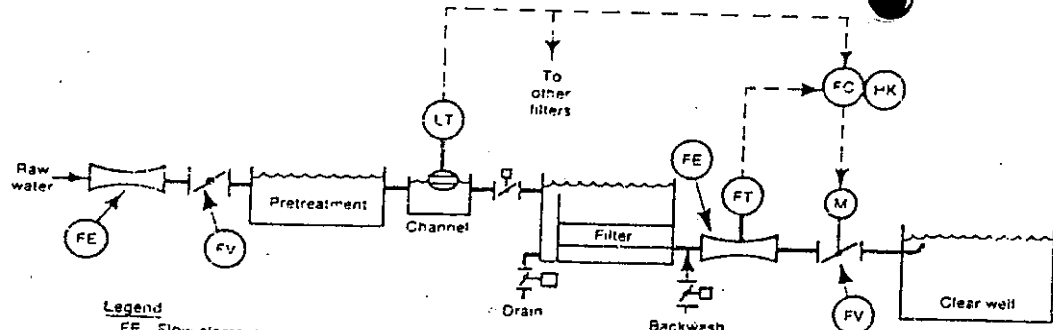
Variable Level Declining Rate



Proportional Level Declining Rate

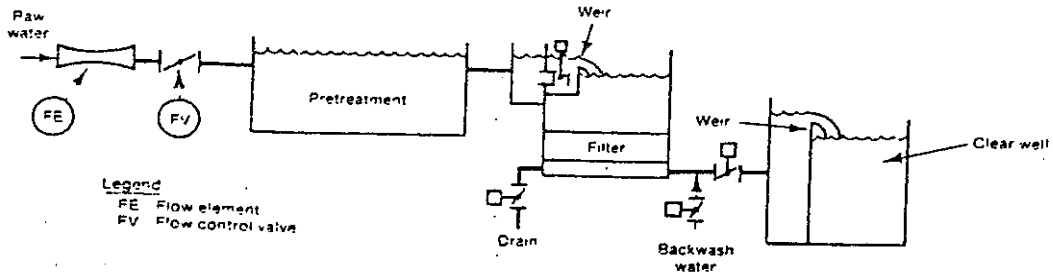
512

AWWA



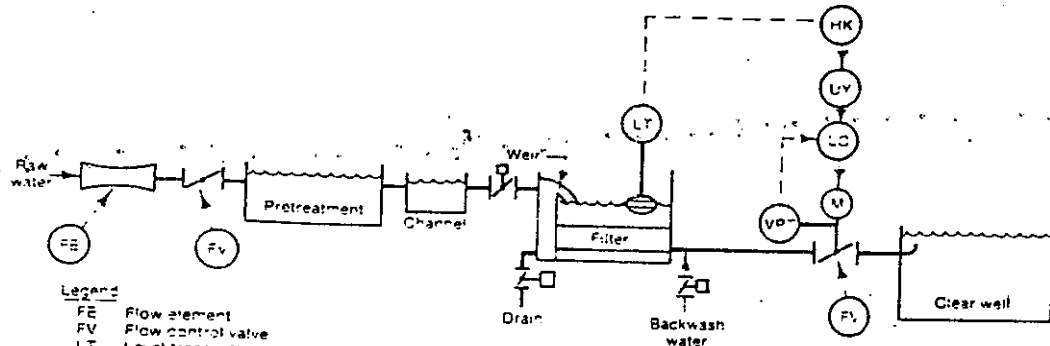
- Legend
- FE Flow element
 - FV Flow control valve
 - LT Level transmitter
 - FT Flow transmitter
 - M Motor
 - FC Flow controller
 - HK Hand control station

(a)



- Legend
- FE Flow element
 - FV Flow control valve

(b)

