

3.0 EXECUTIVE SUMMARY

This senior thesis report provides background information on Redland Technology Center, along with in-depth research and analyses of the construction and technical aspects of the project. One theme carried throughout the report is energy efficiency.

As part of the critical industry research in this thesis, chilled beam mechanical systems were researched as a potential new technology to be more energy efficient. Results were very positive for chilled beams with the only major downside being that the technology is unfamiliar. Case studies were discovered that detailed buildings with savings in energy of up to 40%. Initial costs tend to hold back chilled beams from potential installation as they cost 5-15% more than all air systems. Chilled beams have been proven to have a payback period of less than 5 years.

To further learn about chilled beams, this first analysis applied the lessons learned in the critical industry research about chilled beams to Redland Technology Center. Cost analysis showed that chilled beams would be more expensive initially than the VAV system used for the project. However, savings in energy consumption could potentially be up to \$133,713 per year. The chilled beam system reduced the ductwork by 70% and eliminated the self contained AHUs on each floor, providing more valuable office leasing space. Payback period for the chilled beams systems was less than one year.

The second analysis of this thesis focused on the feasibility of saving energy whenever the wire size for electrical circuits are upsized beyond the National Electric Code minimum size. The analysis proved that it is feasible in some scenarios, it works best whenever the loads consistently high. Data center equipment, large constant speed motors, and HVAC chillers are potential areas where this technique can be implemented successfully. Payback for the larger wire size can be as little as 2 years.

The third and final analysis of this thesis used a 4D BIM model to resequence the parking garage at Redland Technology Center. Through the BIM model, a revised sequence was formulated that would have allowed the project team to complete the construction of the parking garage 43 days earlier than with the original construction sequence. The resequencing also allowed the site work to be completed before the cold winter months of January and February.