

Appendix A - Breadth Studies

Structural Analysis (Analysis II)

2175 K Street provides for a challenging arena for the application of an alternate roofing type. The proposed three types of roofs to be analyzed are solar, vegetated, and cool. Each type has a different weight per square foot associated with it. Seeing as how 2175 K Street consists of adding three floors onto an existing building, additional loads are critical. To allow for the existing structure to carry the newly imposed loads caused by the new structure, steel reinforcement or carbon fiber, depending on location, was utilized. With this in mind, any additional load imposed by an alternate roofing type would need to be calculated. To ensure the proposed solution is feasible, a structural analysis will need to be conducted.

Mechanical Analysis (Analysis III)

In an attempt to reduce unwanted thermal gain and increase energy efficiency, Analysis III will look into customizing the building facades based upon their orientation and sun exposure. Additionally, different types of glazing will be explored to further reduce unwanted thermal gain. The two proposed solutions to this facet of the analysis is using electrochromic window tinting and/or PV integrated glazing. One way to determine the success of the analysis in terms of beneficial outcomes is the effect the changes have on the building's mechanical system. Therefore, the results, in terms of reduced thermal gain, will be incorporated into a redesign of the building's mechanical system.

MAE Requirement

The skills and knowledge attained through a number of graduate level classes will be used to enhance the quality of analysis conducted. Additionally, the classes will help to create compelling arguments of the findings of such analyses. Such classes are AE 542 – Building Enclosure Science and Design, AE 572 – Project Development and Delivery Planning, and AE 597D – Sustainable Building Methods. Concerning AE 542, the knowledge gained through this course could be applied to the curtain wall analysis proposed above. Additionally, AE 572 can be used to create more thorough financial models which will result in more compelling results. Finally, the knowledge gained in AE 597D will serve as the basis for all of the research involving this proposal.