



BAGIAN 3-1

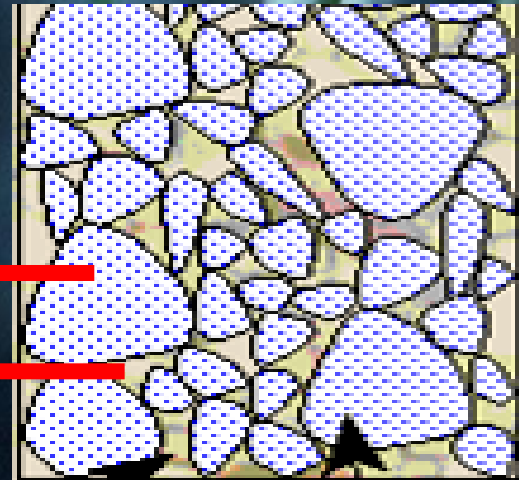
**KOMPOSISI,
PROPERTIES TANAH,
KLASIFIKASI TANAH**

KOMPOSISI TANAH

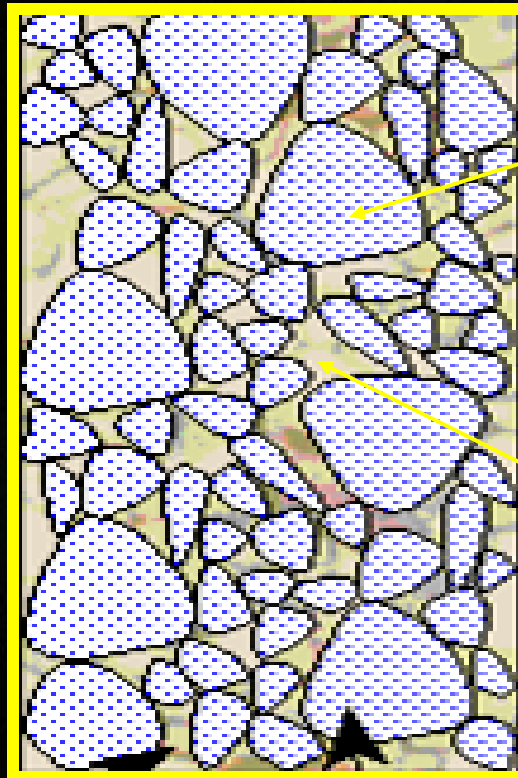
- **TANAH** terdiri dari **PARTIKEL PADAT** dan **PORI TANAH**
- **PORI TANAH** ini bisa terisi oleh **UDARA, AIR,** atau keduanya
- Sehingga dalam elemen tanah terdapat :
 - Partikel Padat (Solid, s)
 - Udara (Air, a)
 - Air (Water, w)

Partikel Padat (s)

Pori Tanah (a, w)



