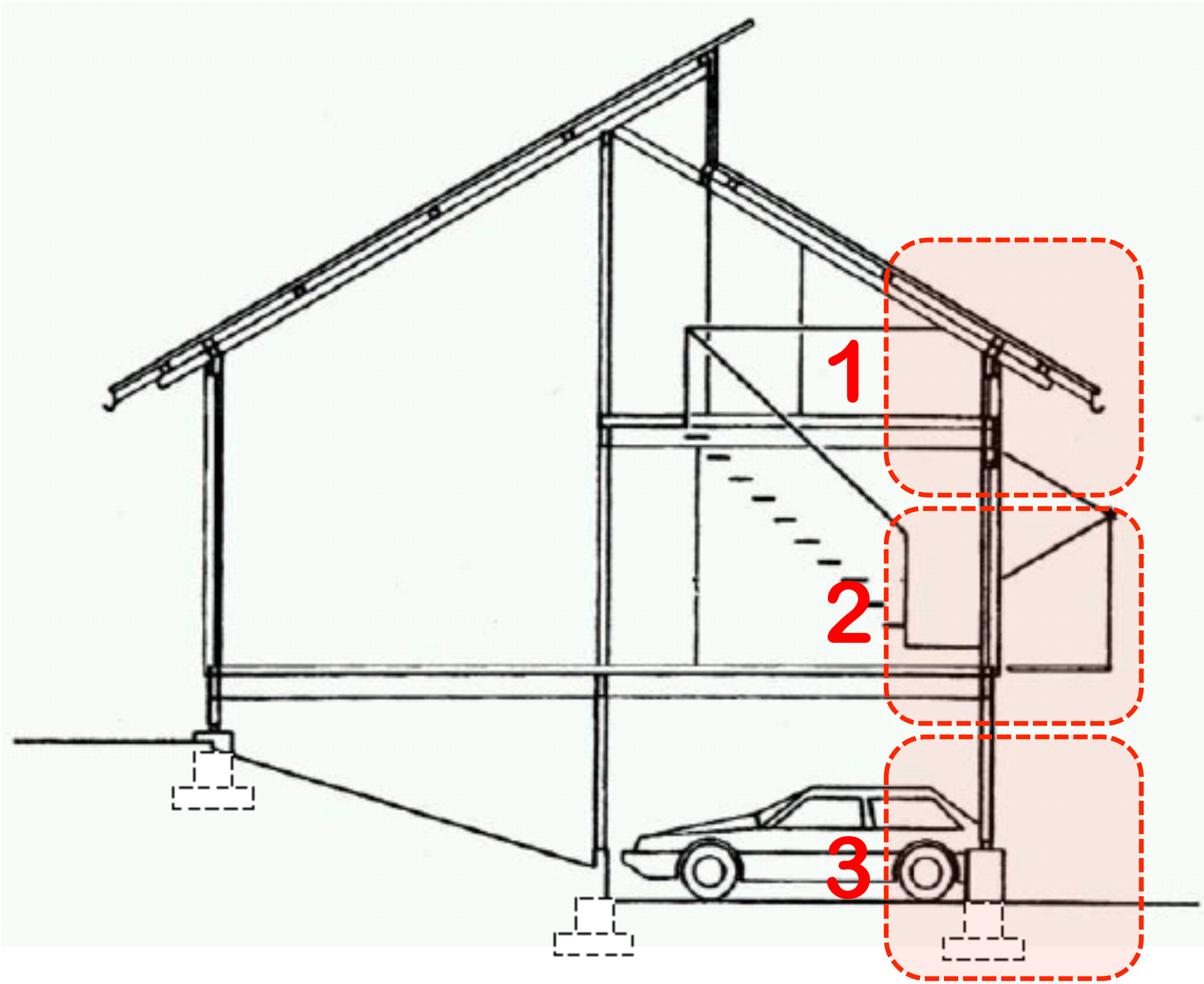
PERENCANAAN TEKNOLOGI & SISTEM BANGUNAN (PTSB) _03_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FIELD EXPLORATION

1. Knowledge of the general topography of the site as it affects foundation design and construction, e.g., surface configuration, adjacent property, the presence of watercourses, ponds, hedges, trees, rock outcrops, etc., and the available access for construction vehicles and materials.
2. The location of buried utilities such as electric power and telephone cables, water mains, and sewers.
3. The general geology of the area, with particular reference to the main geologic formations underlying the site and the possibility of subsidence from mineral extraction or other causes.

4. The previous history and use of the site, including information on any defects or failures of existing or former buildings attributable to foundation conditions.
5. Any special features such as the possibility of earthquakes or climate factors such as flooding, seasonal swelling and shrinkage, permafrost, and soil erosion.
6. The availability and quality of local construction materials such as concrete aggregates, building and road stone, and water for construction purposes.
7. For maritime or river structures, information on tidal ranges and river levels, velocity of tidal and river currents, and other hydrographic and meteorological data.

1. Adequate Depth
   It must have an adequate depth to prevent frost damage.
2. Bearing Capacity Failure
   The foundation must be safe against a bearing capacity failure.
3. Settlement
   The foundation must not settle to such an extent that it damages the structure.
4. Quality
   The foundation must be of adequate quality so that it is not subjected to deterioration, such as the sulfate attack of concrete footings.

5. Adequate Strength

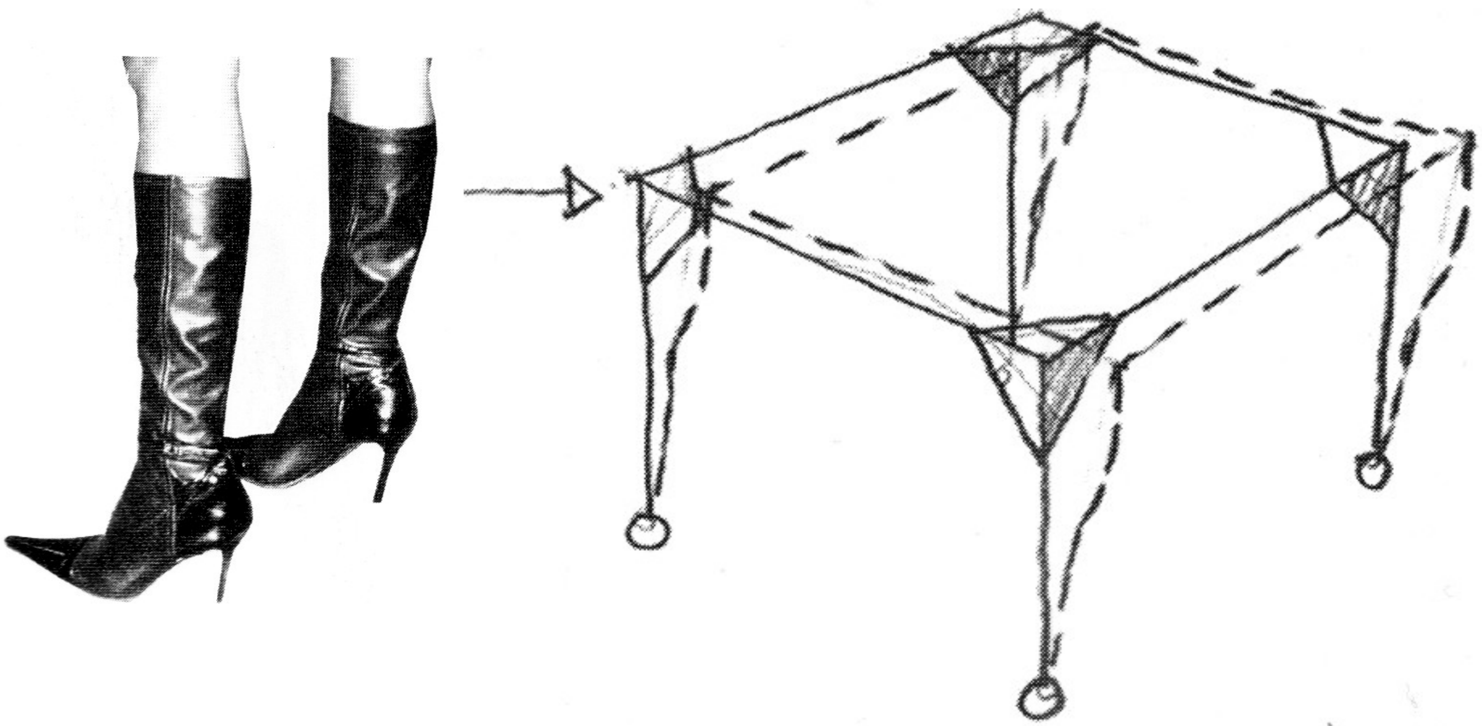
The foundation must be designed with sufficient strength that it does not fracture or break apart under the applied superstructure loads. It must also be properly constructed in conformance with the design specifications.

