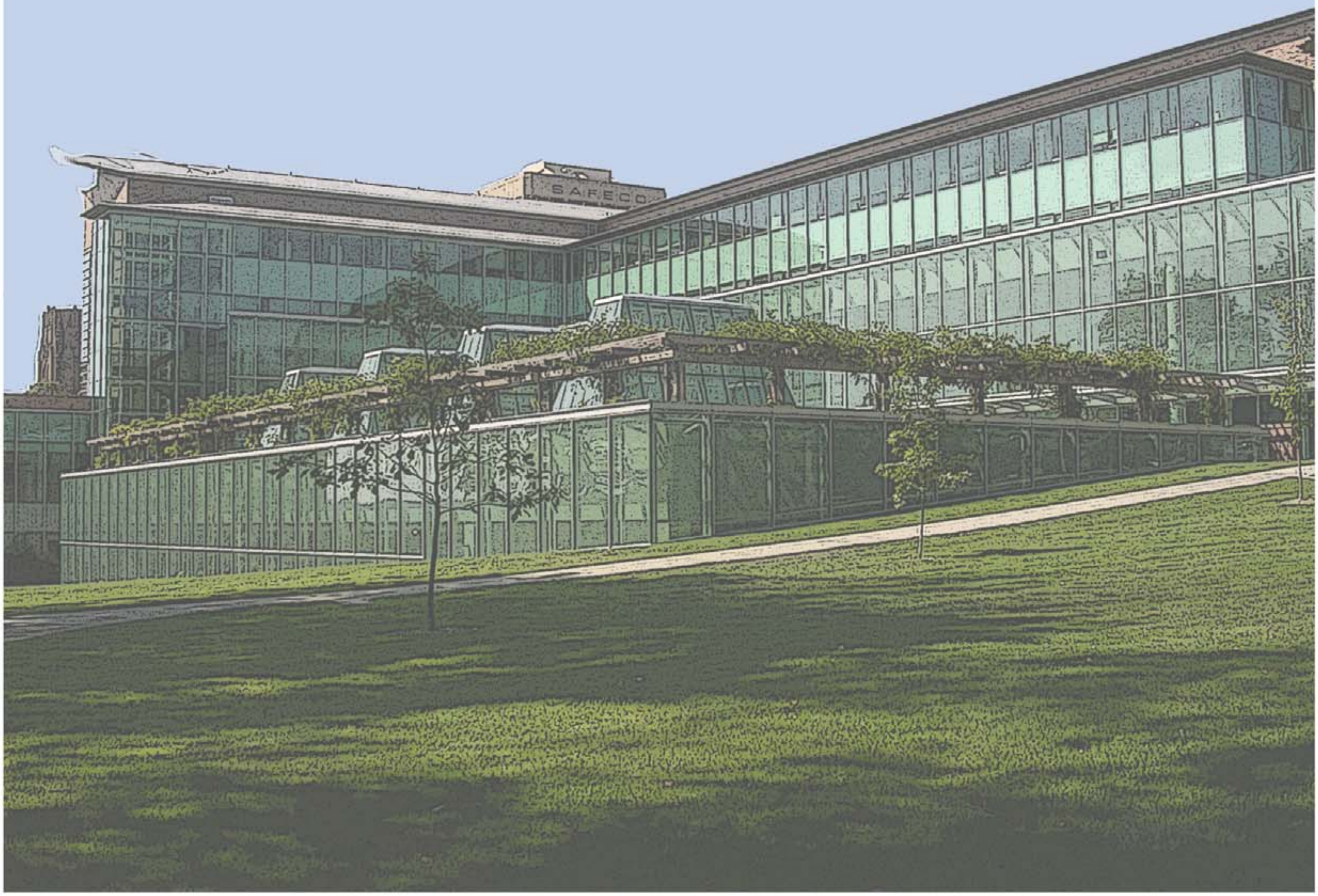
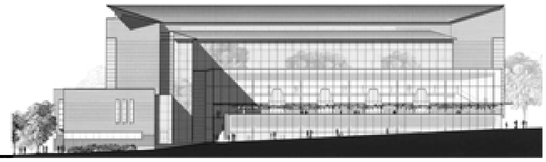
Summary & Conclusions





