Executive Summary

The building located at 11141 Georgia Avenue in Wheaton, Maryland was recently renovated into an apartment building, finishing construction in August of 2014. The original building was a 7 story concrete office building. A 7 story addition was added on top of the existing structure in joist-framed steel, and the concrete portion of the building was renovated to meet new architectural needs.

The following report includes the methods and processes used in the analysis and redesign of the addition. Both the gravity and lateral systems were analyzed in the redesigned system. Also included is breadth work in the topics of construction management and mechanical.

In order to keep the addition lightweight to minimize effects on the existing system, wood was chosen for the redesign. Although wood construction does not currently meet code US for the 7 story addition, the report discusses the research regarding taller wood buildings and the use of wood in taller buildings in other countries. A purpose of the report was to discover whether or not a wood addition would be feasible in the case of 11141 Georgia Ave.

A panel product called Cross Laminated Timber was used for the floors, which spans a full bay between girders. Glulam is used for the girders and columns. The gravity system was designed for flexure, deflections, fire performance, and connections for use with dyrwall encapsulation. Fire performance calculations were completed with the assumption that all wood structural elements will be encapsulated with a single layer of drywall.

The lateral system included several concrete shear walls to resist wind loading, the controlling lateral case over seismic. ETABS was used to complete the lateral system design. Several methods were used to validate the model.

The topics of construction management and mechanical systems were also explored in this report. The construction breadth determined that the redesigned system is competitive with the existing system when considered both cost and schedule. The wood redesign cannot have enclosed spaces, and thus new mechanical system was chosen to improve the aesthetics of the equipment in each apartment.

After completing the wood redesign, it was found that the wood alternate is structurally feasible as an addition. There are both challenges and benefits to using wood in the addition. Although there are several challenges with regards to fire safety, research has shown that heavy timber can meet safety requirements. Finally, the wood redesign does not add too much cost considering it significantly reduces the schedule, and it is a very lightweight structure.