6. Adverse Soil Changes

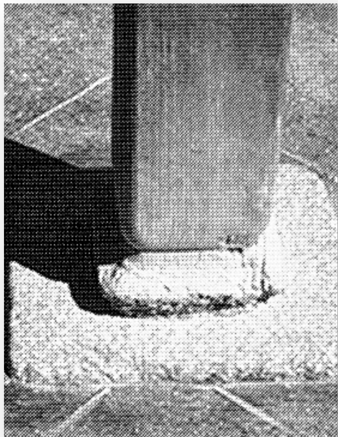
The foundation must be able to resist long-term adverse soil changes. An example is expansive soil (silts and clays), which could expand or shrink causing movement of the foundation and damage to the structure.

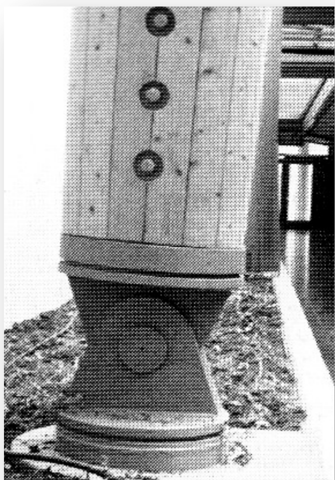
7. Seismic Forces.

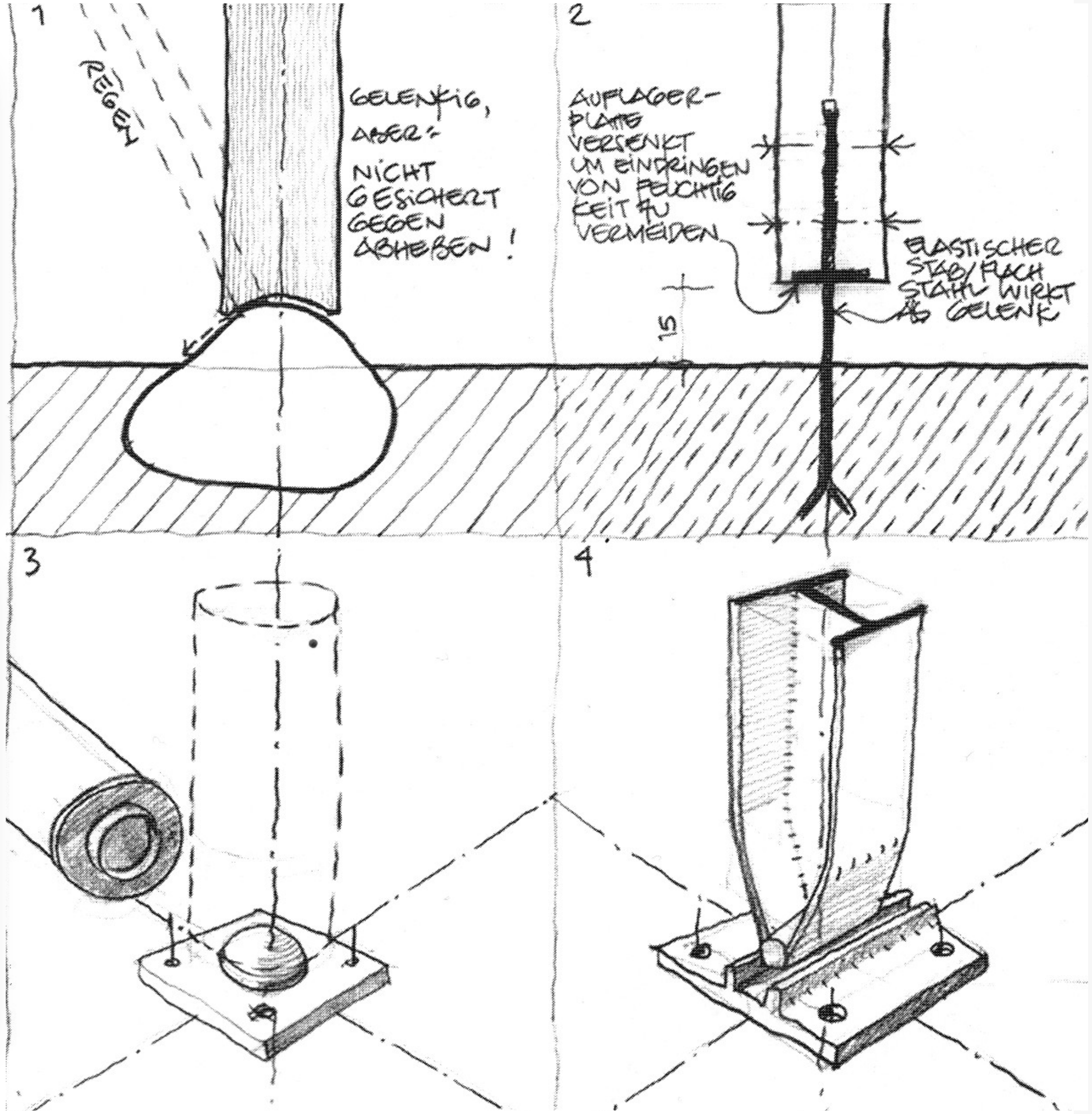
The foundation must be able to support the structure during an earthquake without excessive settlement or lateral movement.



Kreatifitas – **Hubungan kolom & Pondasi**







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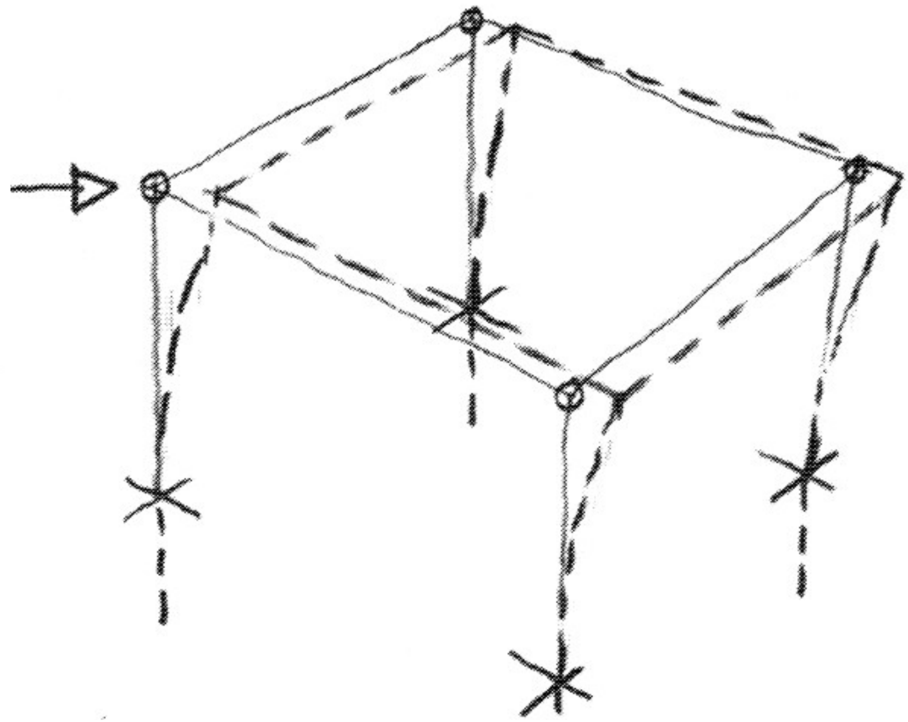