KOMPOSISI TANAH

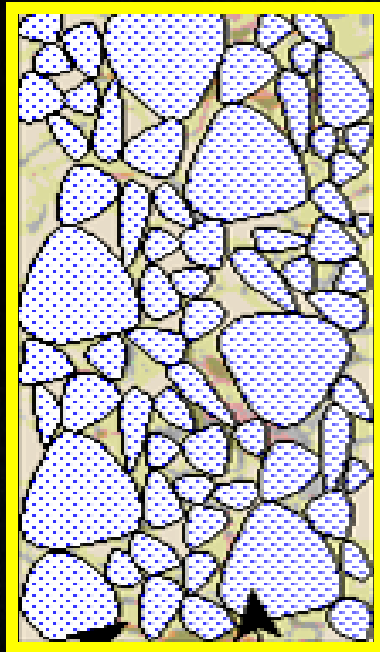


Solid Particles

Voids

Volume

KOMPOSISI TANAH

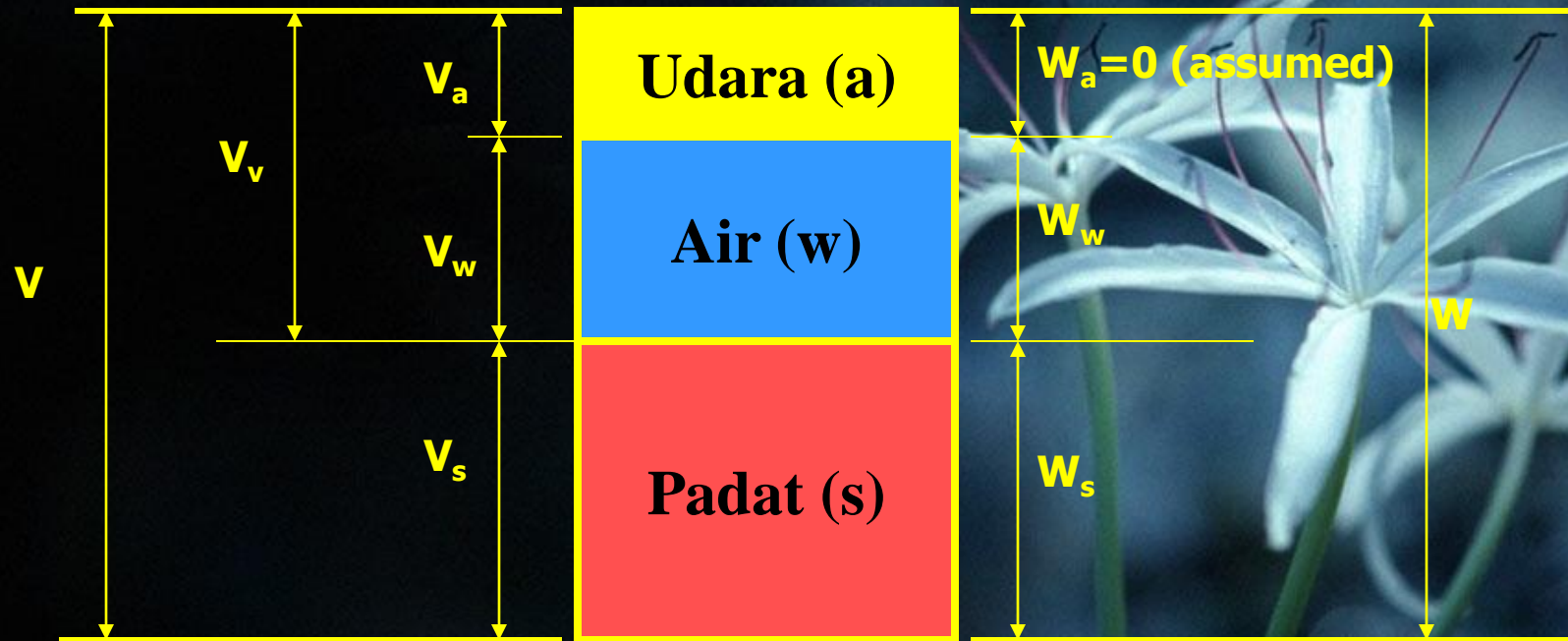


**Mineral
Skeleton**



Diagram 3 Fase

KOMPOSISI TANAH



Volume

$$V = V_s + V_v$$

$$V_v = V_a + V_w$$

Weight, or Mass

$$W = W_s + W_v = W_s + W_w$$

$$W_v = W_a + W_w = W_w$$

VOLUMETRIC RELATIONSHIP

- Void Ratio (e) $\rightarrow e = V_v / V_s$
- Porosity ($n, \%$) $\rightarrow n = (V_v / V) \times 100\%$
 $n = e / (1 + e) \times 100\%$
- Degree Of Saturation ($S_r, \%$)
 $S_r = (V_w / V_v) \times 100\%$
Tanah jenuh air $\rightarrow V_w = V_v \rightarrow S_r = 100\%$
Tanah kering oven $\rightarrow S_r = 0 \%$

WEIGHT RELATIONSHIP

- Water content

$$w, \% = (W_w / W_s) \times 100\%$$

Nilai Kadar Air bisa > 100%

UNIT WEIGHT (t/m³, kg/cm³, kN/m³)

