Juma, N. 1999. The pedosphere and its dynamics. Salmon Productions, Edmonton, Alberta, Canada
Air: 20 – 30%
Water: 20 – 30%
Mineral: 45%
Organic: 5%

Pore Space

Soil Solids
Capillary Fringe
(est. thickness)

<table>
<thead>
<tr>
<th>Soil</th>
<th>Range in Depth</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sands</td>
<td>0-3 in.</td>
<td>2 in.</td>
</tr>
<tr>
<td>Silts</td>
<td>0.5 – 5 ft.</td>
<td>&lt;12 in.</td>
</tr>
<tr>
<td>Clays</td>
<td>5-10 ft.</td>
<td>&lt;60 in.</td>
</tr>
</tbody>
</table>
Saturation

Field Capacity

Wilting point

Saturated Soil

Field Capacity

Wilting coefficient

Hygroscopic coefficient

- **Solid**
- **Water**

<table>
<thead>
<tr>
<th></th>
<th>Solid</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Saturation</strong></td>
<td>100g</td>
<td>40ml</td>
<td></td>
</tr>
<tr>
<td><strong>Field Capacity</strong></td>
<td>100g</td>
<td>20ml</td>
<td></td>
</tr>
<tr>
<td><strong>Wilting coefficient</strong></td>
<td>100g</td>
<td>10ml</td>
<td></td>
</tr>
<tr>
<td><strong>Hygroscopic coefficient</strong></td>
<td>100g</td>
<td>8ml</td>
<td></td>
</tr>
</tbody>
</table>

Pore Space
FIGURE 3.6 Soil water and soil suction relationships to field capacity wilting point and plant-available water.

FIGURE 3.7 The elusive nature of field capacity.
Bedrock

Solum

O - Organic
A - Mineral Mixed with humus, dark colored
E - Horizon of maximum eluviation of silicate clays, Fe, Al oxides
B - Horizon of maximum illuviation of material
C - Zone of least weathering, accumulation of Ca & Mg carbonates, cementation, etc.
R

Bedrock
Surface

- \( O_1 \): Loose leaves and organic debris
- \( O_2 \): Partly decomposed organic debris
- \( A_1 \): Dark color; rich in organic matter
- \( A_2 \): Light color; zone of leaching of colloids and organic matter (Absent in mollisols)
- \( A_3 \): Transitional to B, but more like A than B
- \( B_1 \): Transitional to B, but more like B than A
- \( B_2 \): Calcium carbonate or gypsum in mollisols; deeper colored zone of maximum accumulation of colloids
- \( B_3 \): Transitional to C
- \( C \): "Glei" layer in bog and meadow soils

True soil or solum

Zone of eluviation

Zone of illuviation

Weathered parent material

Underlying rock
Coarse Sand 18”

Fine Sand Silt

Silt Clay

Coarse Sand Silt 8”

Silt Clay

Water Infiltration

Rapid

Moderate/Slow

Slow
Fig. 1.11. Profile of soils belonging to three different soil orders.

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Examples of Different Soil Structure Classes

Granular

Subangular Blocky

Angular Blocky

Platy

Prismatic
Example of macropore formation due to soil shrinkage and cracking.
Example of surface sealing due to soil swelling.
Clay Shrink/Swell Capacity

**dry**

0.001 mm

**wet**

0.02 mm

0 to 20 times Dry Size
(Bentonite)

Figure 4.6 Calculated and measured soil water profiles for air-dry Hesperia soil allowed to wet at $\theta_0 = 0.385 \text{ cm}^3 \text{ cm}^{-3}$. (After Davidson et al., 1963.)