

Objective

This assignment aims to develop an analysis tool that will complement your reinforced concrete beam design project and compute the cost-adjusted SWR from the beam data collected in the first week of Project #2.

Write a spreadsheet determining the mix proportion using the ACI method for non-air-entrained and air-entrained concrete. Write your spreadsheet so that the user may enter values for the design variables (the maximum aggregate size, the desired slump, and the 28-day compressive strength) and values for material constants (for example, specific gravity, dry-rodded unit weight, absorption capacity, and fineness modulus). Use the VLOOKUP function to search the data tables by rows and the MATCH function to select the appropriate column. [Click here for the Excel lookup function notes.](#)

Part 1. Compute the mix design for an interior column. The 28-day compressive strength should be 6,000 psi. The slump should be between 1 and 2 inches, and the maximum aggregate size should not exceed 1.5 inches. The properties of the materials are as follows:

Cement: Type I, specific gravity = 3.15

Coarse Aggregate: Bulk specific gravity (SSD) = 2.70;
dry-rodded unit weight = 105 lb/ft³;
absorption capacity = 1.1%;
surface moisture = -0.5%

Fine Aggregate: Bulk specific gravity (SSD) = 2.65;
fineness modulus = 2.70;
absorption capacity = 1.3%;
surface moisture = 1.0%

Part 2. Compute the mix design for an exterior column under extreme freeze-and-thaw conditions. 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;
dry-rodded unit weight = 100 lb/ft³;
absorption capacity = 0.5%;
surface moisture = 0.5%

Fine Aggregate: Bulk specific gravity (SSD) = 2.67;
fineness modulus = 2.70;
absorption capacity = 1.1%;
surface moisture = 1.0%

Part 3. Read Chapters 11 and 12 in "*A Mind for Numbers*" by Barbara Oakley.