Automation of Concrete Mix Design Scope of Work

Project goals

The goal of this project is to migrate an existing concrete mix design model from an Excel-based workflow to a Python-based system. The client for this project is NDOT (Nebraska Department of Transportation). They would like us to replicate and automate the logic of the " Mix Design" worksheet so that the user can enter material properties and automatically generate the weight chart for one cubic yard of concrete. The client requests (1) A translation of the Excel logic into Python code. All of the calculations need to be replicated, and each major calculation should be clearly defined as a Python function. (2) Implement sequential user inputs. The client would like for the program to prompt the user to enter a required design input in a step-by-step fashion, an example of this is cement content, water–cement ratio, air content, and aggregate proportions. The inputs should be collected in a logical order and mirror the Excel worksheet. (3) Generate a final mix design. The program must produce a clearly formatted weight chart for one cubic yard of concrete. The output values should be labeled and presented in a professional manner that is readable to the client. (4) Evaluation of 4 concrete mix scenarios. In order to test the program, the client has requested 4 scenarios. The scenarios that are run are based on our own research.

Project Tasks

Task #1 – translate Excel logic to Python

Coding tasks:

- Get equations used in Excel
- Translate equations to Python
- Organize in similar fashion to Excel workbook

Research:

No research need for this task

Task #2 – implement sequential user inputs

Coding tasks:

- Draft code to request user inputs
- Ensure all inputs are included
- Ensure all inputs have correct set up

Research:

No research need for this task

Task #3 – Generate a final mix design output

Coding tasks:

- Organize code so clearly formatted
- Produce a weight chart for one cubic yard
- Label output values

Research:

No research need for this task

Task #4 – Preapre to evaluate four concreat mix senerios

Coding tasks:

- Must be evaluated using automatic work flow

Research:

- Use DOT references and other external sources to obtain 4 concrete mix scenarios.
- Ensure the mixes are expressible using the inputs required

Project Deliverables

Deliverable	File	Due Date
GitHub	GitHub Repository + README	2/24/26
Scope of work	Scope of work	2/24/26
Gantt Chart	Gantt Chart	2/24/26
Mix Scenarios	Research + Documentation	2/24/26
Python Code	Python Code	2/24/26
Annotated code document	Annotated code document	2/24/26
Written Technical Reprot	Written Technical Reprot	2/24/26