
Executive Summary

The following thesis report analyzes four different topics that were seen as problematic areas in the Penn State Health and Human Development Building. Each analysis studies how the project could be impacted from the standpoints of cost, schedule, and quality. This thesis report will focus on the construction of the concrete stair tower, re-sequencing of the atrium system, a return air plenum, and alternative excavation options. Analyses of mechanical and structural breadths will offer support to finalize results and conclusions.

Analysis 1: Stair Tower Redesign

The current design of the structure is a steel braced frame with concrete shear walls in the stair towers and elevator shaft. This design caused many issues on this project as it took 1 week per level to construct and resulted in a very low quality product. The delay to the project schedule was increased as the concrete couldn't be poured during the winter months of the project. This analysis will look at changing this concrete structure into a steel braced frame in order to accelerate the schedule and improve quality. A structural breadth will be utilized in order to size the steel members. The cost and schedule implications associated with this change will be analyzed to determine which system would provide the best product for the project.

Analysis 2: Re-Sequencing of Atrium Systems

The project will contain a large atrium space which will include an elaborate stair system, an architectural screen wall, and a scaffolding system to install this work. The coordination of these trades is a major challenge for the project team. This analysis will study different options for sequencing this work and the speed, safety, and coordination implications associated with each. The goal of the analysis is to select the best option for the project sequencing plan.

Analysis 3: Return Air Plenum

The complexity of the ceiling spaces in the building bring forth an issue of schedule and coordination concern. In order to address this concern, the implementation of a return air plenum will be explored. This analysis will study the logistics of how the system works as well as the cost and schedule implications associated with the installation.

Analysis 4: Alternative Excavation Methods

The final analysis will examine alternative means of excavation. The project utilized rock excavation blasting as opposed to the traditional rock excavation method. This analysis will study the similarities and differences of the two methods as well as research alternative methods to perform rock excavation blasting.