



Executive Summary

The Senior Thesis Final Report is intended to explain the four technical analyses implemented on the River Vue Apartments (River Vue) project. The theme for this senior thesis capstone project is to incorporate value engineering techniques, such as energy conservation and overall building quality, into River Vue's design and construction that are a financial benefit to River Vue Associates, LP (RVA).

Technical Analysis #1: Photovoltaic Glass Window System Implementation

River Vue is scheduled to achieve LEED Certification upon completion. However, very few sustainable design and energy production techniques were used. The goals of this study were to develop a photovoltaic (PV) glass window system and to determine the financial and energy feasibility of incorporating it into the existing electrical system. This analysis showed that Pythagoras Solar's PV glass unit (PVGU) was not a recommended investment for RVA because the energy savings would not allow them to receive the initial cost of the system back within the PVGUs' 25-year lifespan.

Technical Analysis #2: Green Roof System Implementation

As previously stated in Technical Analysis #1, very few sustainable design techniques were used. The goals of this study were to develop a resident-accessible green roof system, analyze the structural impact of the load-bearing green roof, and determine the financial feasibility. This analysis showed that the LiveRoof® Maxx System would be a beneficial investment to RVA. A structural analysis revealed that the existing roof would need upgrades to accommodate the green roof's weight. A feasibility study showed that a rent increase was needed to accommodate for the yearly roof maintenance and loss of third-floor apartment costs.

Technical Analysis #3: 3D Laser Scanning Technology Implementation

Several constructability challenges occurred on the River Vue project including as-built drawing inconsistencies and coordination issues. The goals for this study were to analyze the effects of using three-dimensional (3D) laser scanning technologies to evaluate existing building conditions and to determine the financial feasibility. Even though 3D laser scanning technology could be very beneficial during the preconstruction and construction phases, from a cost standpoint, the results show that implementing this technology is not feasible for RVA.

Technical Analysis #4: Lighting Occupancy Sensor Control System Implementation

At the PACE Roundtable event, industry professionals discussed many key topics about energy management, a critical industry issue, and its techniques for residential buildings like River Vue. The goal for this technical analysis was to research new ideas for electrical and lighting systems that are energy efficient, but simple enough for the occupants of the building to use the system correctly. This analysis showed that Sensor Switch's WSD-PDT is a recommended investment. The feasibility study, with the rebates/incentives in Pittsburgh, PA, showed that the system would recover its initial cost within 5 ½ years of the occupancy sensor's 15-year lifespan.