

Scope of Work

Project Title: Automation of NDOT Concrete Mix Design.

Client: Nebraska Department of Transportation

Date: February 23, 2026

Project Goal:

The goal of this project was to automate the Nebraska Department of Transportation concrete mix design process using Python in jupyter notebook. Transitioning the manual excel based calculations into jupyter notebook. The project aims to reduce calculation errors made in excel, standardize the given outputs for mix design, and allow for testing scenarios efficiently for given, common NDOT concrete classes.

Project Tasks:

Task 1: The core mathematical formulas from the NDOT excel file translated into python functions. Including the conversion of weights to volumes using specific gravity and the constant weight of water. In the code, it will specifically calculate three different categories; water weight (Q), material volumes (R-W), and aggregate weights (Y, Z, AA).

Task 2: The tool will be programmed to calculate and run four mix design scenarios (47B, 47BR, High Strength, 47B-Air) without the need to manually re-enter data. This automated tool will produce an analysis of each of these different mix designs and the requirements for each of the various NDOT needs.

Task 3: An annotated code document will be made for future project engineers as a tool they can use to help understand the program. It will include a written word document that describes the various code used throughout the jupyter notebook program.

Task 4: Write a final technical report to discuss findings from mix design results. This will include comparing the aggregate requirements and durability characteristics between the four scenarios that were tested.

Deliverables

1. **Automated Mix Design Tool:** Jupyter notebook (.ipynb) containing the code
2. **Scenario Result Summary:** A .csv file containing the outputs from the four required mix designs
3. **Annotated Code Document:** Step by step documentation explaining each line of code.

4. **Written report:** Technical report detailing the methods, results, and discussion on the different tested scenarios

Gantt Chart

Task/Activity	Week 1	Week 2	Week 3	Week 4
Logic and function Development	X	X		
Scenario Testing		X	X	
ACD and Documentation			X	X
Final Report and GitHub upload				X