

Executive Summary

The following report is a comprehensive thesis that not only investigated the structural implications of redesigned gravity and lateral systems for the James W. & Frances G. McGlothlin Medical Education Center, but also explored the impacts on cost of the entire project, time required for construction, and architecture. A summary of the original structural system is provided in the report for comparison. To answer all building functions and program requirements, rational design alternatives of a non-composite system with bar joists and steel girders and a lateral system composed of moment frames with minimal bracing were explored. Hand calculations were completed to size members, check vibration control, and calculate loadings. Computer modeling was also utilized to verify hand calculations, apply loadings, and evaluate drift control.

Research was also completed on two breadth topics: cost/schedule analysis and architectural impacts caused by the redesign. An estimate was completed for the redesigned gravity system along with an assessment of the implications of the redesigned system on the total cost of the project. A predicted schedule was also drafted for the redesigned system; all of this research was then compared with the original system to evaluate the cost and time savings. The redesign of the lateral system was determined to have an effect on the layout of the building – removal of bracing allowed for alteration of walls to create more open spaces. The redesigned gravity system also created an opportunity to move towards a more passive fire suppression system.

The final results of the research demonstrated that the redesigned gravity and lateral systems are an economical alternative. Some of the benefits of the redesigned structural system are lighter members, satisfactory drift control, small cost and time savings, decreased bracing, and potential for altered fire suppression system. However, it was determined that some of the improvements are only marginal when compared to the original system. Even though the advances might only be minor, it is reasonable to say that either option, the original or the redesigned system, would result in an efficient, economical structure.