Estimating in Building Construction | (8th Edition)

Problem

Using a waste factor of 5 percent, determine the number of cubic yards of concrete needed to pour the foundation walls shown in Figures 1 and 2.

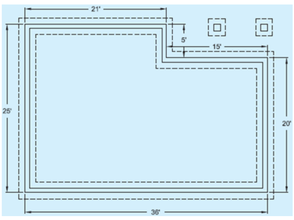


Figure 1. Foundation Plan.

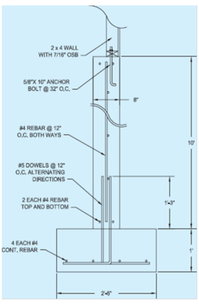


Figure 2. Foundation Section.

Step-by-step solution

Step 1 of 3

Calculate the volume of concrete by using the equation.

$$\begin{pmatrix}\text{Volume of}\\ \text{concrete}\end{pmatrix} = \begin{pmatrix}\text{Volume of concrete required for the}\\ \text{continuous wall foundation of the building}\end{pmatrix} \times \begin{pmatrix}\text{Waste factor}\\ \text{of 5\%}\end{pmatrix} \quad \ldots\ldots (1)$$

Calculate the Volume of concrete required for the continuous wall foundation of the building by using the equation.

$$\begin{pmatrix}\text{Volume of concrete required for the}\\ \text{continuous wall foundation of the building}\end{pmatrix} = A \times L \quad \ldots\ldots (2)$$

Here, A is cross sectional area of the footing and L is length of the building.

Calculation cross sectional area of the footing

$$A = b \times h$$

Here b is width of the footing and h is height of the footing.

Substitute $10'$ for h and $8'$ for b

$$\begin{aligned} A &= 10' \times 8'' \\ &= 10' \times \frac{8}{12} \\ &= 6.667' \end{aligned}$$

Comment

Step 2 of 3

Calculate length of the building.

$$\begin{aligned} L &= 25' + 21' + 5' + 15' + 20' + 36' \\ &= 122 \text{ ft} \end{aligned}$$

Substitute 122 ft for L and 6.667 ft for A in equation (2).

$$\begin{aligned} \begin{pmatrix}\text{Volume of concrete required for the}\\ \text{continuous wall foundation of the building}\end{pmatrix} &= A \times L \\ &= 6.667 \times 122 \\ &= 813.374 \text{ cubic feet} \end{aligned}$$

Comment

Step 3 of 3

Convert the units of cubic feet to cubic yards.

Here, $1 \text{cubic yard} = 27 \text{ cubic feet}$

$$\begin{aligned} \begin{pmatrix}\text{Volume of concrete required for the}\\ \text{continuous wall foundation of the building}\end{pmatrix} &= \frac{813.33 \text{ cubic feet}}{27} \\ &= 30.12 \text{ cubicyards} \end{aligned}$$

Substitute 30.12 cubic yards for the volume of concrete required for the continuous wall foundation of the building and $(1+5\%)$ for waste factor.

$$\begin{aligned} \begin{pmatrix}\text{Volume of}\\ \text{concrete}\end{pmatrix} &= \begin{pmatrix}\text{Volume of concrete required for the}\\ \text{continuous wall foundation of the building}\end{pmatrix} \times \begin{pmatrix}\text{Waste factor}\\ \text{of 5\%}\end{pmatrix} \\ &= 30.12 \times (1+5\%) \\ &= 30.12 \times 1.05 \\ &= 31.62 \text{cubicyards} \end{aligned}$$

Use 32 cubic yards of concrete.

Therefore, required volume of concrete is $\boxed{32 \text{ cubic yards}}$.

Comment

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Recommended solutions for you in Chapter 10

Chapter 10, Problem 23RQ

Determine the number of linear feet of forms needed for the continuous footings shown in Figures 1 and 2.Figure 1. Foundation Plan.Figure 2. Foundation Section.

See solution

Chapter 10, Problem 6RQ

Where would the estimator most likely find the strength of the concrete required?

See solution

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