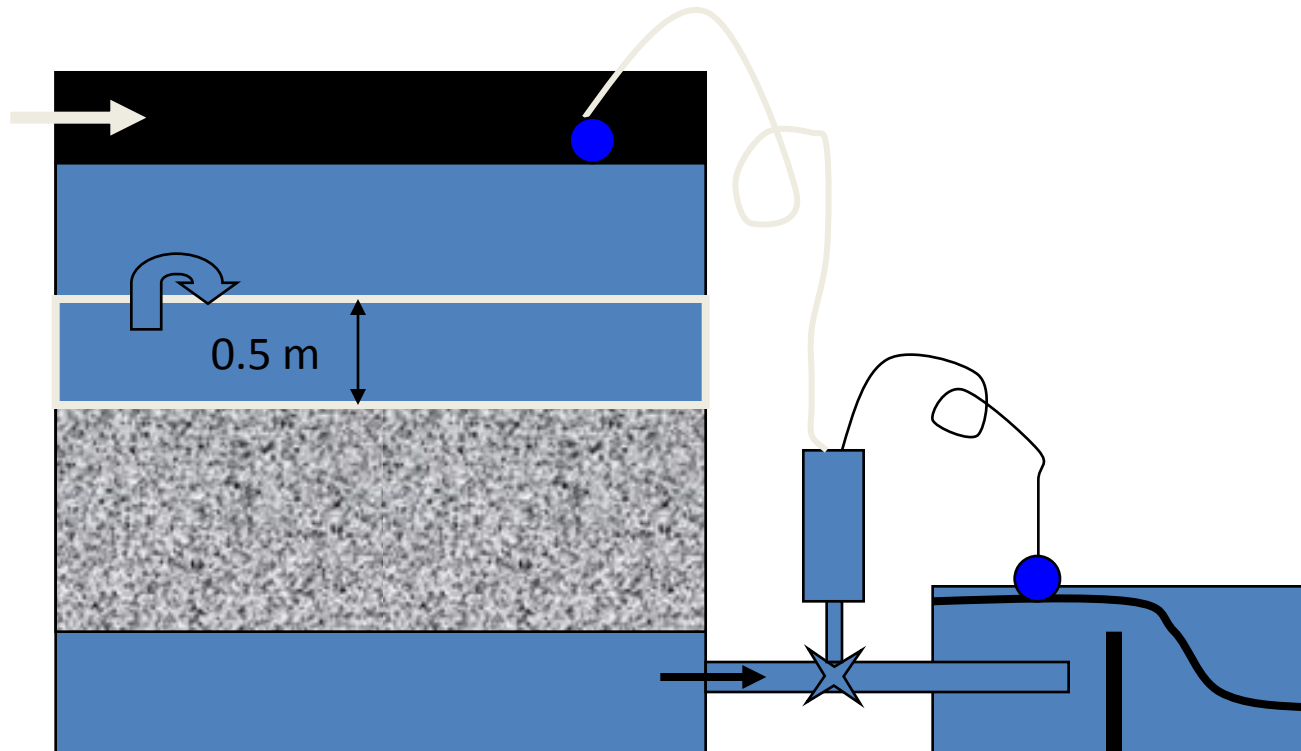


- Legend
- FE Flow element
 - FV Flow control valve
 - LT Level transmitter
 - LC Level controller
 - M Motor
 - UY Selector relay
 - HK Hand control station
 - VPT Valve position transmitter