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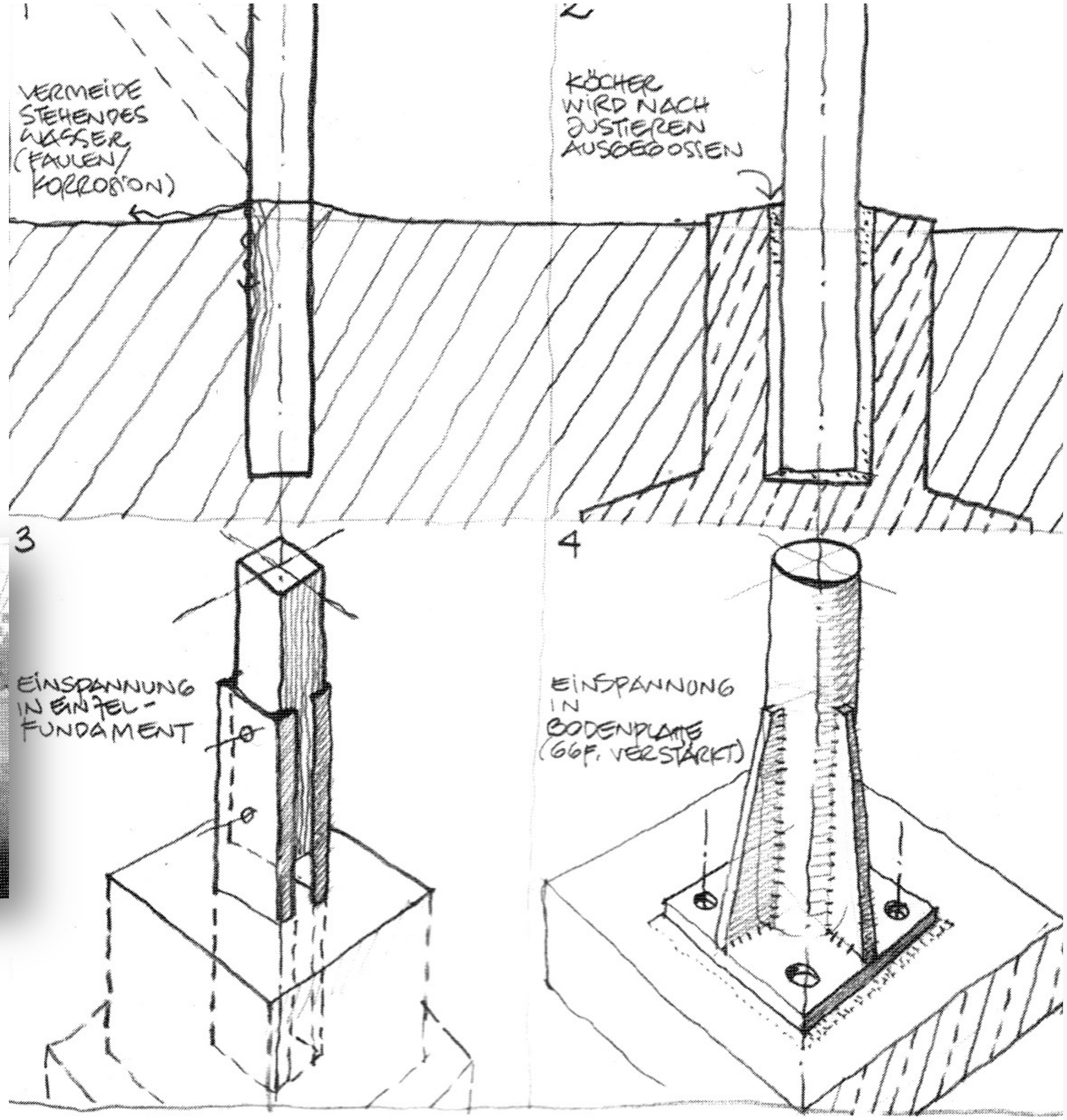

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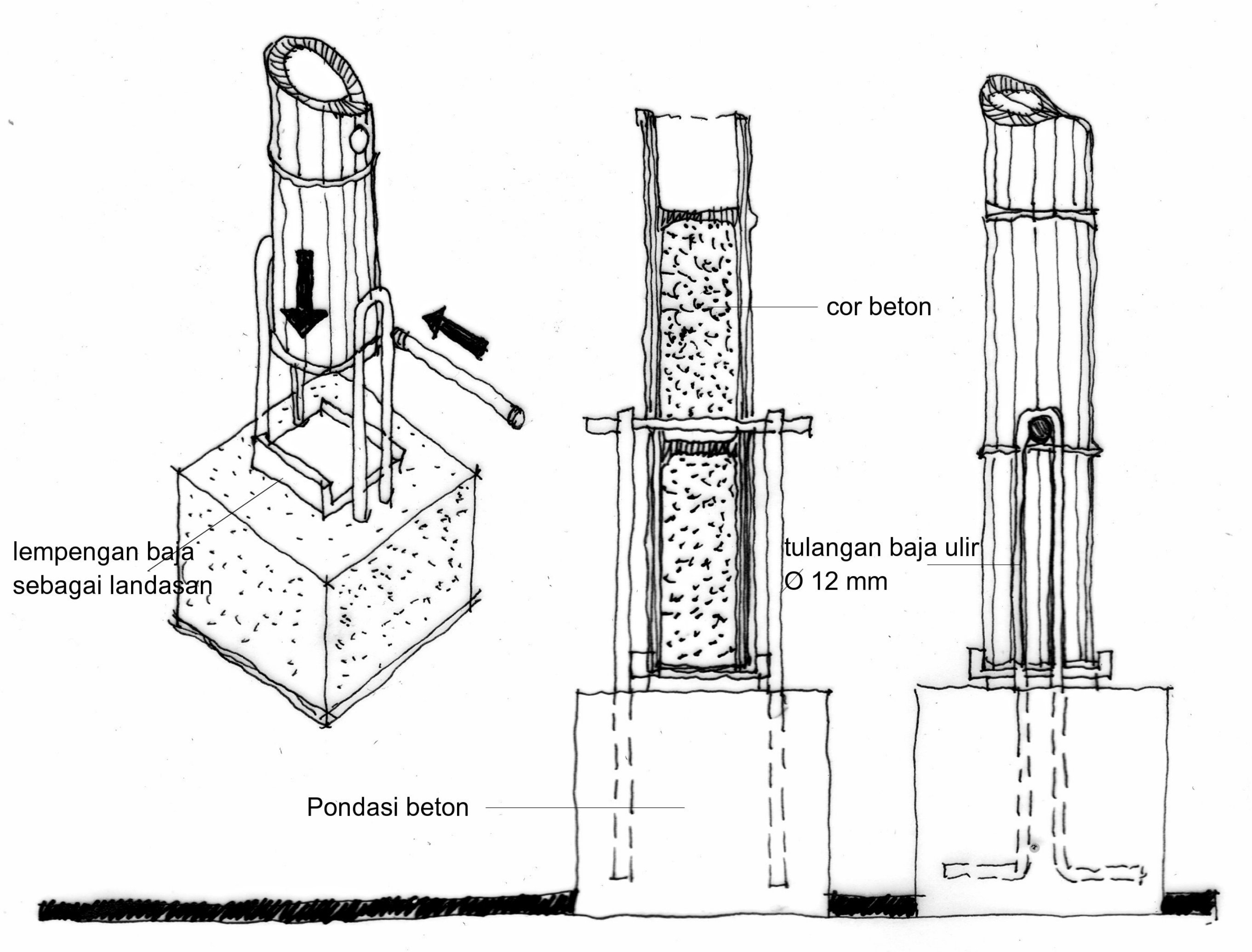


