

## **Executive Summary**

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This thesis report outlines the research of the construction of Health Sciences Facility III in Baltimore, Maryland. Throughout the year, the building as a whole was analyzed to understand and identify avenues of research in areas like constructability, schedule acceleration, or challenges on the project. These avenues of research developed into specific analyses to investigate based on specific goals in each analysis. All of the analyses cover a wide range of construction topics and are related to understanding value and how to improve value on the project, from the value of a product to the value of time spent performing certain tasks or using certain equipment on a job. This thesis presents the findings of three specific areas of research: alternative support of excavation methods on this project, motivation and its correlation to team performance and resource leveling for cash flow.

### **Analysis 1: Design of Shoring System**

One major challenge on the project included the dewatering system paired with the pile and lagging support of excavation surrounding the site. The project required dry soil in order to both achieve bearing capacity for the pours and to install the waterproofing membrane. Through the investigation of two alternative shoring methods, it was decided that sheet piles would be the best alternative method based on its schedule and overall cost. At \$1,640,040 and 90 days of construction, this method is \$490,000 cheaper than the pile lagging system and will save 24 days compared to the original system.

### **Analysis 2: Motivation and Team Performance**

Taken from the PACE roundtable, this critical industry research revolves around defining elements that motivate people to do work and how that correlates with team performance on a project. Literature reviews of research done in this area as well as a survey sent to construction managers in the industry paint a picture of how broad of an opinion people have on their motivators to work as well as how their team performance is affected by positive or negative motivators.

### **Analysis 3: Resource Leveling for Cash Flow**

Another challenge on this project involves cash flow. With the project spanning several years, there is only a certain amount of state funding given to the project each fiscal year. Through an analysis of the cash flow for the mechanical trade, a manipulation of the manpower on the project helped move \$2.5 million dollars out of fiscal year 2016 into other fiscal years on the project, but it delayed the mechanical rough-in and testing and balancing in the upper floors at least one month. This means that the interior trades that were originally delayed a month could start as originally scheduled and this would accommodate the month delay of the overhead and in-wall installation on the upper floors without compromising the critical path of the project. Overall, it is recommended to use this alternative manpower schedule for the project.