Breadth Proposal

University of Maryland College Park Dorm Building 7

College Park, MD

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Executive Summary

The proposed thesis will include an investigation of a total structural system redesign from the current primarily propriety systems in Building 7 to a steel system. The new structural system will include gravity redesign in either composite steel beams or composite castellated beams based on which will provide more room for MEP systems within the small ceiling cavity. The chosen system will then be modeled in ETABS with a new lateral system that is comprised of Steel plate shear walls. This proposal hopes to eliminate the overall number of shear walls from the original design while keeping the lateral system within the walls to reduce architectural impacts. Steel was chosen for it seemed to be a good alternative found in Technical Report 2 for a floor system

Advanced computer modeling techniques will be used to take into consideration more factors, such as shear deformation for example, regarding the lateral system. Along with this, a look and design of the connections in the steel plate shear walls will be studied as part of the graduate requirement. In the end a comparison will be made to see if the new system and breath topics are a better overall choice for Building 7.

Since Building 7 is a dorm, it is almost always common to have noise issues, due to the living environment. For this reason a sound isolation study will be looked at for a single room to see the impacts of the structural material change and be designed to meet the requirements if determined to need be. Building 7 is also approaching a LEED Gold rating from its various systems and architectural designs that are incorporated. A green roof with be studied to see if it can contribute to making the building more green water collection and storage from the roof will be looked at also.

Breadth Topics

Following the main structural depth study, a minimum of two breadth studies will also be performed for this proposal. These studies are chosen for they have a correlation to the structural depth change and also towards the goal of making Building 7 a LEED rated building, a gold rating preferred by the owner.

The first breath topic will look at a green roof added to the top of Building 7 this was one LEED/green design option the owner and architect avoided due to cost reasons. Green roofs have benefits with being able to recycle the water runoff and be used throughout the building. For this proposal different green roof will be looked and the best choice will be picked. Waterproofing issues, weight issues, and the collection tanks with the piping will be designed for this breath.

The second breath topic will be to look at a single apartment/dorm room and will study the impact of the change in structural material to steel to see if sound isolation is an issue. If sound isolation is a problem then the walls and floors will be designed to prevent as much of the noise as possible from being transmitted from one area to another.

Tasks and Tools

1. Green Roof Architecture Study
    - Research types of green roofs and requirements
    - Layout green roof
    - Design/investigate waterproofing
    - Determine water collection and location for holding tanks to recycle water.

2. Acoustics
    - Research noise criteria requirements for dorms
    - Determine materials needed for proper sound isolation
    - Determine placements and resulting effects of materials
    - Determine architectural limitations