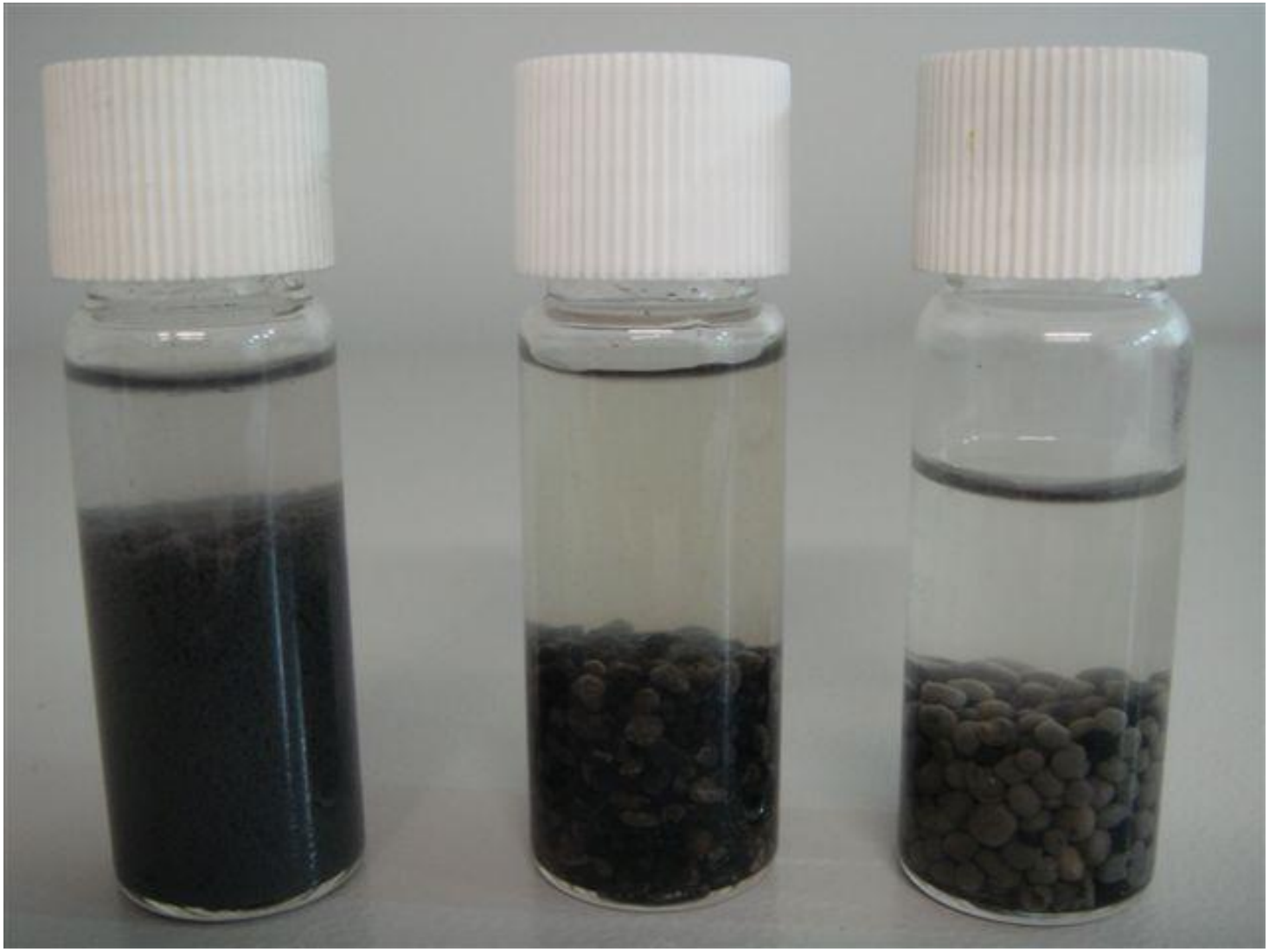