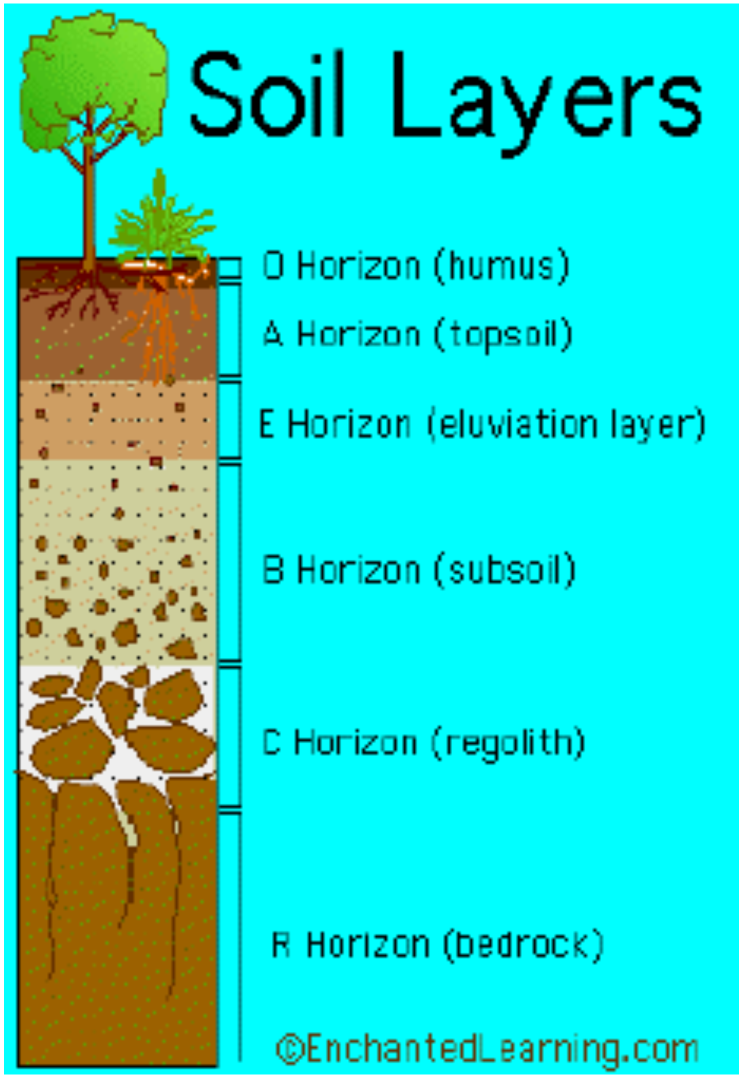
Kreatifitas – Hubungan kolom & Pondasi

A shallow foundation

a foundation that derives its support by transferring load directly to soil or rock at a shallow depth.

is often selected when the structural load will not cause excessive settlement of the underlying soil layers.

Shallow foundations are more economical to construct than deep foundations.



Soil Layers
O Horizon (humus)
A Horizon (topsoil)
E Horizon (eluviation layer)
B Horizon (subsoil)
C Horizon (regolith)
R Horizon (bedrock)
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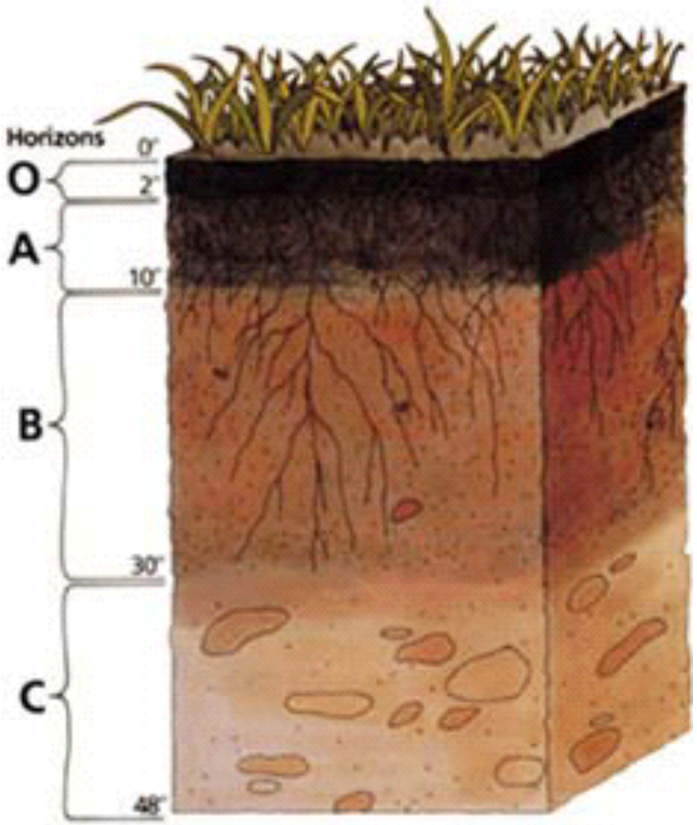
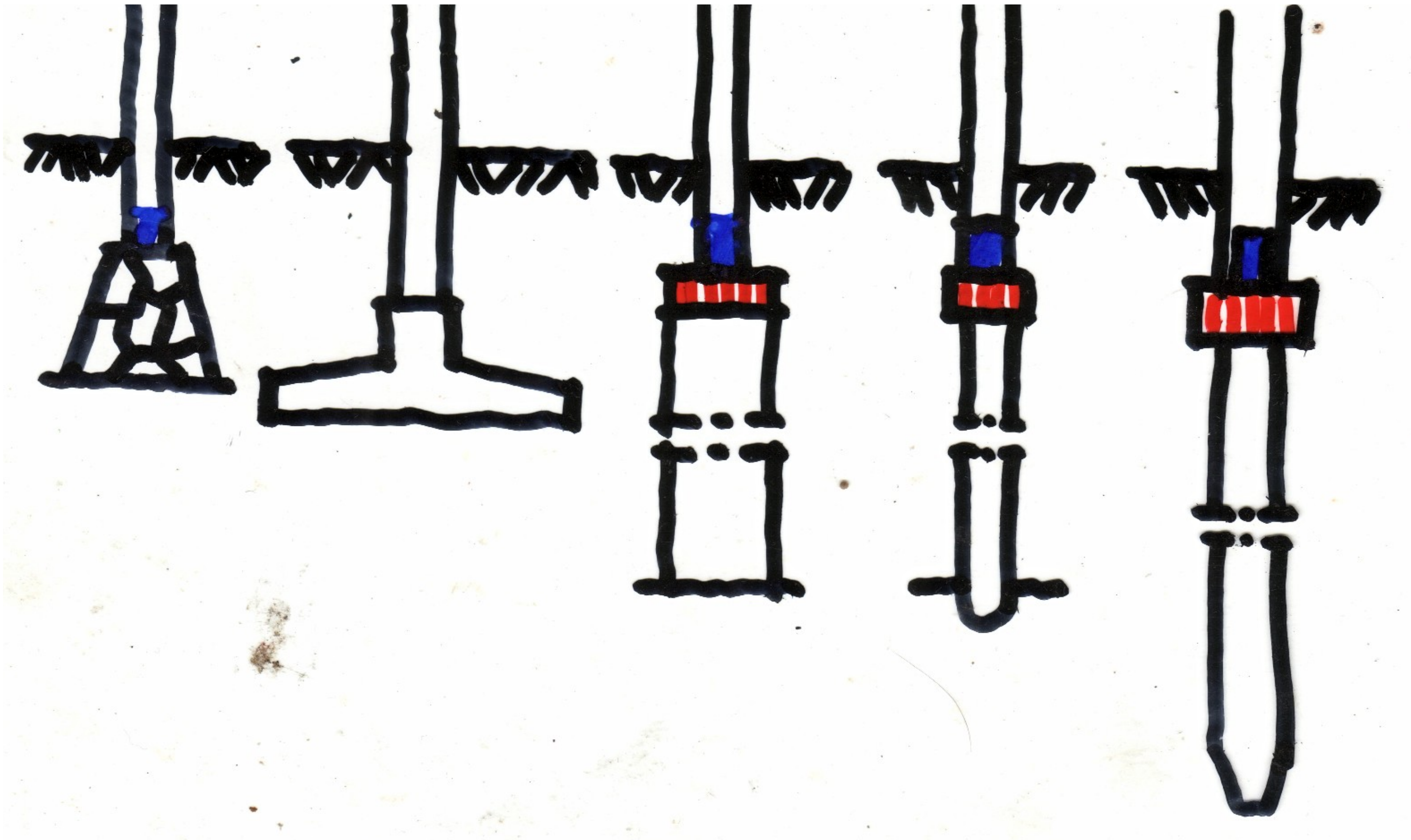
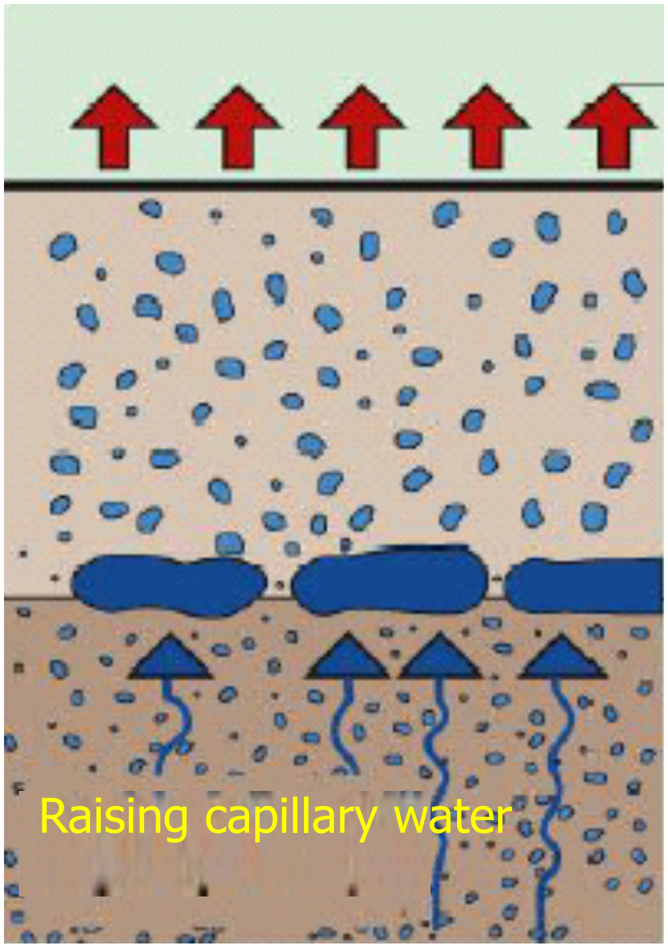