- Unit weight

$$\gamma = W / V \quad \rightarrow \quad \gamma_n$$

- Dry unit weight

$$\gamma_d = W_s / V$$

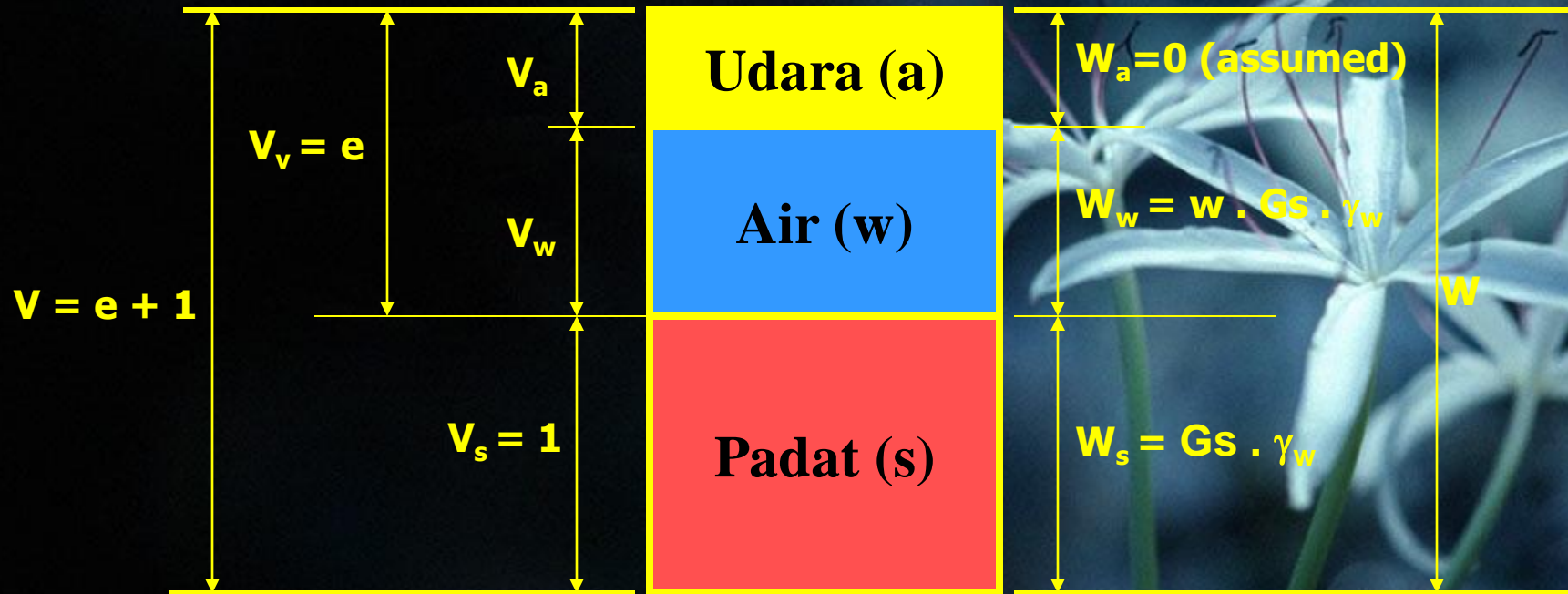
- Saturated unit weight, Berat isi tanah saat semua pori terisi oleh air
- Buoyant (submerged) unit weight, is berat isi efektif saat tanah dalam kondisi terendam

$$\gamma_b = \gamma - \gamma_w$$

RELATIONSHIP

- Specific Gravity (G_s , Berat Jenis) :
Rasio antara Berat Isi dari tanah dengan Berat Isi dari Air
- Biasanya nilai G_s berkisar antara 2.4 – 2.8
- $W_s = G_s \cdot \gamma_w$
- $w = W_w / W_s \rightarrow W_w = w \cdot W_s$
 $W_w = w \cdot G_s \cdot \gamma_w$