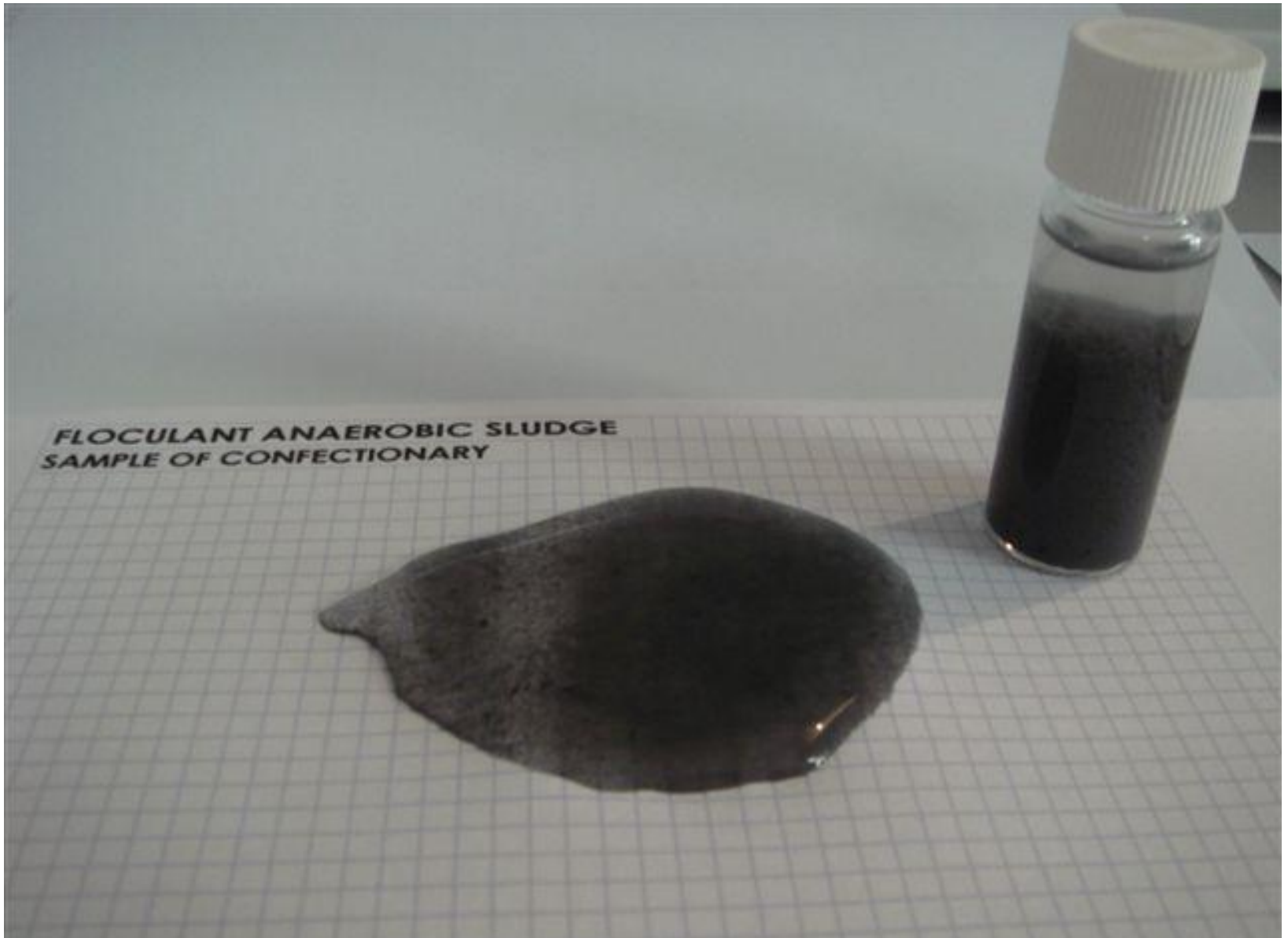
ATV- Design of Final Clarifiers