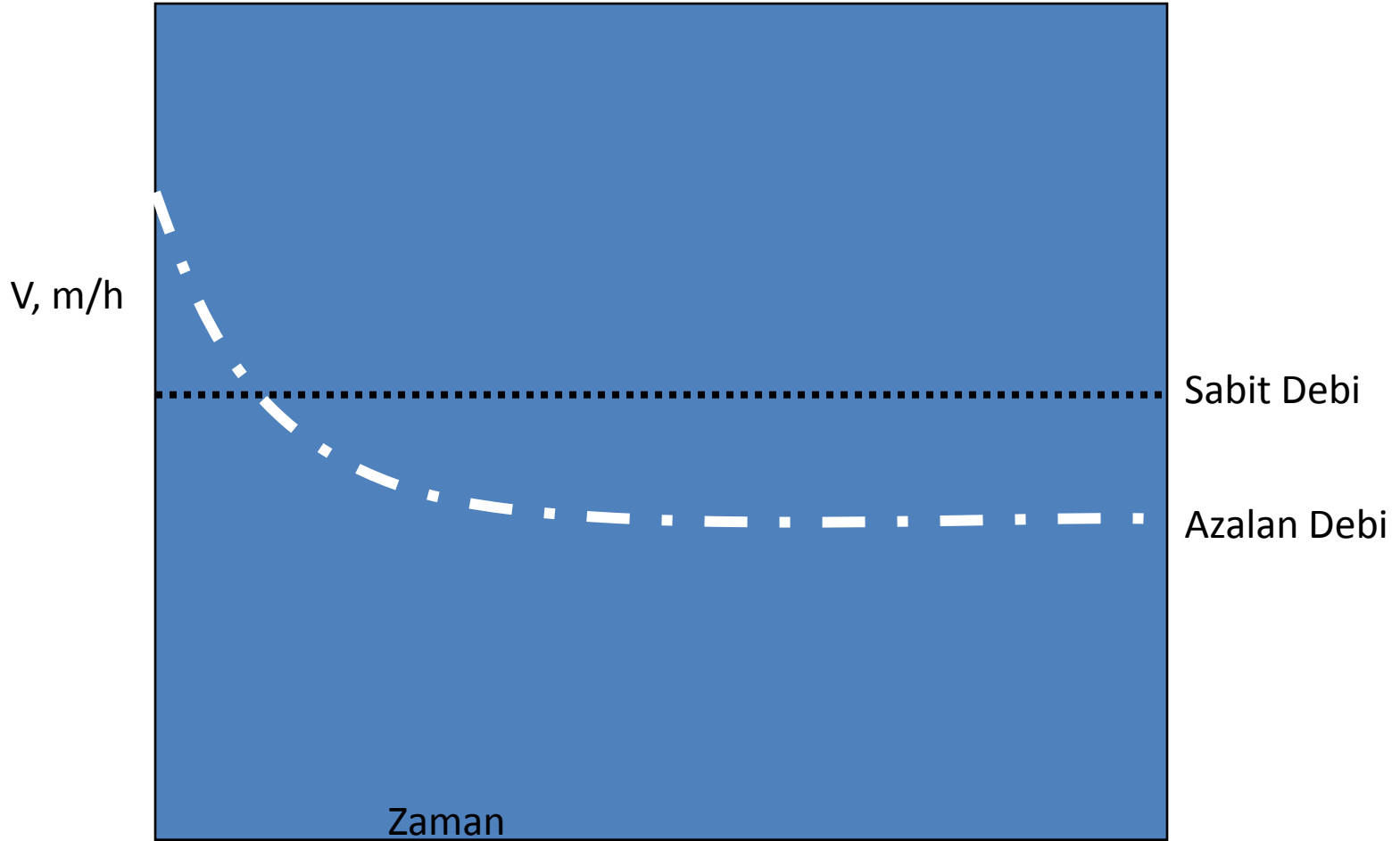
(c)

