

ANALYSIS OF DESICCANT DEHUMIDIFICATION FOR USE IN THE WAVERLY ON LAKE EOLA



AN ARCHITECTURAL ENGINEERING SENIOR THESIS REPORT

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EXECUTIVE SUMMARY

This report studies possible improvements in HVAC performance for The Waverly on Lake Eola. The Waverly is a 22 story luxury apartment high-rise in downtown Orlando, Florida. The water source heat pump system already applied to the building is extremely efficient for a system that takes up very little space in the building and that gives each apartment individual control.

Possible envelope improvements on the floor-to-ceiling window system were first analyzed. Florida Building Code does not make efficient window technology mandatory. Since no window data was found on The Waverly, Florida code minimum for double glazing was assumed. Carrier's Hourly Analysis Program was used to calculate the load decrease associated with tinted, reflective, and triple pane glass.

A construction management study was done on the window system for a breadth topic. Triple pane glass was found to be too heavy and expensive for the gains associated. Reflective glass creates an annual savings of \$10,102 for the mechanical system. Tinted glass produces a savings of \$5,809 per year. The payback of 32 years for reflective glass may be too long for the owner; however, with rising energy prices this window change may prove more beneficial than this payback shows.

Solar air conditioning using desiccant technology was examined as a way to eliminate rooftop heat pumps. The total solar panel area needed for desiccant reactivation proved more than available on the roof of The Waverly. Passive desiccant systems were examined to see if a lesser load on the rooftop heat pumps would produce positive results. EcoFresh, Rotor Source, and SEMCO desiccant wheels were analyzed for load decrease. SEMCO wheels proved to be the most effective with an annual savings of 5,765 MBtus and a payback of less than 4 years.

An acoustical analysis of the parking garage's effect on the building spaces was performed as a breadth topic. The effectiveness of a storage room used as a noise damper between the garage and the lobby was first analyzed. This space was found to be more than effective as a damper. Next, the infiltration of garage noise into a typical 5th floor bedroom was examined. The noise heard in the bedroom from the garage was found to exceed standard maximum levels. This would be remedied with noise dampening panels on the roof of the parking garage's 4th story.