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This senior thesis report examines construction and technical aspects of the Washington Christian Academy. The Washington Christian Academy is a private school serving K-12 students in Olney, MD. This in depth analysis focuses on adding value to the school without substantially increasing costs. In many instances, significant value is added while actually decreasing costs and reducing the schedule. Specifically, this report examines a critical issue that faces the construction industry today, the acoustics in the gymnasium, and the daylight in the classrooms.

A language barrier created by the English and Spanish speaking workers is a critical issue facing the construction industry in and around Washington, D.C., which is mostly an open shop labor market. The number of Spanish speaking laborers is growing at an exponential rate. By surveying industry members information was gathered concerning the status and consequences of the barrier today. To highlight only a few conclusions from the analysis, 95% of the 65 survey participants believe that a language barrier does exist and affects a project's success. The participants were divided over which was more likely to happen: teach English to Spanish speaking people or the inverse. The survey concluded that the largest problems stemming from the barrier are the difficulty in giving basic jobsite instructions and increased safety hazards. To begin solving this problem, there are multiple programs that teach both languages to workers. These programs are being slowly incorporated into the industry through company offered courses and university courses.

The first technical analysis replaces the sheet metal ductwork in the WCA gymnasium with fabric ductwork. This was done to improve the acoustics of the space. There are also many other advantages to using fabric ductwork such as color selection, easy maintenance, light weight, and better air distribution. No structural redesign was necessary for the space. In the end, the fabric duct had a positive but minimal improvement on the acoustics of the space. The cost savings was \$9,650, and when compared to the current sheet metal system resulted in a 74% reduction. Most of the money saved was on shipping and installation. The schedule reduction was 21 days, which is an 84% reduction. While the acoustical benefits of the new system alone would not be enough to recommend the change, compounded with the many benefits and the cost and schedule savings the new system is the best solution for the gymnasium.

The second technical analysis examines using daylighting techniques in the WCA Flagship classrooms. The analysis was conducted using a three dimensional model and a lighting design software. After the calculations were run, it was found that the current room design is not acceptable for daylighting practices. If each room were to have four windows rather than two, daylighting could be used and the lamps could be reduced from four to three per luminaire. While exact cost data was difficult to obtain, the reduction of lamps alone would result in a 25% energy cost savings to the owner. The analysis also concluded that switching lamps rather than dimming lamps would benefit the owner with cost savings, and benefit the students with a learning opportunity. This system will raise students' awareness of the uses of daylighting and help them identify situations when electrical lights are not needed.