Inlet channel
or pipe

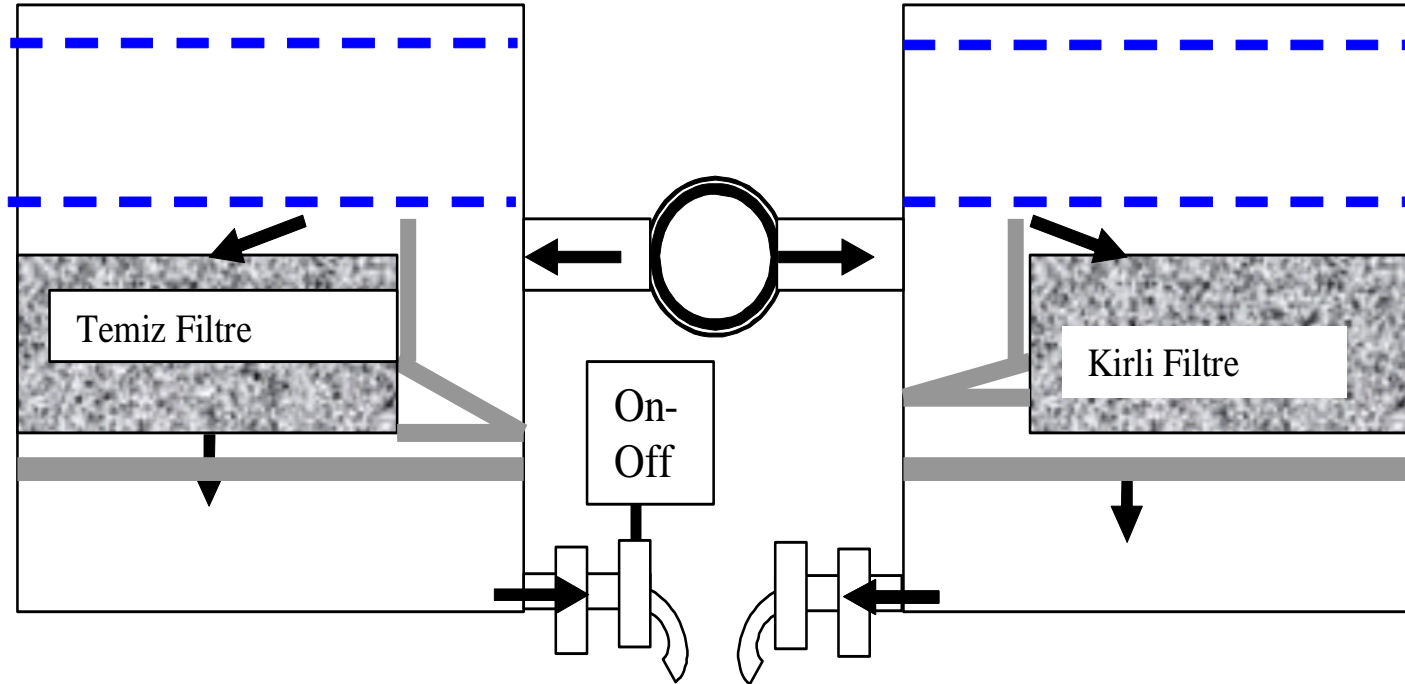
Varibar Sistemi



Azalan Debili Filtre



