Executive Summary

Crystal Lake Elementary School is a public educational facility that is financed by taxes from the surrounding community. Therefore, cost and energy efficiency is an important factor in designing this building. This report will focus on the lighting and electrical redesign of four different spaces within this elementary school. In addition, the emergency system was redesigned to include the chillers, a photovoltaic array was implemented on the roof, a roof structural analysis was performed, and the acoustics in the multipurpose room were evaluated.

The lighting design and electrical circuiting for these changes was redesigned for the covered entrance and covered walkways on the exterior entrance to the building, the lobby, the multipurpose room, and a primary classroom. The lighting is designed based on guidelines from the IESNA handbook, as well as the emphasis on energy efficiency throughout the building. To determine if the illuminance recommendations are met, computer calculations from AGI32 are performed.

Due to the excessive heat of the summers in Florida and the use of this space as a hurricane shelter in the summers, the emergency system is redesigned to include the two chillers located on the exterior of the building.

With the main design goal as energy efficiency, a photovoltaic array is implemented on the roof of this building to decrease the buildings reliability on the utility company. A study is performed to determine if this system is cost effective and worth the initial upfront cost of materials and labor. Since this system is being places on the roof of the building, a structural analysis of the existing roof structure is performed to determine if there are any additional construction costs to implement the photovoltaic system.

The multipurpose room is typically used as an auditorium space, making the acoustical performance of the space is important. Therefore, an acoustical analysis of the existing space is performed to determine if the reverberation time is desirable for this space type.