Horizons
O
A
B
C
0"
2"
10"
30"
48"

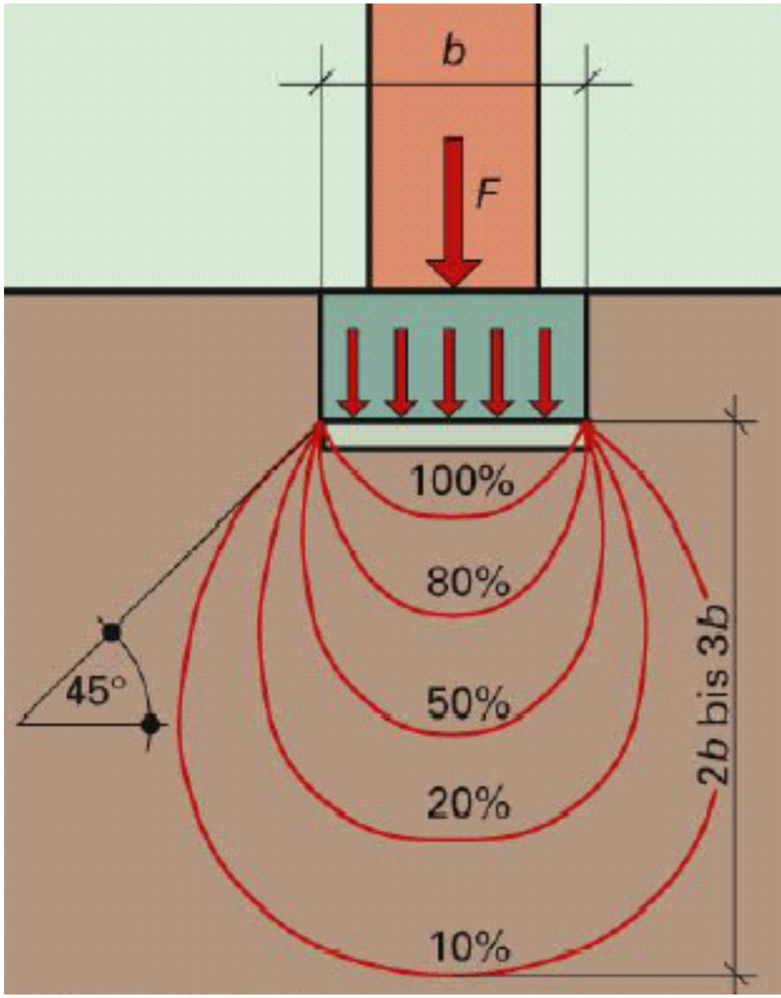


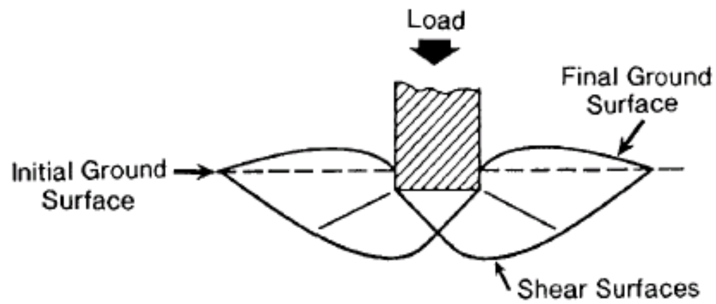
Tipe umum pondasi berdasarkan kedalamannya

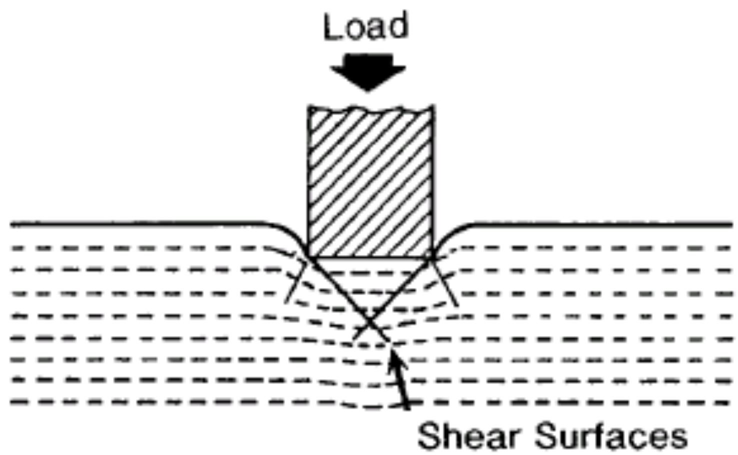


Raising soil due to increasing volume

Frost zone
0.8 – 1.2 m







Isobar of tension pressure (%)

$$\sigma = \frac{F\ (kN)}{A\ (m^2)}$$

$$A = \frac{F\ (kN)}{\sigma\ (kN/m^2)}$$

The 2:1 method

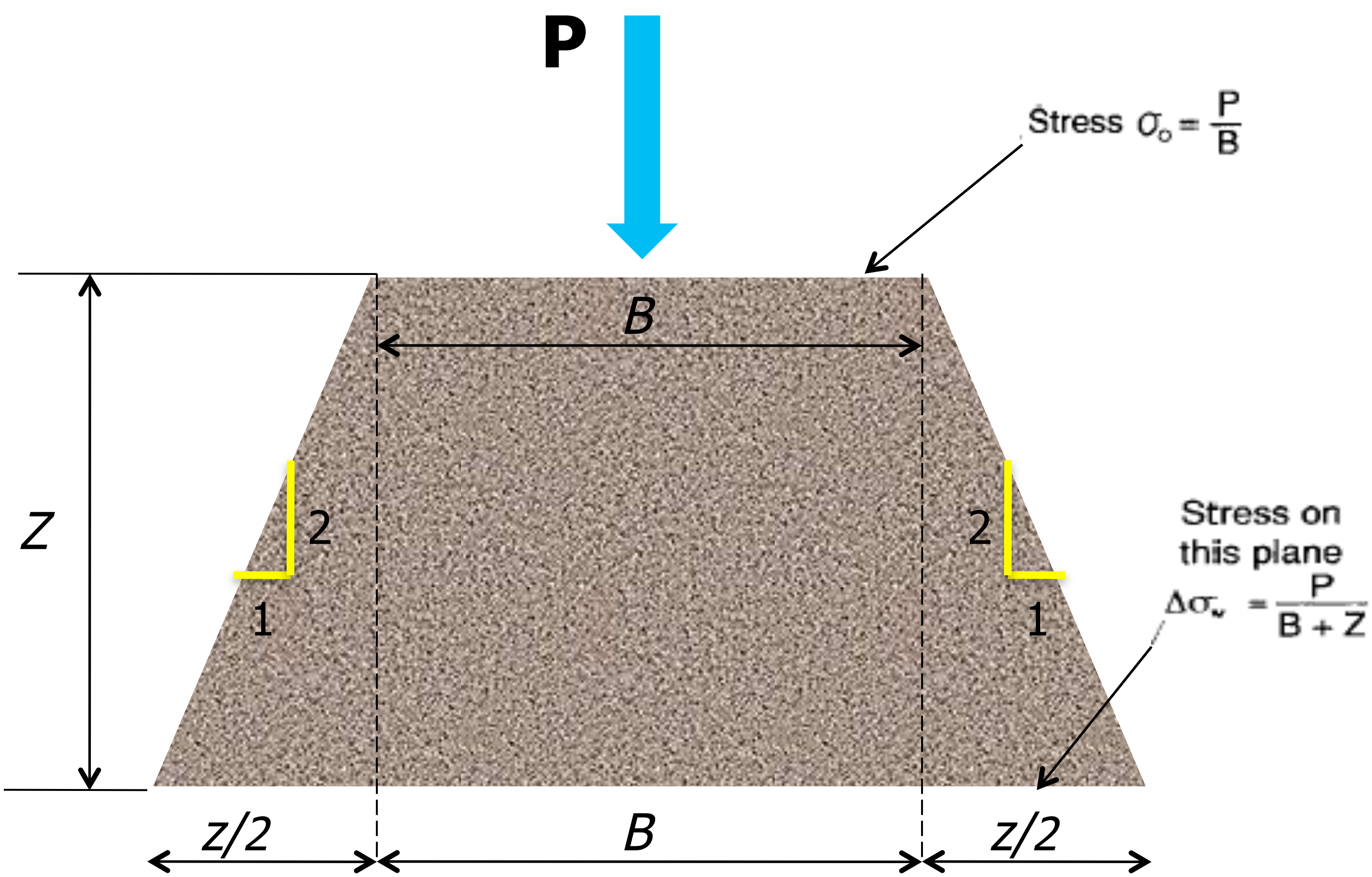
assumes that the stress dissipates with depth in the form of a trapezoid that has 2:1 (vertical: horizontal) inclined sides.

