# Practice Exam 2

**41.** A jobsite needs 120,000 bank cubic yards (BCY) of soil that will be compacted to a unit weight of 135 lbf/ft$^3$. Soil with a unit weight of 120 lbf/ft$^3$ is available for fill from a borrow pit. Most nearly how much fill must be excavated from the borrow pit and brought to the jobsite to complete the earthwork?

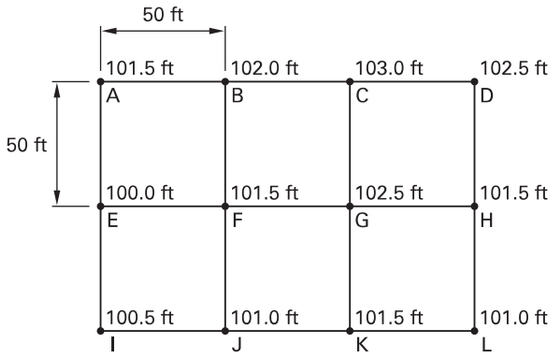
(A) 107,000 BCY

(B) 120,000 BCY

(C) 135,000 BCY

(D) 169,000 BCY

**42.** The existing topography of a borrow pit to be excavated to a depth of 95 ft is shown.




What is most nearly the volume of soil that must be removed from the pit?

(A) 600 yd$^3$

(B) 3600 yd$^3$

(C) 45,000 yd$^3$

(D) 100,000 yd$^3$

**43.** Which statement regarding construction site layout is FALSE according to *Occupational Safety and Health Regulations for the Construction Industry* (OSHA)?

(A) Jobsite trailers must be located in the corner opposite the entrance to the site.

(B) The contractor must provide adequate access roads into and through the site.

(C) The contractor must ensure that the construction area is firm and has been properly graded and drained.

(D) The contractor must consider safe storage of materials and safe operation of the erector's equipment when planning the site.

**44.** Earthwork end areas of cut and fill for six stations of a highway project are given. Assume the soil has a shrinkage factor of 0.2.

| | end area (ft$^2$) | |
|---|---|---|
| station | cut | fill |
| 0 | 45 | 20 |
| 1 | 50 | 13 |
| 2 | 57 | 0 |
| 3 | 23 | 30 |
| 4 | 0 | 29 |
| 5 | 0 | 23 |

What is most nearly the net cut or fill required for these six stations?

(A) 150 yd$^3$ cut

(B) 150 yd$^3$ fill

(C) 300 yd$^3$ cut

(D) 300 yd$^3$ fill

## Electrical Wiring and Conduit

Electrical wiring connects electrical devices such as light fixtures, outlets, panels, transformers, starters, motors, and motor controls. The most common wire sizes are listed in Table 2.3 with their corresponding diameters and ampacities (the maximum amount of electrical current a conductor or device can carry).

***Table 2.3*** *Typical Wire Sizes and Ampacity*

| AWG | diameter (mils) | ampacity (mils) |
|---|---|---|
| 18 | 40 | – |
| 17 | 45 | – |
| 16 | 51 | – |
| 15 | 57 | – |
| 14 | 64 | 20 |
| 12 | 81 | 25 |
| 10 | 102 | 30 |
| 8 | 128 | 40 |
| 6 | 162 | 55 |
| 4 | 204 | 70 |
| 3 | 229 | 85 |
| 2 | 258 | 95 |
| 1 | 289 | 110 |
| 0 | 325 | 125 |
| 00 | 365 | 145 |
| 000 | 410 | 165 |

Conductors are typically installed in conduits to protect them from damage and to prevent electrical fires. A conduit and protective covering surround conductors. The most common conduit types are listed in Table 2.4.

***Table 2.4*** *Typical Conduit Types and Sizes*

| name | size (in) | length (ft) |
|---|---|---|
| intermediate metalconduit (IMC) | ½ to 4 | 10 |
| rigid metal conduit (RMC) | ½ to 6 | 10 |
| rigid nonmetallic conduit (RNC) | ½ to 6 | 25 |
| electrical metallic tubing (EMT) | 1½ to 4 | 10 |
| flexible metal conduit (FMC) | ⅜ to 4 | 25, 50, or 100 |

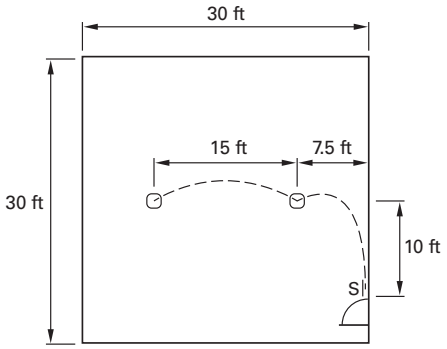
Romex is the most common type of electrical wire used in residential structures. Romex consists of two to three conductors, sizes no. 12 or no. 14, and a ground wire, contained in thermoplastic sheathing. Most residential electrical wiring does not require the use of conduits.

Conductors installed in commercial and industrial structures are sized and installed based on length and the electrical load they must carry. For the most part, all commercial wiring is run in conduits.

To estimate how much electrical wiring is needed for an installation, determine the length of wiring for each wire run as well as the length of each conduit used to encase the wiring. Electrical wiring is typically run vertically within walls and horizontally within the ceiling. Ideally, the wire and conduit are run parallel to walls. To determine the length of wire required between electrical devices, the horizontal distance between electrical devices and the vertical distance within the walls must be taken into account. Additionally, 1 ft is typically added to an electrical wire where it connects to an electrical device. Material and labor costs for wiring and conduit are commonly calculated based on the cost per 100 ft or 1000 ft of conduit or conductor.

**Example 2.11**

A 30 ft × 30 ft room has a ceiling height of 10 ft. Two light fixtures are placed 15 ft apart and 7.5 ft from the walls. The fixtures must be wired to a switch by the door, 10 ft from the center of the wall and 4 ft above the floor. No. 10 copper will be installed in ¾ in IMC conduit. Approximately how many lengths of conduit and wiring should be ordered?



plan view

*Solution*

First, determine the length of conduit required. The conduit will run horizontally along the ceiling (15 ft + 7.5 ft), turn toward the light switch (10 ft), and then down 6 ft to the light switch. This results in a total of 38.5 ft. For purchasing purposes, four 10 ft lengths of IMC conduit must be purchased.

Next, the length of wiring must be calculated. An extra foot must be added at each end of the wiring between the light fixtures, which results in 17 ft (1 ft + 15 ft + 1 ft). A foot must also be added to each end of the section of wire between the light fixture and light switch. The vertical distance of 6 ft must also be added to the 7.5 ft shown in the figure. This results in a total distance of 25.5 ft (1 ft + 7.5 ft + 10 ft + 6 ft + 1 ft). Conduit to power a circuit must be run in threes, so a total of ~~76.5~~ ft ~~(25.5 ft × 3)~~ is required.