A. Saatçı

Flocculant Granule Sludge

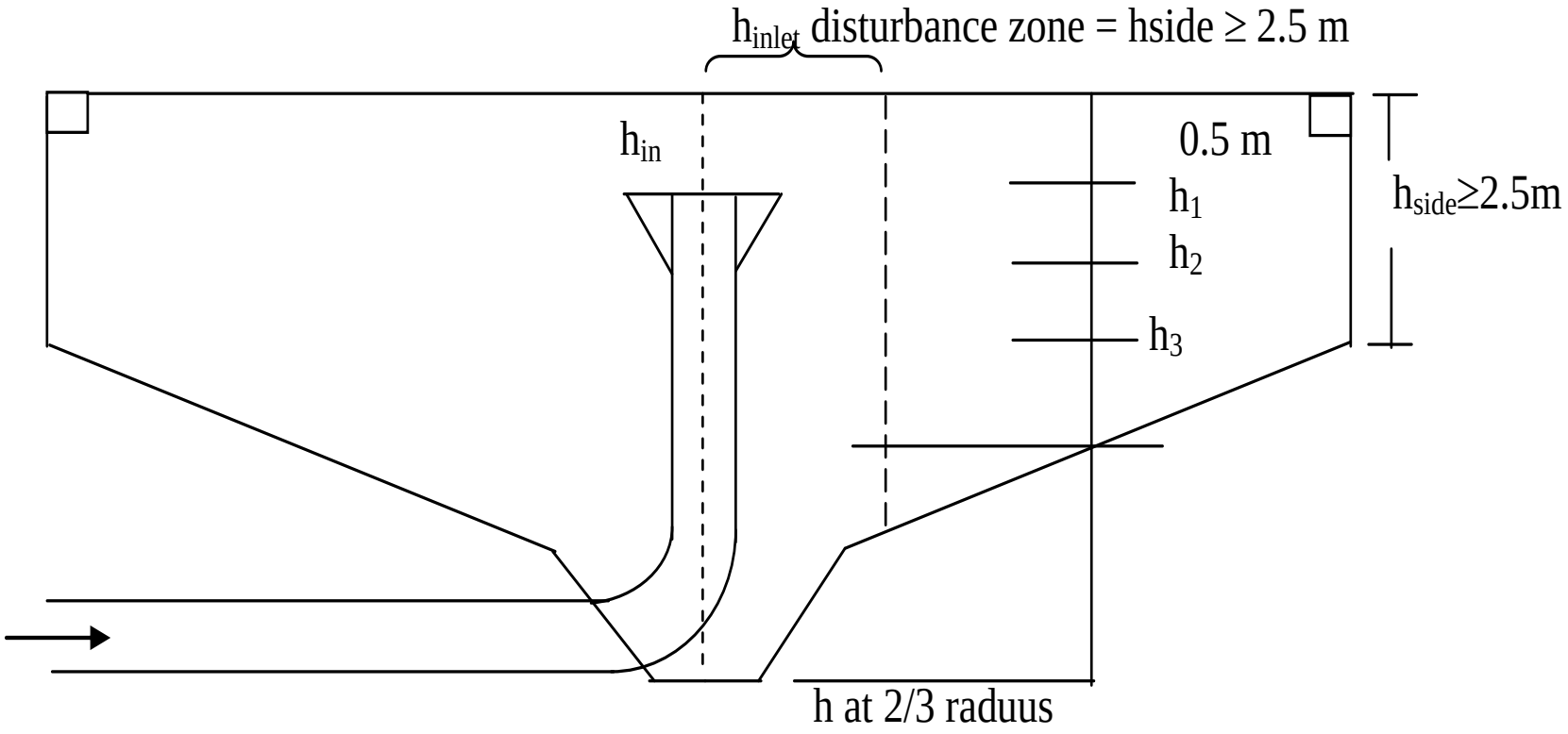


Flocculant Anaerobic Sludge



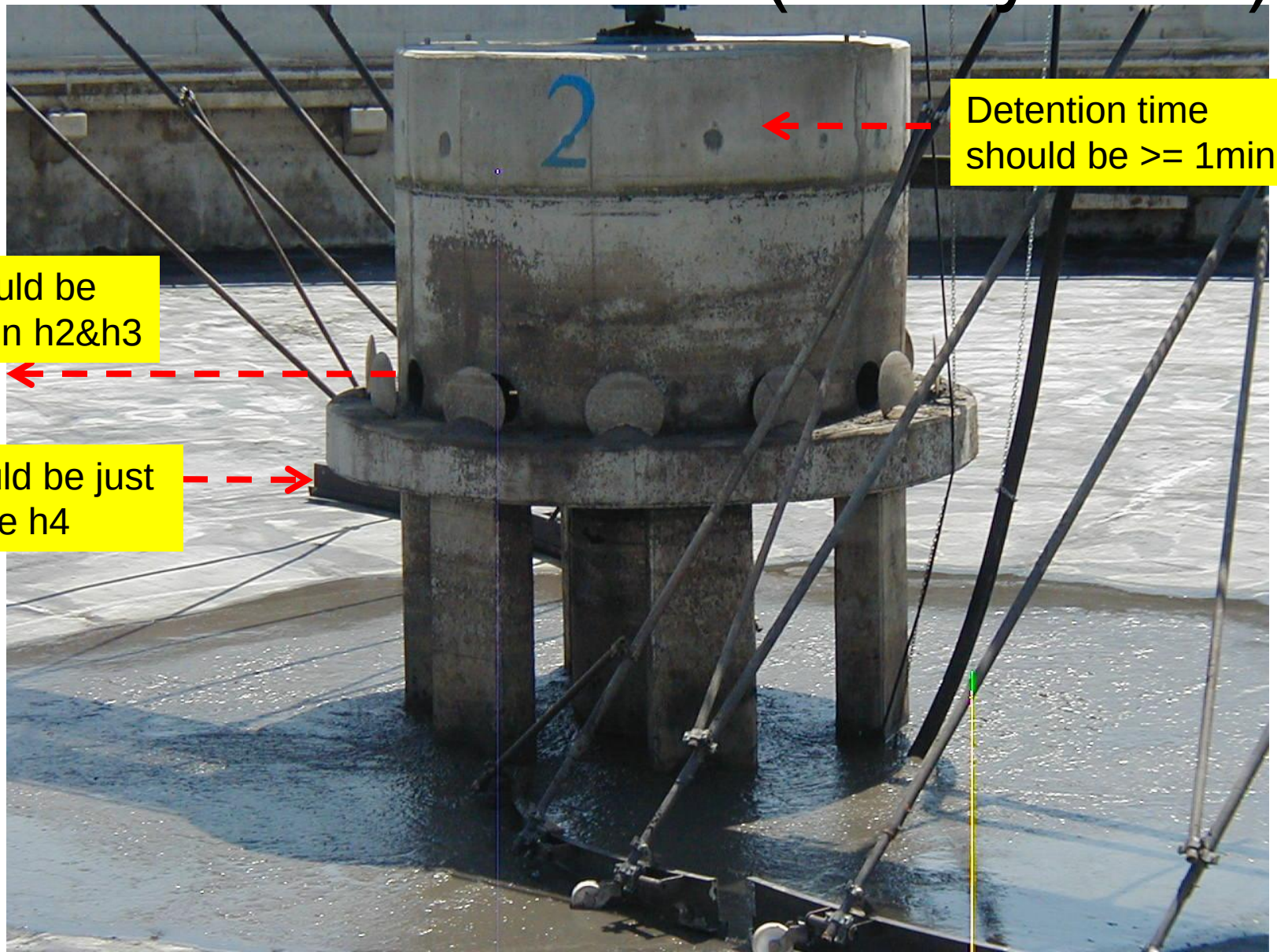
Granule Anaerobic Sludge

Design of FCs in ATV – 131

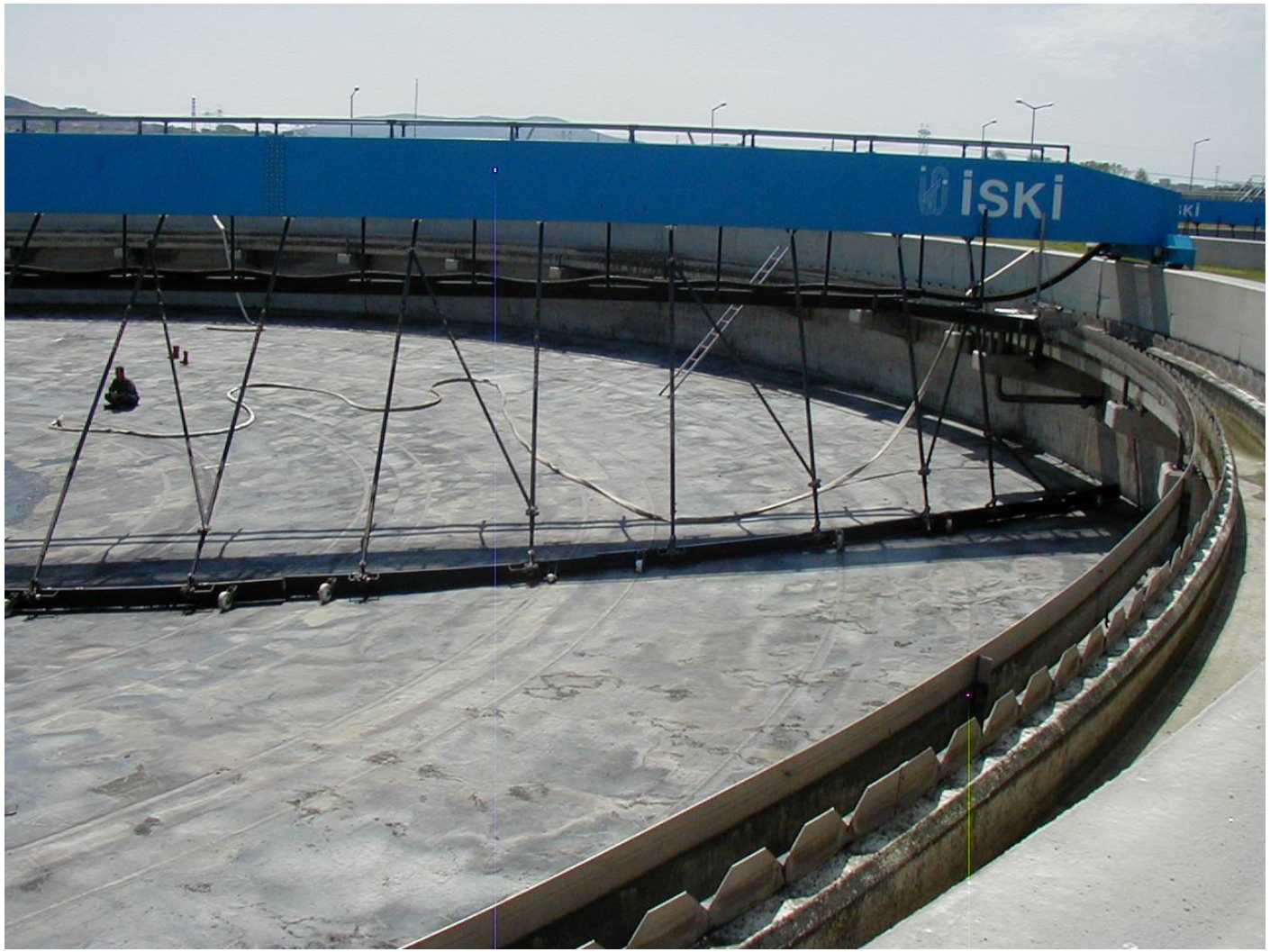


Final Clarifier Inlet Pipe-Çerkezköy STP

Final Clarifier Inlet (P.Köy STP)



Final Clarifier Effluent Collection Weirs (P.Köy STP)



DESIGN OF FINAL CLARIFIERS IN ATV – 131

DESIGN OF FINAL CLARIFIERS IN ATV – 131

FC design is based on R = 0.75 and Qwwf.

$$\text{Diluted Sludge Volume} = \text{DSV} = X \cdot SVI = \frac{X.10^3 \cdot \sqrt[3]{t_{Th}}}{X_R}$$

in which t_{Th} = Thickening time

$$SVI = \frac{10^3 \cdot (t_{Th})^{1/3}}{X_R} [=] \frac{ml\ solids}{1\,gr\ of\ solids}$$

