# Material properties

For the material properties we looked at previous years of Earthy. In earthy 19 material test were performed at the faculty to test the effect of different brick compositions. After reading through all of the reports the results varied quite a lot. Therefore it was decided to keep looking. Eventually we decided on looking at the reports of last year (earthy 20) and going with values used there.

The decision was made to use the bricks made of water, clay and fine sand. These bricks are quite strong and contain materials that can easily be found in the area of the Zataari refugee cap. The values taken for this material are:

| | |
|---|---|
| Young's modulus | 150 N/mm2 |
| Compressive strength | 2,5 N/mm2 |
| Compressive strength after safety factor | 1,5 N/mm2 |
| Self-weight | 12 kN/m3 |

These values are used as the inputs for Karamba and are taken form the house of heritage group. Karamba is the software that was used for the Finite element modelling in this project because of our previous experience with the program. Karamba is a program that works in Grasshopper which works in Rhino. The values used to perform the Finite elements analyses are:

| | |
|---|---|
| Yield strength | 1000 kN/cm2 |
| Young's modulus | 10 kN/cm2 |
| Self-weight | 15 kN/m3 |

In the consultations with C. Andritos it was discussed that the yield strength could be assumed to be unlimited. This is because only the stress and the displacement are relevant. The compressive strength and the tensile strength are not used as inputs for karamba but are compared to the results of the FEM calculation to verify the structure.

Figure 1: Clay (Fontes refractories, 2021)

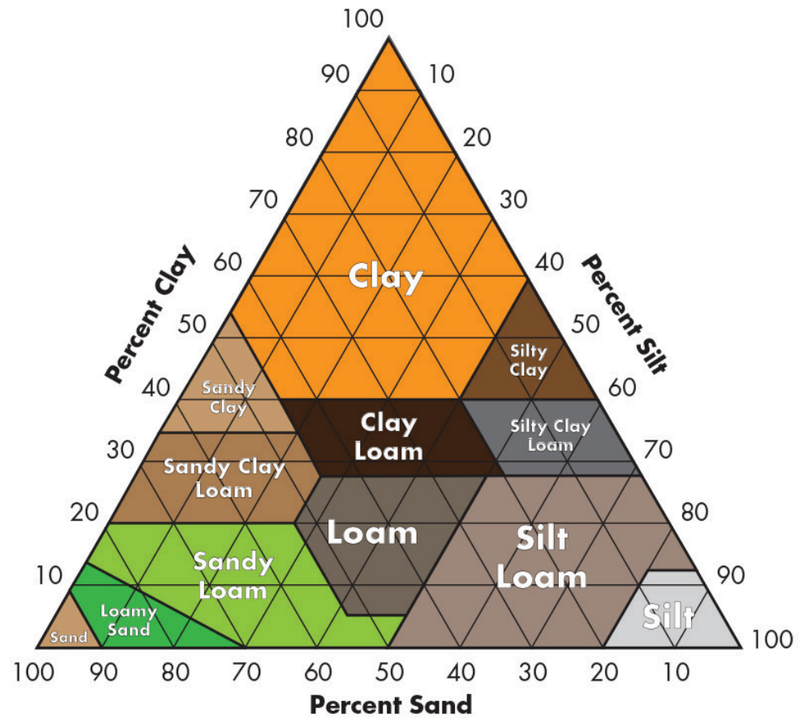


Figure 2: Soil triangle (Trugreen, 2021)