Azalan Debili Filtreler



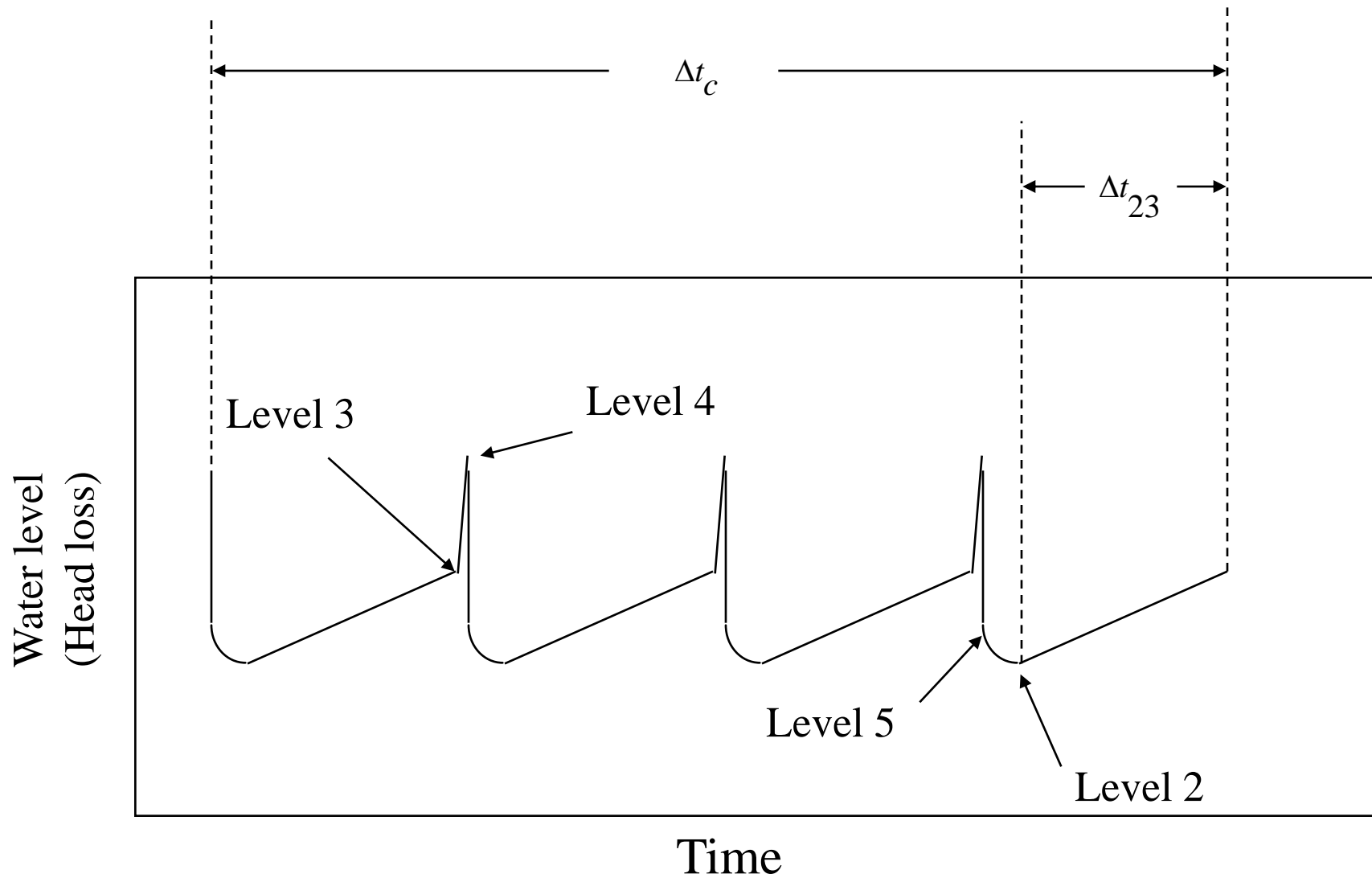
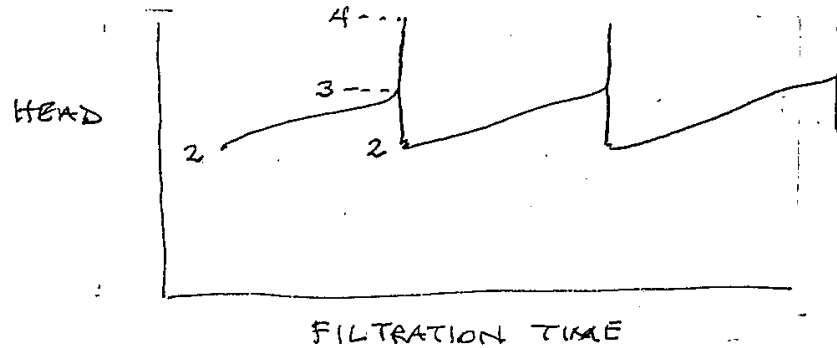


