

Annotated Code Document

Code	Annotation
UNIT_WEIGHT_WATER = 62.4 CUBIC_YARD_FT3 = 27.0	These are constants that represent properties required for conversions. 62.4 is the standard weight of water and 27 is the amount of feet to one cubic yard, both of which are the standard for NDOT concrete
$Q = (\text{data['A']} + \text{data['B']} + \text{data['C']} + \text{data['D']}) * \text{data['E']}$	In the excel worksheet, Q is calculated by summing all cementitious materials and multiplying the W/C ratio. This line of code calculates the total weight of water needed based on the total cementitious content (A+B+C+D) and the design of water to cementitious ratio E.
$R = \text{data['A']} / (\text{data['J']} * \text{UNIT_WEIGHT_WATER})$ $W = Q / \text{UNIT_WEIGHT_WATER}$	Replace the manual volume columns in the excel spreadsheet. For each material, divide by the product of its specific gravity and the unit weight of water. It converts the mass into volume which is a necessary to do to ensure the total mix equals one cubic yard
$Y = \text{UNIT_WEIGHT_WATER} * (\text{data['G']} / 100) * \text{data['N']} * X$	Automates the Absolute volume method used by the NDOT excel file. Once the total remaining volume X is found, its multiplied by the percentage of the specific aggregate G, specific gravity N, and the unit weight of water to ensure that the final batch weight is returned in pounds.