

Scope of Work

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Client: Nebraska Department of Transportation (NDOT)

Project: Migration of NDOT Excel Logic to Python

Date: February 23, 2026

Project Goals

The main goal of this project is to update the concrete mix design process at the Nebraska Department of Transportation (NDOT). Our team will convert the existing Excel-based "Mix Design" workflow into a clear, repeatable, and modular Python system. The primary objectives include:

- Replacing manual data entry in spreadsheets with a step-by-step, user-friendly Python script. Replacing manual data entry in spreadsheets with a step-by-step, user-friendly Python script.
- Ensuring that the engineering logic is stable and modular to avoid the formula errors typically found in offline spreadsheets.
- Validating the new system by testing it against four realistic concrete-mix scenarios in accordance with professional engineering standards.
- Developing a codebase that can be easily integrated into future web-based engineering tools.

Project Tasks

Task 1 - Research and Logic Mapping

- The team will extract the necessary mathematical logic from the NDOT Concrete Mix Excel. We will identify all input variables, such as Cement Content, water-to-cement ratio, and specific gravities, and align them with their respective absolute volume calculations. This approach guarantees that the Python model accurately reflects the Mix Design worksheet.

Task 2 - Python Development

- Based on the established logic, the team will create a Python script in Jupyter Notebook. This will involve coding modular functions for converting volume to weight and normalizing total volume to ensure it sums to 27.0 cubic feet. We will also implement a sequential input loop to assist users in entering data in the same order as presented in the NDOT Excel sheet.

Task 3 - Scenario Research and Validation

- The team will investigate and outline four realistic concrete mix scenarios in accordance with the NDOT Standard Specifications for Highway Construction. These scenarios will then be analyzed using the Python model to ensure that the automated results align with anticipated engineering outcomes.

Task 4 - Documentational and Annotated Code

- We will develop an Annotated Code Document (ACD) that offers a detailed, line-by-line explanation of the script. This task includes thoroughly documenting the translation of each Excel formula into a Python function, ensuring clarity and transparency for future NDOT users or developers.

Task 5 - Final Reporting

- The team will compile all findings into a comprehensive Technical Report, which will include a comparison of the four test scenarios. At the same time, we will set up a GitHub repository that will house the code, a “README” User Guide, and the project management Gantt chart to meet all client delivery requirements.

Deliverables

Deliverable Item	Due Date
Functional Jupyter Notebook (.ipynb) with 4 Mix Scenarios	Feb 24, 2026
Annotated Code Document (ACD) explaining logic translation	Feb 24, 2026
Professional Gantt Chart (Project Schedule)	Feb 24, 2026
Final Technical Report (Intro, Methods, Results, Refs)	Feb 24, 2026
GitHub Repository link with README User Guide	Feb 24, 2026