

A contractor is estimating the amount of soil to be removed in order to build the 4 feet base footings and the 1-foot thick foundation walls for an office building. According to the structural design, the footing will reside 6 feet underground with a height of 1 foot. Geotechnical tests show that the soil is made up of clay. The contractor estimates that it is necessary to allocate 2 feet for working space on both sides of the footings to set up the formwork for the foundation walls. The plans call for 700 LF of foundation walls.

How much earth will the contractor have to remove and handle?

How much earth will the contractor have to dispose of assuming that the excavation will be backfilled to the original level?

Estimate the amounts of materials required to build the foundation wall.

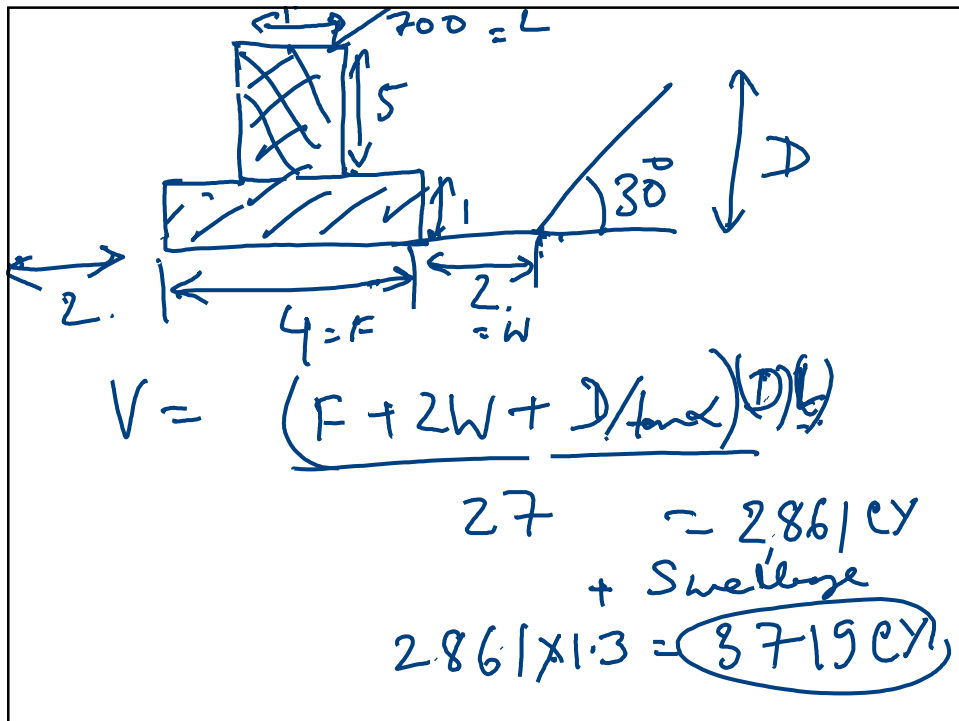
Concrete will be produced on site following a 1:2:2.25 mixture by volume.

The wall reinforcement consists of horizontal and vertical steel bars.

The horizontal reinforcement is made up of #4 bars spaced at 10" from one another at both sides of the wall.

The vertical reinforcement is made up of U-shaped #3 bars located every 2 feet along the wall.

Finally, the 170 lb/CF concrete will be poured at a rate of 4 feet/hour. The concrete temperature is expected to be 70 °F.



Vol of earth to be ditch
 $= [(4)(1) + (5)(1)] 700 / 27 \times 1.3$
 $\approx 303 \text{ CY}$

Estimating Cement-

$$= (A \times L \times W) / 27$$

$$= (5 \times 700 \times 1.05) / 27$$

$$= 136 \text{ CY}$$

1 : 2 : 2.25

$$CA = 0.65 \times 136 \text{ CY} = 89$$

$$FA = 0.56 \times 136 \text{ CY} = 77$$

$$\text{Cement} = 7.75 \times 136 \text{ Sacks} = 1054$$

Estimating Reinf.

Horiz. (#4 bars)

$$= \underline{L} \times (\underline{W} / \underline{H}) \times (2) \times \underline{W}$$

$$= 700 \times (60 / 10) \times 2 \times 1.1$$

$$= \textcircled{x} 4.$$

$$\rightarrow * 0.668 \text{ lb/LF}$$

$$= \text{---} \text{ lb.}$$

Vent. Reinf-

$$LF = [(WL)/(VS)] (WH) (W) \times 2.$$

$$= \text{---} \rightarrow \text{lbs} / 2000 \rightarrow \text{tons.}$$

FORMWORK: 170 lb/cf
4 ft/hr
70 ft

Cone. Pressure
→ lb/sf

150 lb/cf
70°F
4 ft/hr

Table
664 lb/sf

$$\frac{170 \times 664}{150} = 753 \text{ lb/sf}$$

Spacing for formwork ←

Table

Uses (Divide)

- Studs

- Walls

- Sills

Nails
Ties
X # Uses

LF of lumber.

↳ 5507 LF of 2x4
Lumber.