The purpose of this method is to approximate the actual ‘‘pressure bulb’’ stress increase beneath a footing.

$$\sigma_z = \Delta\sigma_v = \frac{\boldsymbol{P}}{B + z}$$

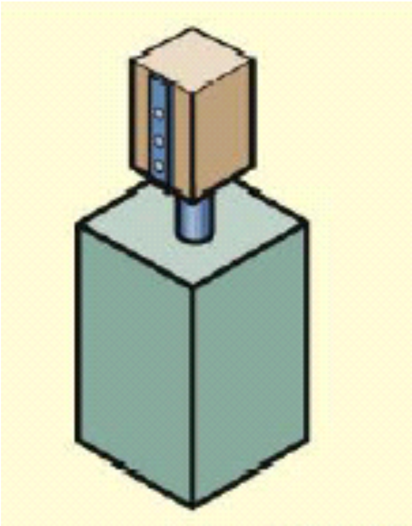
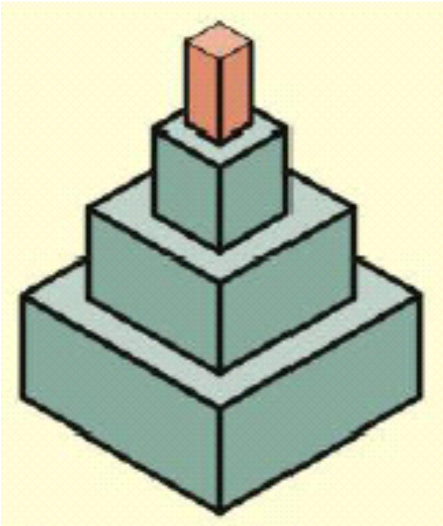
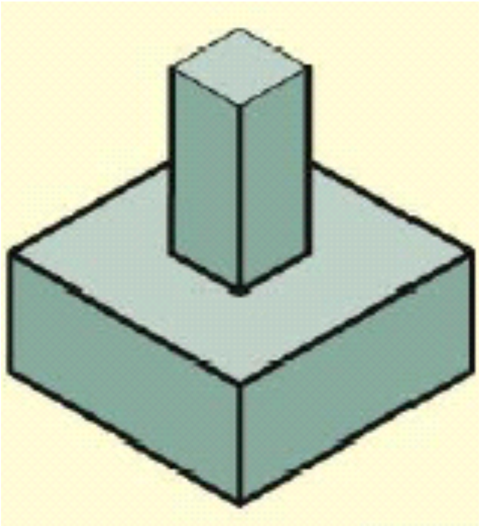
If the footing is a rectangular spread footing having a length L and a width B, then the stress applied by the rectangular footing (σo) would be $\sigma o = P/ (BL)$ where P entire load of the rectangular spread footing.

$$\sigma_z = \Delta\sigma_v = \frac{\boldsymbol{P}}{(B+z)\,(L+z)}$$


P
Stress $\sigma_o = \frac{P}{B}$
B
Z
2
1
2
1
Stress on this plane
$\Delta\sigma_v = \frac{P}{B+Z}$
z/2
B
z/2

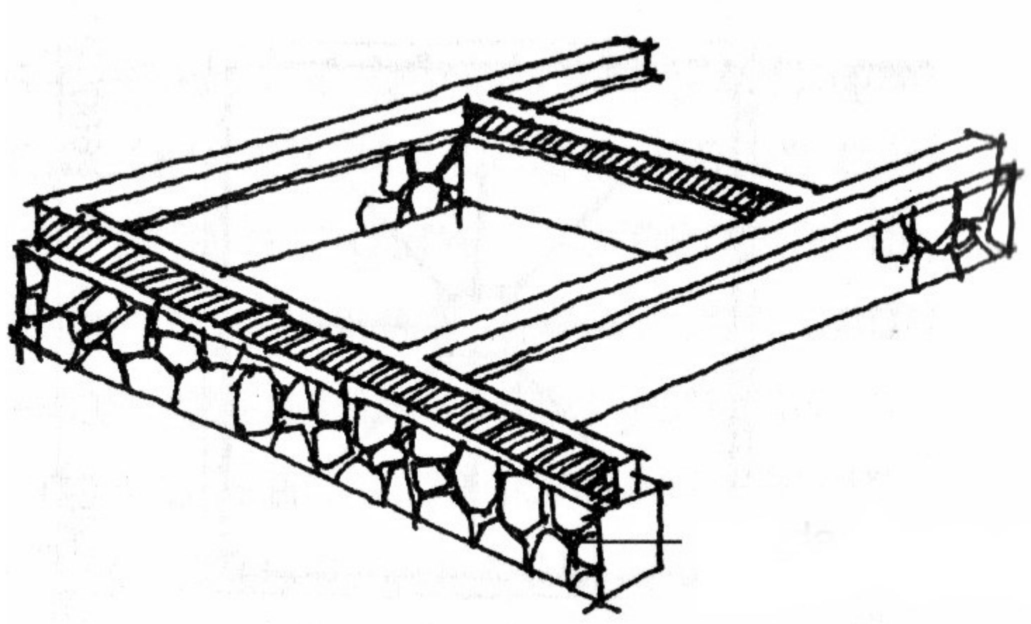
Spread footings (or pad footings)

