5. THESIS DESIGN PROPOSAL

The primary goals of this thesis are to improve energy efficiency and acoustic conditions for the Sorenson Language and Communication Center. In the spirit of sustainability thesis proposes designs that also reduce the impact of the facility on its surroundings. Success is defined as achieving the stated goals at a similar or reduced life cycle cost. Since the building has been designed to LEED-NC v2.1 Standards the proposed designs are be justified by improvement in the LEED Rating of the facility. Two design elements are proposed: a green roof and a dedicated outdoor air system (DOAS) with a parallel sensible cooling system.

5.1. GREEN ROOF

The first design this thesis investigates is the application of a "green roof" or garden roof. The expected benefits are building heating and cooling load reductions, increased acoustic transmission loss, and improved stormwater management. However, there may be implications on the structural support system due to the additional weight of the saturated soil and plant matter.

5.2. MECHANICAL SYSTEM

The second design proposed in this thesis is a dedicated outdoor air system (DOAS). The objective of this system is to provide each space with an appropriate supply of outdoor air to meet ASHRAE Std. 62.1 and to meet latent loads. Instead of using air as a thermal transport medium a parallel sensible cooling system in each space uses chilled water. Water has a much higher specific heat capacity and density than air so the volume of the energy transport medium is much lower.

Fan energy is expected to decrease for a DOAS system relative to a traditional VAV system, but pumping energy should increase. Airside equipment could be downsized because of reduced air flow and cooling loads. However, waterside equipment would need to be enlarged because of the increase in chilled water flow throughout the building. Radiant panels or chilled beams carry the sensible load in each space. The reduced airflow, smaller equipment, and elimination of VAV boxes could reduce mechanical noise and improve acoustic conditions in the building.