

Final Report

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Executive Summary

For this thesis, the goal was to redesign the structure of the BBH Building with reinforced concrete. This was determined to be successful. One way slabs with beams were designed to support the design loads that were applied to them. Three typical beam sections were analyzed and designed to resist flexure, shear, and torsion. The sections were also designed to satisfy immediate and long term deflection limits stated in the IBC. The girders were the deepest sections with a total depth of 28”.

The computer program ETABS was used to aid in the analysis and design of the concrete moment frames that were designed to resist lateral loads by the controlling wind cases in both directions. Excel spread sheets were used to determine how the lateral loads were distributed between the moment frames. Reinforcement values for both beams and columns were cross checked with the hand calculations to verify that adequate amounts of reinforcement were provided to resist the applied gravity and lateral loads. A brief cost analysis was done between the existing steel structure and redesigned concrete structure and it was determined that the redesign would cause a 12% increase in cost.

In order to possibly help alleviate the cost and possible schedule increase, a thin brick precast façade was researched as an alternative to the existing traditional hand laid brick façade. Information from the Precast/Prestressed Concrete Institute (PCI) helped in the determination of the heat and moisture resistance requirements needed to match that of the existing façade. A brief cost analysis was done between the existing and precast facades and it was determined that the precast would cause a 40% decrease in cost. It was determined the precast façade would be a good alternative to the existing, although the owner and architect would have to accept the more manufactured look of the panels compared to the traditional look that the hand placed brick would provide.

Finally a schedule was produced to determine what kind of impact the above changes would cause to the project. It was determined that even though the construction of the concrete redesign would take 3 months longer, the precast façade would allow for the entire building to be enclosed 6 months earlier than what was originally scheduled. This would allow for interior finishes to start earlier, which could provide a positive impact on the project’s completion.