

## AEN 4131: FARM STRUCTURES

### ASSIGNMENT 3

Due date: May 23, 2024

#### Question One

- (a) Concrete is a very common and durable building material. Apart from placing, compaction and curing factors, give two factors that affect the strength of concrete.
- (b) A concrete floor for a maize shed of 25 m long and 10m wide is planned. It is felt that the layer of the concrete slab should be 7.2cm. Your colleague bought enough concrete blocks for the foundation wall. You are tasked to estimate the amount of materials needed just for the concrete slab.

Assume the following about the materials:

Moisture content of river sand is 3%.

Stones are completely dry.

Bulk density of dry sand is 1400kg/m<sup>3</sup>.

Bulk density of dry stones is 1600kg/m<sup>3</sup>.

Density of water is 1000kg/m<sup>3</sup>.

The volume of the concrete is two third (2/3) of the sum of volumes of the mixed individual materials. And the concrete use efficiency is 95%.

#### The nominal mix for the concrete is 1:3:4

- i. Determine the maximum size of the coarse aggregate (stones)
- ii. Calculate the number of bags of cement that are required.
- iii. How many tones of stones would be bought?
- iv. How many tones of sand would be bought?
- v. If you desire to achieve a water cement ratio of 0.7, how many litres of water would be added to the concrete mix?

#### Question Two

A farmer is building a maize shed concrete slab of 30m long, 15m wide and 0.1m thick. The farmer has already built the foundation walls and has already backfilled the foundation. You are told to approximate the cost of building the slab. You feel for a maize shed slab a nominal mix of 1:3:5 is ideal.

Calculate the total cost of building the concrete slab assuming it has no reinforcement. You are informed of the following unit costs for the necessary materials and labour.

Stones cost K70.00/tonne, Sand costs K65.00/tonne, Cement costs K140.00/50kg (37L) bag of cement, Labour costs are charged per completed slab as K3,500.00 and Water is drawn from the neighbouring farm at a cost of K20.00/200L drum.

Properties of the aggregate you intend to buy are as follows:

Moisture content of sand: 2%, Moisture content of stones: 1%, Bulk density of the dry sand: 1400 kg/m<sup>3</sup> Bulk density of the dry stones: 1600 kg/m<sup>3</sup>

The decrease in volume is to 34% and wastage to be 6%