Figure 2: Water level variations in DRF

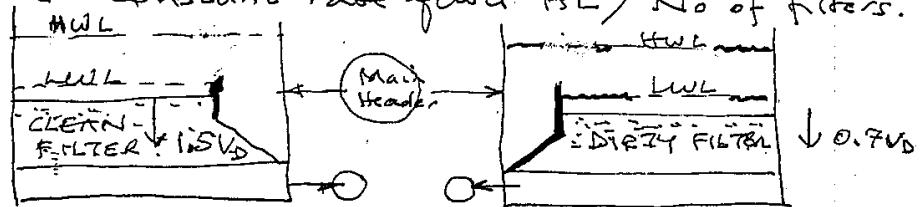
DECLINING RATE FILTRATION.



Level 1. If all filters were in service in a clean condition. Level 1 can be calculated by summing the clean filter headlosses at $V_D =$ Design filtration rate.

Level 3. Maximum water level just before initiation of the backwash of the dirtiest filter.

Level 2. Since the slopes of HL for DRF and CRF are same (experimental evidence), Level 3 - Level 2 = constant rate filter HL / No of filters.



Clean Filter - Level 3

$$\text{Level 3} = K_1 (1.5 V_D) +$$

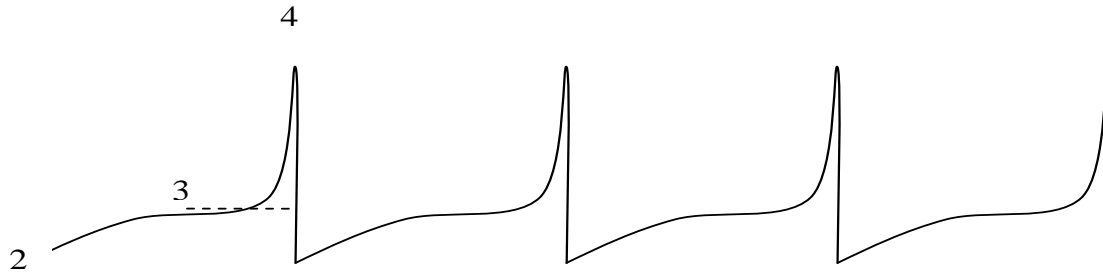
Dirty Filter Level 3

$$\text{Level 3} = K_1 (0.7 V_D) +$$

Azalan Debili Filtre Boyutlandırması

	Temiz Filtre	Kirli Filtre
Seviye 3=	$K1(1.5*Vd) +$	$K1(0.7*Vd) +$
	$K2*(1.5*Vd)^2 +$	$K2*(0.7*Vd)^2 +$
	$K3*(1.5*Vd)^2$	$K3*(0.7*Vd)^2$
	0	1.4

$K1 = 36e-3$ h Temiz kum yük kaybı sabiti
 $K2 = 1.521 e-3$ h²/m Borular, vanalar..
 $K3 =$ Kontrol vanası (bilinmeyen)