RELATIONSHIP



$$e = V_v / V_s \rightarrow e / 1 = V_v / V_s$$

RELATIONSHIP

- $\gamma = W / V$
 $= (W_w + W_s) / (V_v + V_s)$
 $= (w \cdot G_s \cdot \gamma_w + G_s \cdot \gamma_w) / (1 + e)$

$$\gamma = G_s \cdot \gamma_w (1 + w) / (1 + e)$$

- $\gamma_d = W_s / V$

$$\gamma_d = (G_s \cdot \gamma_w) / (1 + e)$$

- $e = (G_s \cdot \gamma_w / \gamma_d) - 1$

$$\gamma_d = \gamma / (1 + w)$$

RELATIONSHIP

- $S_r = (V_w / V_v) \times 100\%$

$$= w \cdot G_s / e$$

$$S_r \cdot e = w \cdot G_s$$

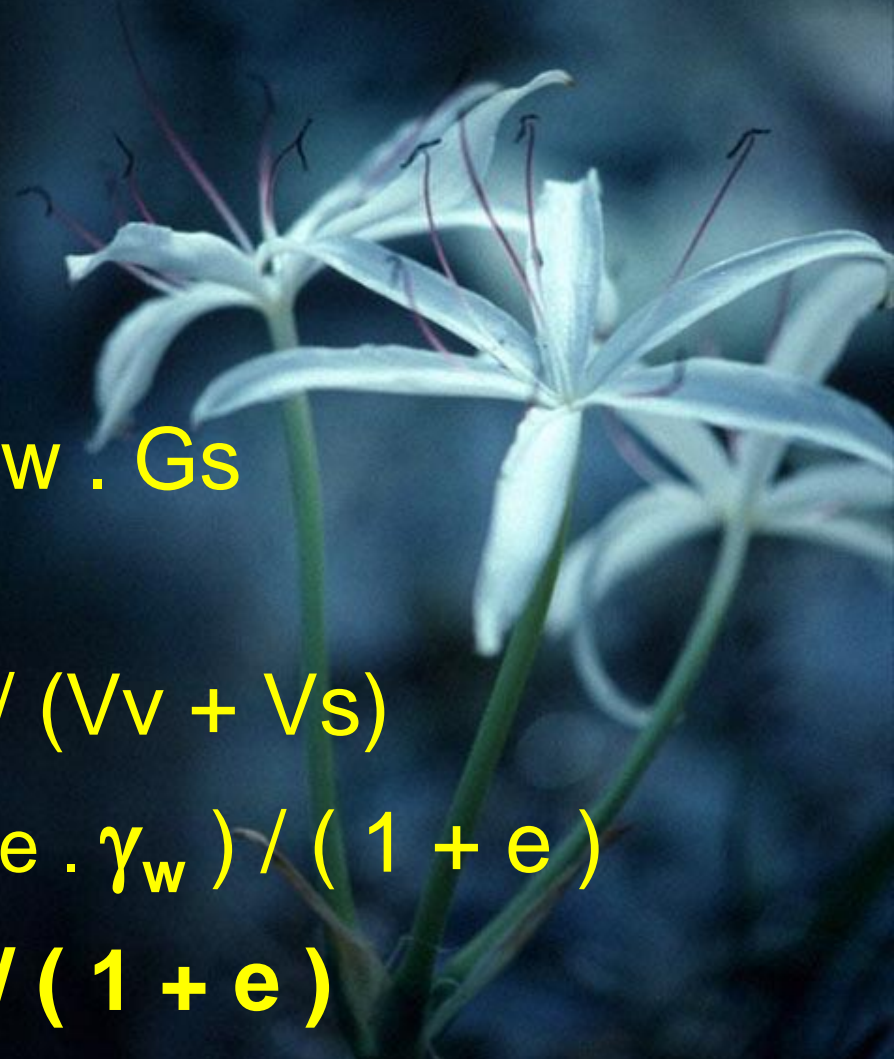
$$\text{Saturated soils} \rightarrow e = w \cdot G_s$$

- $\gamma_{\text{sat}} = W / V$

$$= (W_w + W_s) / (V_v + V_s)$$

$$= (w \cdot G_s \cdot \gamma_w + e \cdot \gamma_w) / (1 + e)$$

$$\gamma_{\text{sat}} = \gamma_w (G_s + e) / (1 + e)$$



RELATIONSHIP

- Ingat definisi dasar dari w , e , S , dan lain-lain
- Sebaiknya jangan hapal rumusnya, **Pahami** pengertiannya
- Asumsikan nilai $V_s = 1$, bila tidak diberikan
- Gambarkan Diagram 3 Fase
- Asumsikan nilai G_s (antara 2.4 – 2.8) jika tidak diberikan

SEE YOU ON NEXT CHAPTER

