

Executive Summary

The Villanova University School of Law thesis project looked at a number of different system redesign and how each would affect the existing systems in the building, the energy properties, the initial and long term cost as well as other construction issues.

The lighting depth focused on the redesign of four spaces in the law school. The four spaces that were redesigned were the courtyard, the atrium, the 135-seat classroom and the moot courtroom. Each design was created in accordance with the criteria set fourth by the IESNA Lighting Handbook and ASHRAE 90.1. The lighting designs for the interior of the building were designed to be flexible, functional educational spaces with an emphasis on some of the key architectural elements. The more exterior spaces were designed to shine like a beacon at night for the rest of the campus to see. As a part of the lighting depth, a daylight study was done for the atrium to determine the benefits of specifying a new glazing system.

The electrical depth focused on the coordination between the new lighting systems and the existing electrical system. This was done through panelboard, feeder, and over-protection sizing. Another area of focus in the electrical depth was the redesign of the distribution system. A more centralized system was explored which implements distribution panels to feed panels rather than lighting and receptacle panels feeding other lighting and receptacle panels. This resulted in a reduction of the number of transformers. A cost analysis was done comparing the new and old systems to determine the best option for the law school. The other areas the electrical depth focuses on are a redesign of the power supply to a rooftop air handling unit that was resized per the mechanical breadth, a payback study to determine the feasibility of implementing energy efficient transformers over standard K-rated transformers and lastly an over-current device coordination study was done on one path through the building.

A mechanical analysis was studied as a breadth topic. The focus of this was determining the mechanical load reduction that resulted from specifying new glass in the atrium. A cost analysis was done to determine how much the new system would cost initially and what kind of energy saving would result.

The final study in this report is an acoustical study that focuses on the 135-seat classroom and the moot courtroom. Initial reverberation time was calculated and materials were modified as a result in an effort to get the reverberation time within the recommended range. Finally, a cost analysis was performed to determine the cost of getting these spaces to fall within the recommended reverberation time range.