

Objective

This assignment's purpose is twofold: (1) use the ACI concrete mix design procedure; and (2) continue to develop your spreadsheet skills.

Part 1. Use the [ACI method for concrete mix design](#) to proportion a 1 yd³ of concrete. Compute the weight of each mix component by hand to meet the following specifications.

Concrete is required for an interior column. The 28-day compressive strength should be 4,000 psi. The slump should be between 3 and 4 inches, and the maximum aggregate size should not exceed 1 inch. The properties of the materials are as follows:

- Cement: Type I, specific gravity = 3.15
- Coarse Aggregate: Bulk specific gravity (SSD) = 2.72;
absorption capacity = 1.3%;
dry-rodded unit weight = 103 lb/ft³;
surface moisture = 1%
- Fine Aggregate: Bulk specific gravity (SSD) = 2.67;
absorption capacity = 1.5%;
fineness modulus = 2.70
surface moisture = 2%

Follow the [homework format](#) given in class and report the weight of cement, water, coarse aggregate, and fine aggregate required per yd³ for this application. If we were to mix this concrete in the lab using the yellow mixer (about 1 ft³ in volume), what would be the required weight of cement, water, coarse aggregate, and fine aggregate?

Part 2. Develop an Excel spreadsheet that computes the amount of fine aggregate using the ACI Mix Design volume method, given the amounts of water, cement, and coarse aggregate, and then adjusts each mix component for moisture content.

Concrete is required for an interior column. The 28-day compressive strength should be 5,000 psi. The slump should be between 1 and 2 inches, and the maximum aggregate size should not exceed $\frac{3}{4}$ inch. The properties of the materials are as follows:

- Cement: Type I, specific gravity = 3.15
- Coarse Aggregate: Bulk specific gravity (SSD) = 2.70;
absorption capacity = 0.5%;
dry-rodded unit weight = 96 lb/ft³;
surface moisture = 1%
- Fine Aggregate: Bulk specific gravity (SSD) = 2.67;
absorption capacity = 1.1%;
fineness modulus = 2.70
surface moisture = 1.5%

In the Volume Calculation section, round your results to two decimal places. The final component weights should be rounded to the nearest integer in the Volume Calculation and Moisture Adjustment sections.

Part 3. Read Chapters 9 and 10 in "*A Mind for Numbers*" by Barbara Oakley.