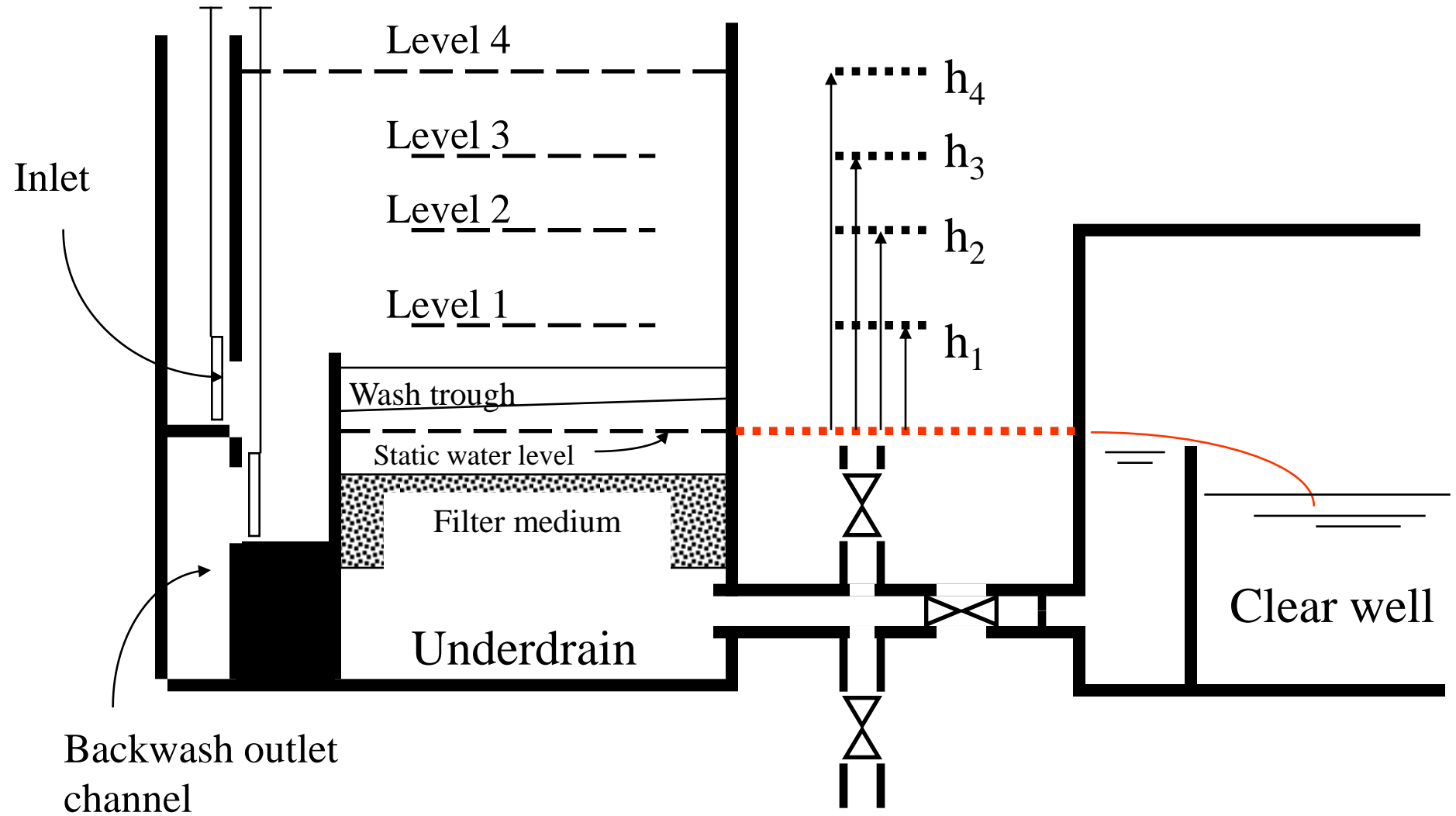
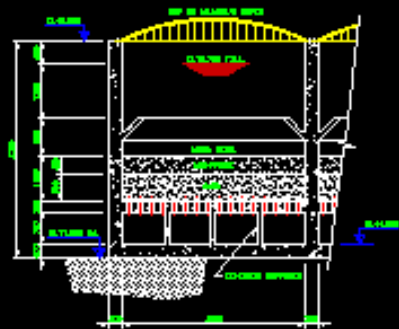