Summary & Conclusions

Lighting Depth

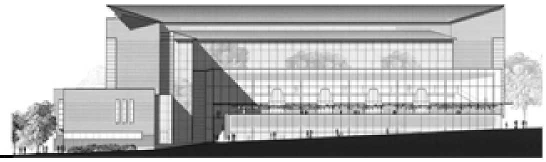
The Lighting Depth looked at the redesign of four different spaces in William H. Gates Hall. For each space, the design meets IESNA design criteria and ASHRAE 90.1 power density allowances. While the overall lighting goals were focused around creating a design conducive to learning and highlighting the building's unique architectural features, each space does so in very different ways. The galleria has been transformed into a glowing window of inspiration for both those traveling through the space and those passing through campus. From within, the space creates an interesting atmosphere while providing an environment that is safe for the occupants. The "glowing" galleria emphasizes the heart and most public space of the building, while providing adequate light levels for the safety of occupants. By accenting pathways and stairs in the adjacent terrace, occupants of the space can feel comfortable and safe when passing through the terrace. The courtroom lighting design provides the illuminance levels required to allow for a visually productive space, while also playing off of the unique ceiling element to provide a more unconventional lighting design for a courtroom space. Lastly, by utilizing a simple lighting design throughout the space and creating a central focal point in the double-height area below the skylights with a custom chandelier, the library lighting design provides the functionality required for this task intensive space, while also creating an area of visual interest.

Electrical Depth

The Electrical Depth looked at several components of the electrical system including panelboard and load coordination, transformers, motor controls, and protective devices.

The panelboard coordination of the lighting changes made in the Lighting Depth adjusted panelboard loads according to the existing lighting loads that were removed and new lighting loads applied. In several circumstances, it was concluded it would be best to downsize some of the lighting panels, as they were significantly oversized. This downsizing, however, still left substantial space for future growth.

In the transformer redesign, the four existing central transformers and all loads and associated feeders were redesigned using distributed transformers. While there are several concerns surrounding the use of distributed transformers, such as an increased number of transformers required and space requirements in electrical closets, it does prove to be an effective design solution. By using distributed transformers throughout the building, feeder sizes running vertically through the building can be reduced, and thus, the high cost associated with copper feeders can be decreased significantly. While the number of step-down transformers in the buildings is increased from seven to seventeen, other equipment is able to be de-rated, feeders are sized smaller and the total cost of the system is decreased



by approximately $26,000. In the case of the electrical system for William H. Gates Hall, distributed transformers are a good alternative to the existing central transformers and would be recommended for this building.

The motor control center design portion of the Electrical Depth allowed for the motor starters for all nine of the air handling units located in the fourth floor mechanical room to be controlled from a motor control center. From analyzing the motor loads, it was determined an 800A bus bar would be needed to feed all of the loads, and the motor control center will be fed from a spare 800A breaker in the main distribution panel. It was determined that the motor control center would need to contain three 20 inch vertical sections in order to house all of the motor starters, and incoming feed main circuit breaker. Additionally, there is ample space and clearance in the mechanical room for the control center at its determined size. By using a motor control center, the motors for this equipment, which is located on the fourth floor while the majority of the mechanical equipment is located on Level L2, are able to be locally controlled.

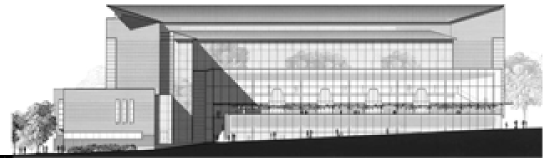
Lastly, a protective device coordination study was completed for a lighting panel main circuit breaker, the lighting panel's feeder protection in the distribution panel, and the distribution panel protection in the main switchgear. After comparing the time/current curves for each of these protection devices it was determined that the protection devices are not properly coordinated.

LEED Breadth

The LEED Breadth topic looked at the feasibility of implementing a rain water catchment system to offset cooling tower makeup water requirements. In order to implement a rainwater catchment system for William H. Gates Hall there are several system components that must be included and many areas of coordination and integration that need to be considered. By using a rainwater catchment system in this situation, cooling tower water makeup can be offset by approximately 1 million gallons a year, with the potential for more of an impact during the rainy, cool months than the dry, warm months. In addition, implementing a system can be done with minimal effects to other systems, with exceptions of the cooling tower pit expansion. Overall, the system is a feasible option for William H. Gates Hall and would be recommended depending on the life cycle cost, which are addressed in the Construction Management Breadth portion of this report.

Construction Management Breadth

When considering the feasibility of implementing a rain water catchment system for William H. Gates Hall to offset cooling tower water makeup requirements in the Construction Management Breadth, both the system's first cost and the payback period of the system are considered. The first cost of the system totals $30,645.60 and includes both components of



the rainwater catchment system and the construction/structural components need to expand to cooling tower pit. Additionally, the amount of water conserved by utilizing the rainwater catchment system allows for financial savings of approximately $4,767 per year, when considered at the current water rate. When the system first cost and system's resulting water savings are directly compared, it is determined that the rainwater catchment system has a payback period of approximately 6.5 years. This payback period is acceptable and allows for significant water cost savings throughout the life cycle of the system. It is recommended that a rain water catchment system be implemented in the design of William H. Gates Hall to help offset the building non-potable water demands acquired by the cooling towers and expand upon the university's commitment to sustainable practices. .