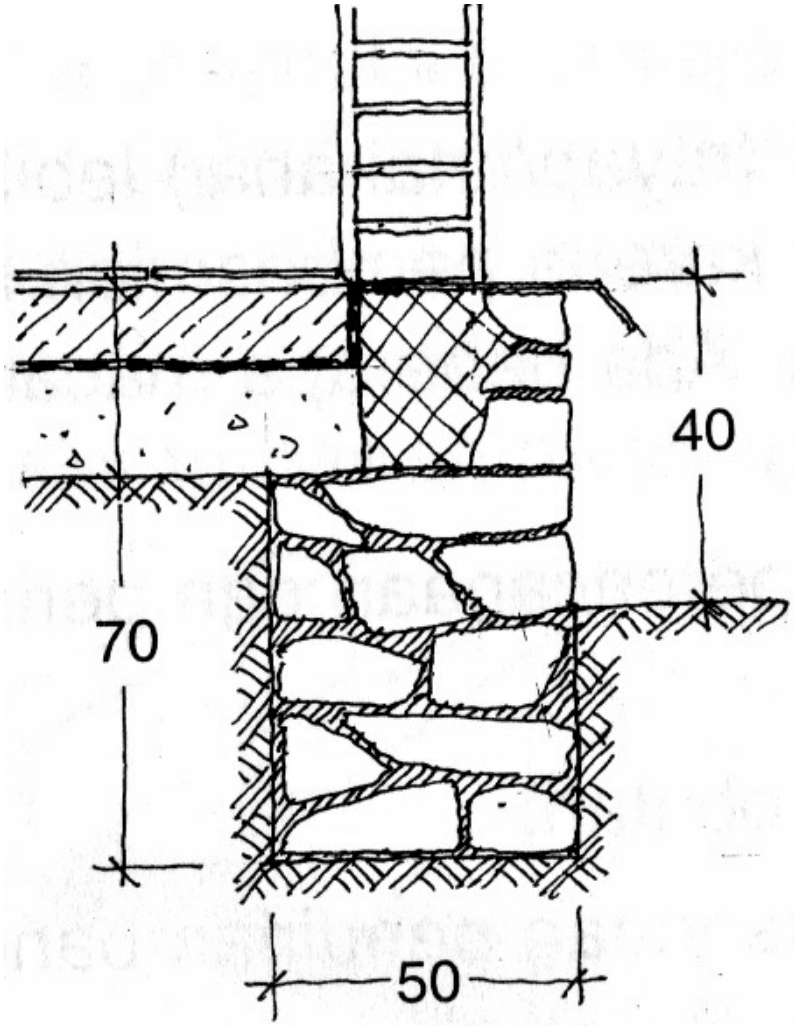
are often square in plan view, are of uniform reinforced-concrete thickness, and are used to support a single-column load located directly in the center of the footing.

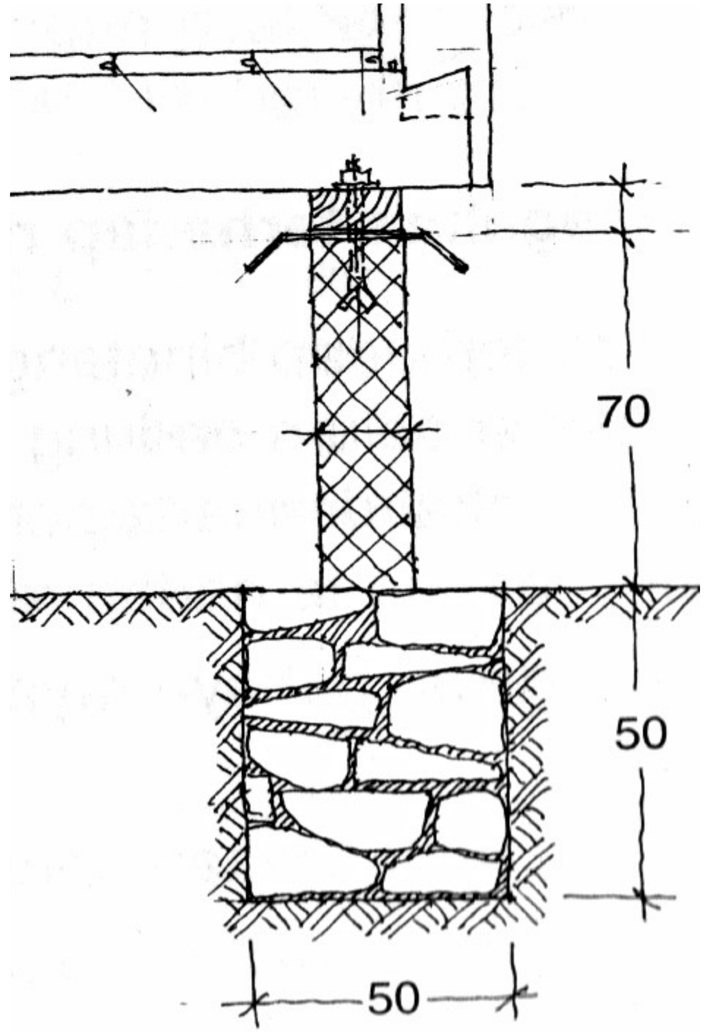




Strip footings (or wall footings)

are often used for load-bearing walls. They are usually long, wall footings reinforced-concrete members of uniform width and shallow depth.




40
70
50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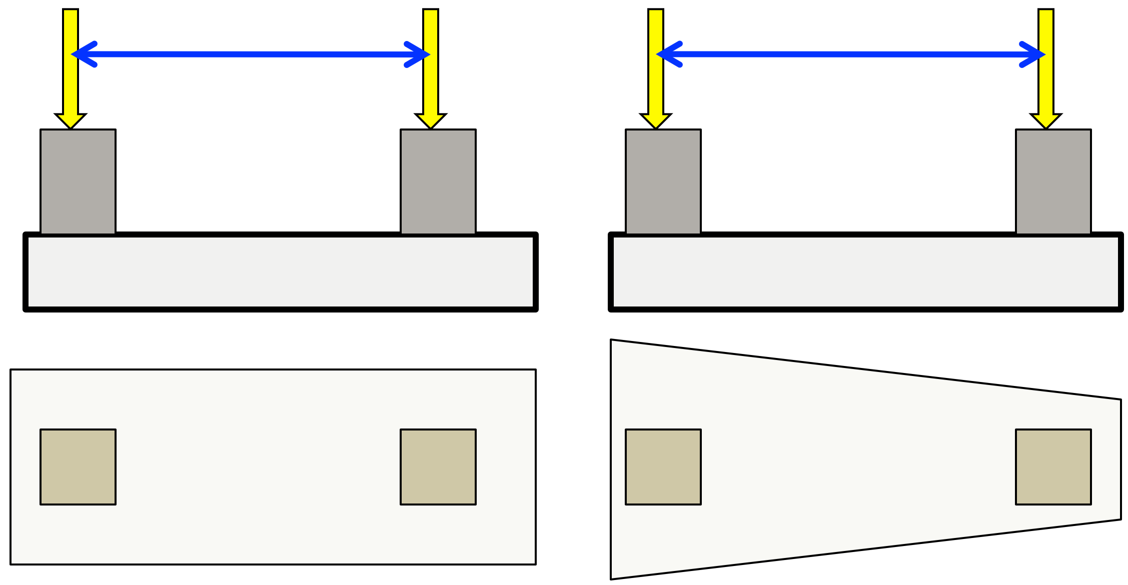
Reinforced-concrete combined footings

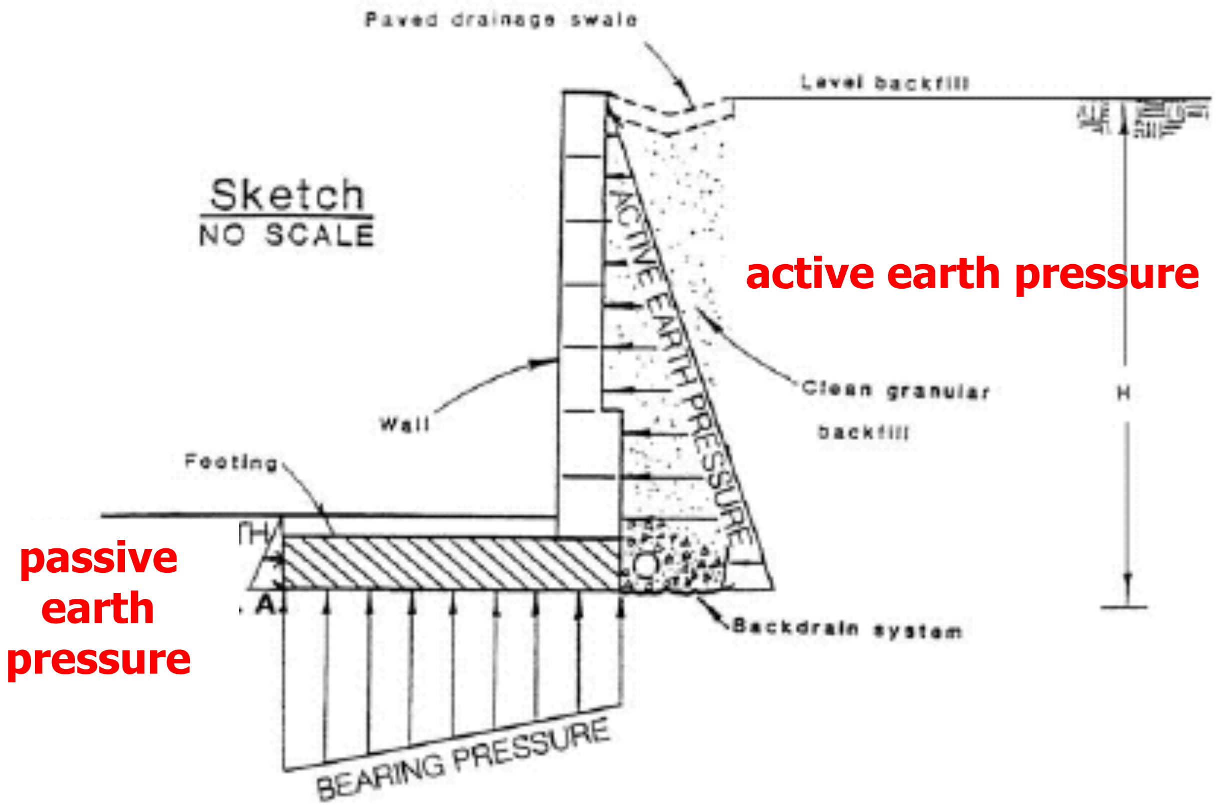
are often rectangular or trapezoidal in plan view, and carry more than one column load.



