



## Activity 2.3.5B Residential Concrete Estimation (Optional)

### Introduction

Cement bonding with water is the key to making concrete. The remainder of the concrete is filler such as sand and aggregate. In 1824 Joseph Aspdin invented Portland cement. While limestone and/or clay had previously been used to create cement, Aspdin improved cement's properties by burning, grinding, and combining limestone and clay. This discovery changed the chemical properties to make the cement much stronger. Today Portland cement remains the most widely used in concrete production.

### Equipment

-  Engineering notebook
-  Calculator

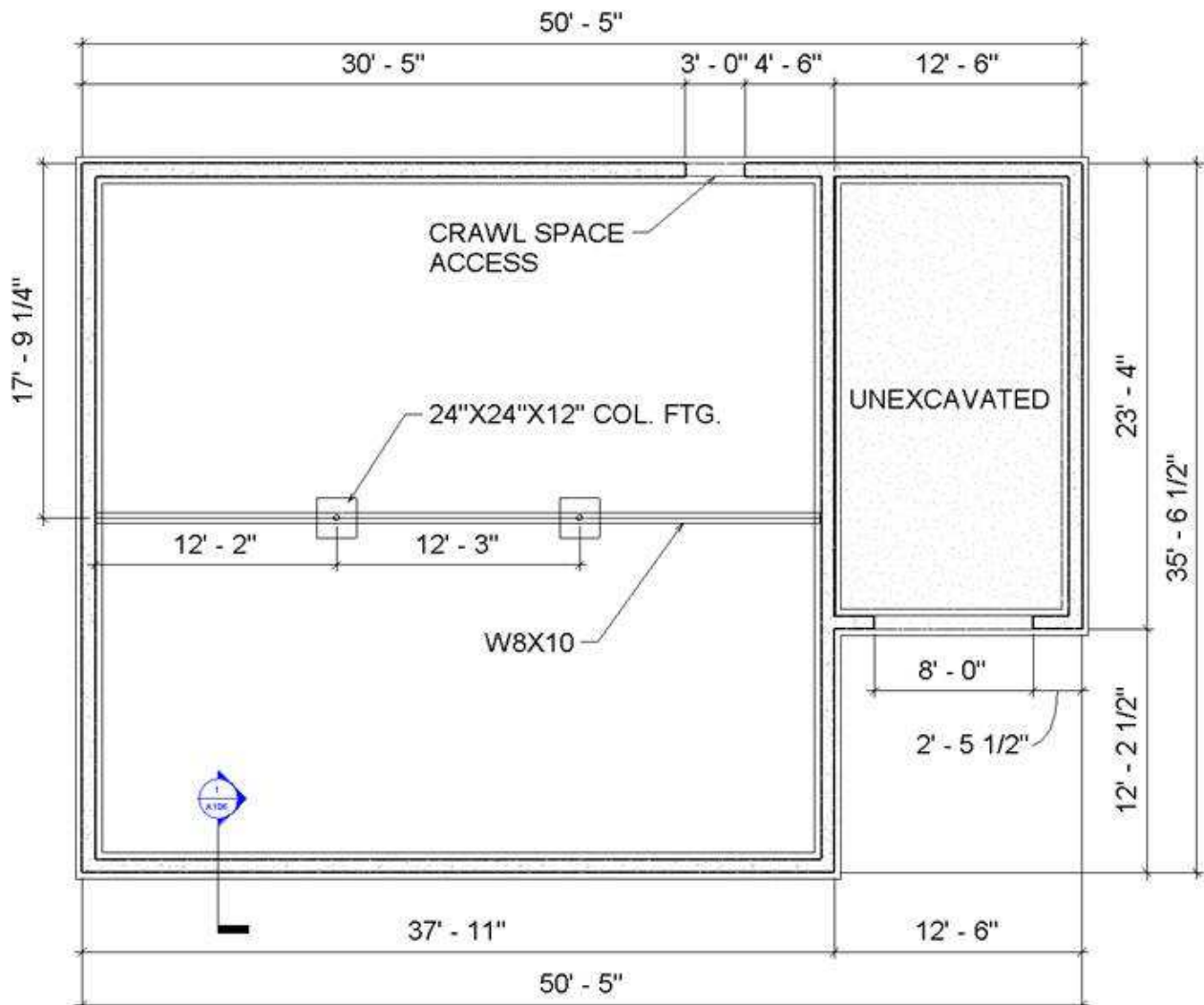
### Procedure

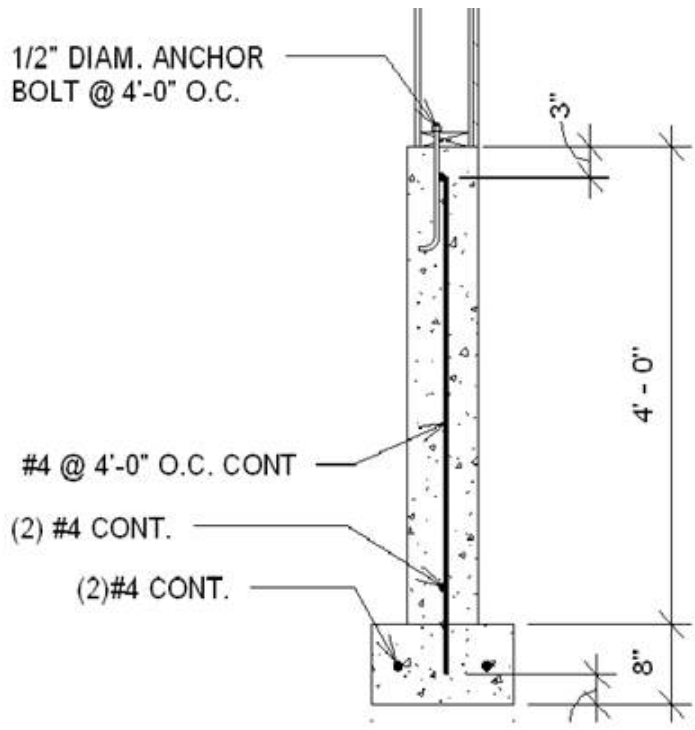
#### Cost for a Residential Structure

You will calculate the cost of concrete and rebar to construct a concrete foundation, footings, and garage floor for the house shown below. Remember to include the interior wall between the garage and crawl space. Show all of your work in your engineering notebook and use a table to clearly present your findings.

#### Dimensions

Foundation	8 in. thick, 4 ft high, containing two rows of continuous horizontal #4 rebar and #4 at 4 ft 0 in. O.C. vertical reinforcing
Wall (Strip) Footings	8 in. thick, 16 in. wide continuous footing, containing two rows of continuous #4 rebar
Column (Spread) Footings	Size is indicated; use four pieces of rebar for each
Garage Floor	4 in. thick, with #4 rebar spaced on a 24 in. grid max (assume 3 in. edge distance to first row)





1/2" DIAM. ANCHOR  
BOLT @ 4'-0" O.C.

#4 @ 4'-0" O.C. CONT

(2) #4 CONT.

(2)#4 CONT.

3"

4'-0"

8"

WALL FOUNDATION DETAIL

## Conclusion

1. Describe problems that will result from ordering too much concrete.
2. Describe problems that will result from ordering too little concrete.
3. What percentage of the total cost of the pad did the steel rebar account for?
4. Assume that the wall and column footings are placed such that the bottom of the footings is 4 inches below the frost depth of the house in a location near your school. At what distance above the ground will the top of the foundation wall fall?