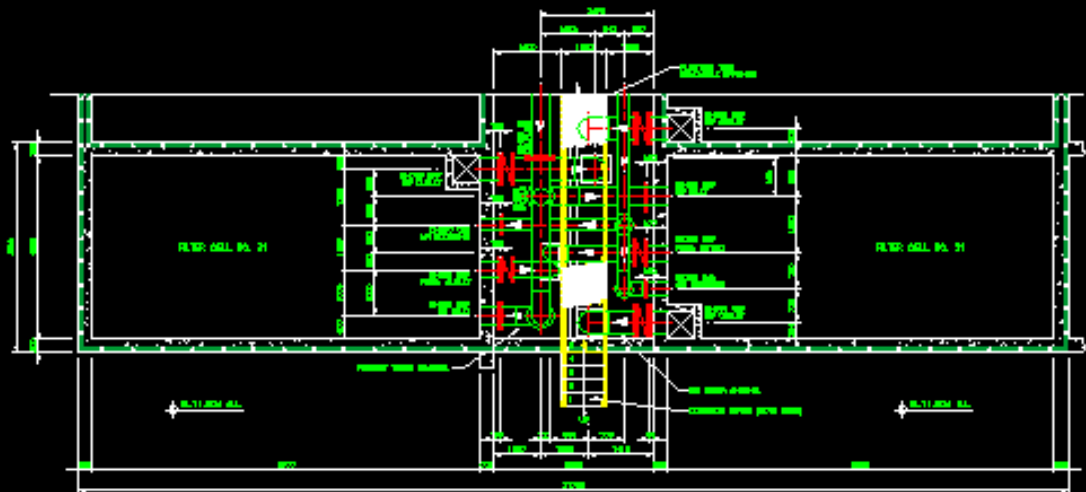
Figure-1: A typical DRF system

Filtre Boyutlandırması

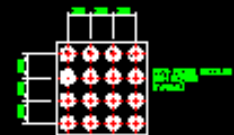
- Temiz yatak yük kaybı= 0.3 – 0.6 m
- Kirlenme yük kaybı = 2.4 to 3.0 m
- Giriş boru hızları = 0.6 m/sec
- Filtre edilmiş su ve geri yıkama hatları= 0.9-1.8 m/sec
- Su derinliği, yatak üst seviyesinden en az 1 m. yukarıda.
- Yüksek filtre hızlarında 1.5 m veya daha fazla.



SECTION A-A



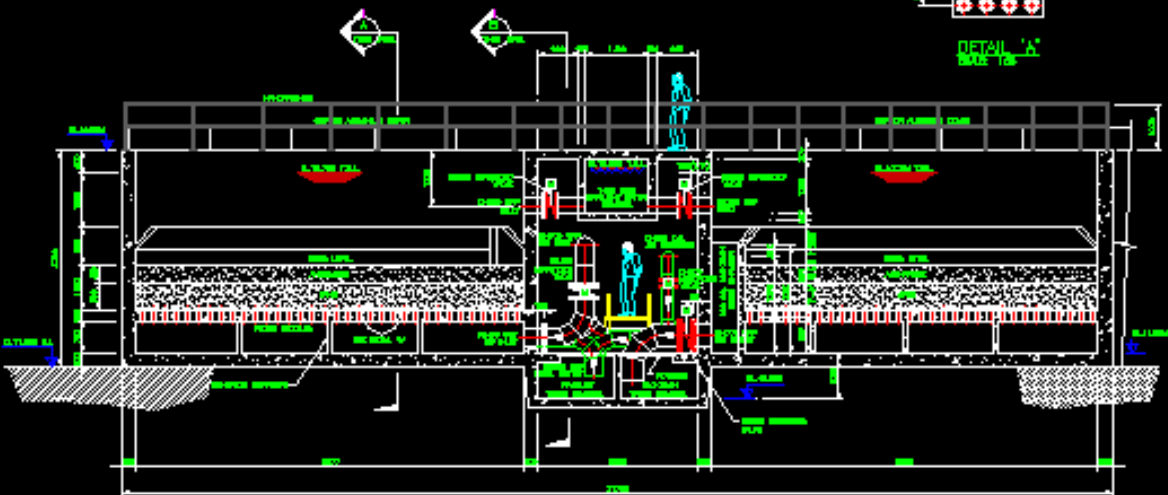
PLAN



DETAIL A



SECTION B-B



SECTION