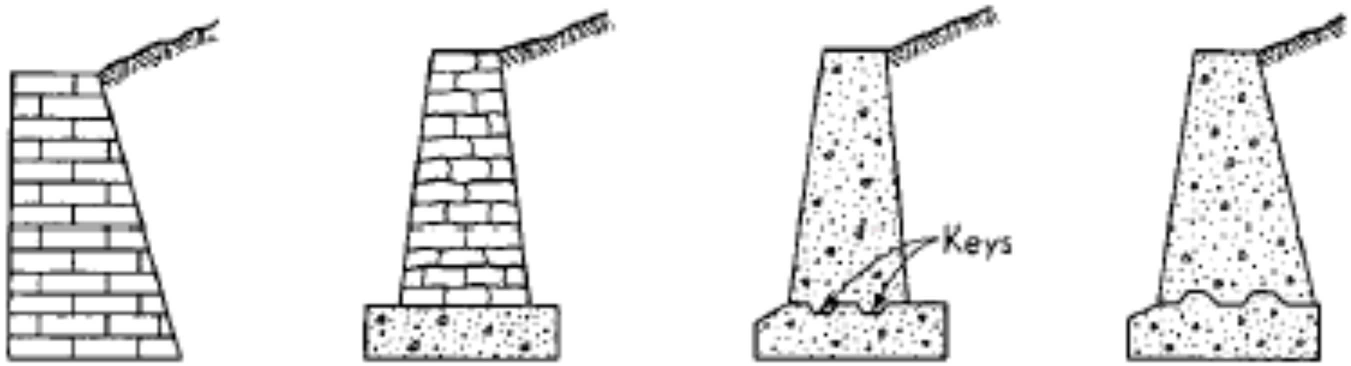
A retaining wall

a structure whose primary purpose is to provide lateral support for soil or rock. In some cases, such as basement walls and certain types of bridge abutments, it may also support vertical loads.

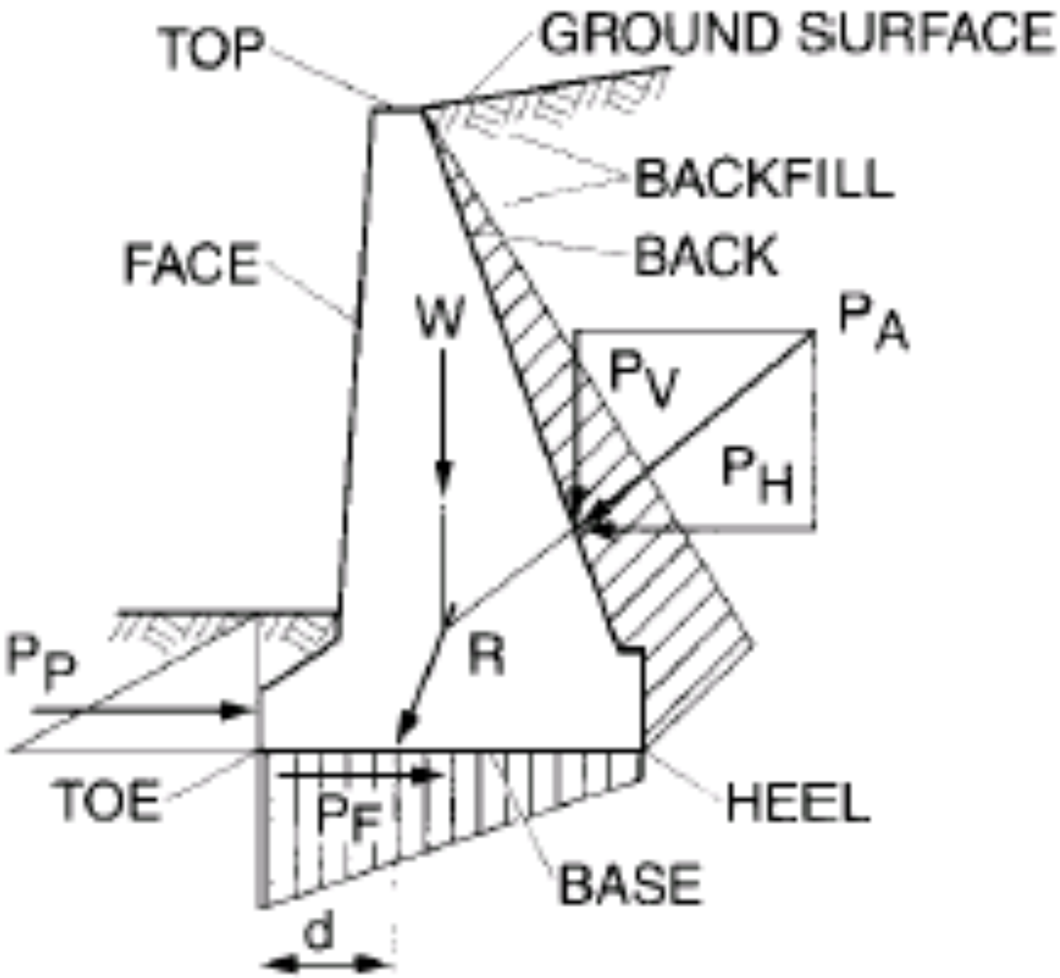
The more common types of retaining walls are gravity walls, cantilevered walls, counter fort walls, and crib walls.



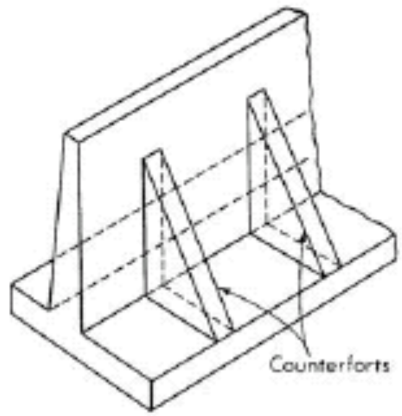
Granular soils (sands or gravels) are the standard recommendation for backfill material.

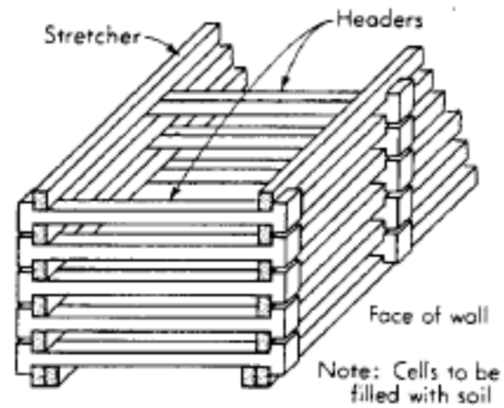


Gravity retaining walls are routinely built of plain concrete or stone, and the wall depends primarily on its massive weight to resist failure from overturning and sliding.



TOP
GROUND SURFACE
BACKFILL
BACK
FACE
W
P_A
P_V
P_H
P_P
R
TOE
P_F
HEEL
BASE
d





Cantilevered retaining wall

Counterfort or buttressed wall. consist of a footing, a wall stem, and intermittent vertical ribs (called counterforts) that tie the footing and wall stem together.

Crib walls consist of interlocking concrete members that form cells which are then filled with compacted soil.