Executive Summary

This report examines the structural system of the Rutgers University Law School Building Addition and Renovation project in Camden, New Jersey. The project was analyzed in depth in previous Technical Reports produced in the Fall semester of 2007. Resulting from those reports, an alternative floor system and lateral force resisting system were analyzed for feasibility and economy in this project.

The existing floor framing system was compared to the composite joist floor framing system. The proposed system was then designed for strength and serviceability requirements necessary for an office building, including vibration and fire protection analysis. Due to vibration analysis, a CJ26 1600/775/270 joist was chosen for the typical floor system spanning 47-feet, a design driven by serviceability criteria rather than strength. This design size was also chosen to maintain the existing floor system depth, maintaining the intended architectural experience.

In connection to the floor system, a braced frame lateral system was analyzed in comparison to the existing moment frame construction. A preliminary virtual work analysis was performed and then evaluated using RAM Structural System to determine required member sizes. The introduction of braced frames changed member size determination from serviceability criteria to strength requirements. The modified lateral system experiences significantly less drift than the existing moment frame construction. Three braced frames were designed for the North-South direction of the Primary East Addition with two frames in the East-West direction.

The architecture was reviewed and modified to maintain existing architectural spaces while permitting lateral braces to be placed within the wall construction. Upper floors were able to be maintained; however, the first floor required a shift of classroom spaces and the development of 20-foot modules for ease of implementing the braces. Additionally, the introduction of braced frames alters several window locations in the existing elevations; therefore a study of the elevations was also performed. Revised floor plans and elevations have been attached to illustrate an efficient method of integrating the structural system with the architecture.

Finally, a cost estimate and detailed schedule analysis was performed to determine the potential cost and time savings from the modified structure. Cost information was researched from industry professionals and R.S. Means to evaluate overall cost of both floor systems and lateral systems. Overall schedule was then developed through the use of information found in R.S. Means. It was determined that an overall project cost savings of $100,000 could be saved through the new lateral system and approximately one week of schedule time. The proposed floor system was determined to be virtually equal to the existing system in cost and schedule.

Through the analysis, it was determined the modification to the lateral system would be beneficial to the overall building if the structural engineer were brought into the design process at a time where plans were still able to be modified. The modification to the lateral system did not positively impact the construction cost or schedule, and therefore is not recommended for use in this project.