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Structural Option
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Executive Summary

This report proposes value-engineering changes to the Medical Office Building in Malvern, Pa. The building site is in a corporate park with several low to medium rise buildings. It is an extension of an existing complex and joins the previous buildings with a sky bridge. Although mostly office space, the building does include a small auditorium that is used for conferences and stockholder meetings. The open office space and auditorium benefit from the 28' square bays that are the basis of the structural system. The gravity system is composed of filigree slabs and beams resting on cast in place concrete columns. The lateral system is made up of cast in place frames in the east-west direction, and beams on torsion girders in the north-south direction.

Four systems are being considered for redesign.

- Slab - Pre-stressed two-way slab on drop panels
- Lateral System - Two shear wall cores around interior stairwells
- Mechanical System - Under floor air distribution system for the open office area
- Lighting - Specialized lighting for the auditorium

The introduction of a two-way pre-stressed slab system puts the design of the floor system back in the hands of the engineer of record. This allows for optimization that may not be present in the filigree system. Preliminary analysis of a two-way system also showed that the floor to ceiling height could be increased 6". The analysis of a new floor system will take one week, but an additional week is required to conduct research.

The current lateral system appears to have been developed to fit into the filigree beam system. By replacing the beams, frames, and torsion girders with shear walls it may be possible to optimize design. Despite the possibility of higher cost, the potential for easier construction and a more efficient system make shear walls a competitive solution. Two weeks will be taken to design the walls, and another week to design the footings.

An under floor air distribution system (UFAD) is a good solution for open office spaces. The flexibility this system introduces may compensate the necessity for better maintenance. There is also a potential for energy savings versus the traditional mixing ventilation system. Research into the available types of UFAD will take a week and the design of the system will take another week. Additionally, if time permits, one week will be taken to perform a computational fluid dynamics analysis of the system.

The lighting system in the auditorium will be redesigned from the conventional down lighting scheme. The new system will use shelved T5 lamps as the standard lighting system and introduce a row of track lights for the presentation area. A week will be taken to design both the conventional lighting system and the new presentation lighting system.

The overall value of the project will be determined based on an increased value as measured by expanded space and improved comfort or utility that does not increase the price by more than 3%. The entire analysis will take ten weeks, with the final presentation being delivered both orally and in written form.