
Activity 3.2.9 Sizing a Spread Footing

Introduction

The foundation is the final structural element in a building through which the design loads will pass. Every load applied to the building must be transferred through a foundation to the supporting soil. Although the design of a building can often be used on many different sites, the foundation design depends on the soils on which the building rests. Therefore, foundation design is site-specific.

In this activity you will use the site-specific soils information to size spread footings for several different buildings.

Equipment

- Engineering notebook
- Calculator
- Pencil

Procedure

Find an economical spread footing size for the following situations.

1. Barnes and Noble is interested in purchasing a two story building for a new retail store. They plan to use the first floor as the display/sales area and the second floor for storage of inventory. Before buying the property, they have asked Jones and Wentworth Engineers to verify that the building is safe for the intended use. The engineer assigned to the project has determined that the interior columns will carry a load of 32 kips (= 32,000 lb). The columns rest on spread footings that are 4 ft by 6 ft and 1.5 ft thick. Note that the column load does not include the weight of the footing. If the footing rests on silty sand, can the footing safely carry the column load?
2. A column carries 5400 pounds of load and is supported on a spread footing. The footing rests on coarse sand. Design the smallest square footing (to the next 3 inch increment) that will safely carry the column load. The footing will be 1ft 9 in. deep and will be constructed of cast-in-place concrete. Note: Concrete weights 150 pcf.
3. A column carries a load of 22 kips and is supported on a 2 ft thick spread footing which rests on clay. Size the smallest round footing (to the next 6 inches) that can support the load.

4. An existing building is suffering from cracks in the exterior walls. The investigating engineer wants to ensure that the foundations are not overloaded. The existing columns carry dead + live load of 45,000 pounds. The footings are 3 ft 6 in. x 3 ft 6 in. x 1 ft 6 in. thick and rest on sandy soil. The soils report estimates the allowable soil bearing pressure to be 2500 psf. Determine whether the existing footings are adequate to carry the load.

Conclusion

1. What recommendation would you make if you discovered that the required column footing size was so large that adjacent footings would nearly touch each other?
2. Give similarities and differences in the design of a continuous footing under a load bearing wall and a spread footing under a column.