Assume 1 m^3 of volume in FC over the sludge accumulation zone.

$$DSV = 1m^3 \cdot X \cdot SVI = \frac{ml\ sludge}{m^3\ mixed\ liquor} = \text{ml of sludge vol in 1 } m^3 \text{ of FC liquid over sludge collect. zone.}$$

$$\Omega = Sludge\,vol\,conc\left[=\right]\frac{ml}{ml} = {DSV}\big/{1000} = \frac{X}{X_R}\sqrt[3]{t_{TH}}$$

q_{SV} = Sludge Volume – Surface Loading = q_A . DSV

$$q_{SV} = \frac{Q.DSV}{A\,of\ clarifier}\left[=\right]\frac{m^3\ of\ sludge\,volume/h}{m^2\ surface\,area\,of\ FC}$$

Depths (h) are measured at 2/3 of radius from center.

h_1 = clean water zone = 0.5

$$h_2 = seperation\ zone = 0.5\frac{Q}{A}.\frac{(1+R)}{(1-DSV/1000)}$$

Q in m^3/h, t_R = 0.5h

$$Ah_2(1-DSV/1000 = Vol\ of\ liq\ in\ zone\ 2 - vol\ of\ solids\ in\ zone\ 2$$

$$h_2 = 0.5\left(\frac{Q+Q_R}{A}\right)\frac{1}{(1-DSV/1000)} = 0.5\frac{Q+Q_R}{A(1-\Omega)}$$

h_3 = Storage zone = volume to store additional volume of sludge: (0.3X . SVI) with a concentration value of 500 L/m^3 expolled in 1.5 h from aeration tank.

$$h_3 = \frac{(1.5)(0.3)}{500}q_{SV}(1+R) = 0.9\left(\frac{Q+Q_{RA}}{A}\right)\frac{DSV}{1000} = 0.9\left(\frac{Q+Q_{RA}}{A}\right)\Omega$$

h_4= Thickening and sludge removal zone

$$h_4 = \frac{X\cdot q_A\cdot(1+R)t_{Th}}{X_R} = \frac{X}{X_R}\left(\frac{Q+Q_R}{A}\right)t_{Th}$$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Suction Type Final Clarifier