

Executive Summary

The main goal in designing the Army Reserve Center was to achieve a LEED Silver or Gold certification while maintaining good design practices such as following the applicable codes and following the requests of the United States Army Corps of Engineers. The codes that were followed were the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Standard 62.1 and 90.1, the United Facilities Criteria (UFC) 4-171-05 and 3-400-02, and all applicable National Fire Protection Association (NFPA) codes and standards. To achieve this goal, a constant volume air handling unit was used for the auditorium, two variable air volume air handling units were used for the entire second floor and the core of the first floor, and smaller unit ventilators met the loads and ventilation requirements for the classrooms on the first floor and several other smaller zones on the first floor.

In order to make the Army Reserve Center more energy efficient, a variable refrigerant flow (VRF) system will be installed to take care of the heating and cooling loads. The outside air required by ASHRAE will be taken care of using a dedicated outdoor air system (DOAS). Another alternative that will be explored is the use of a DOAS to handle the latent loads and the outside air requirements and a ground source heat pump (GSHP) to handle the remaining loads.

The systems will be designed based on ASHRAE Standards using Microsoft Excel for the majority of calculations with some calculations done by hand. The Army Reserve Center will be modeled with these systems in place using Trane Trace 700.

An acoustical study and a structural study will be performed. The acoustical study involves analyzing the sound and vibration of a rooftop condenser for the VRF system. It also entails analyzing the sound and vibration of the new air handlers required for the DOAS. The structural study involves changing the beams and columns to handle the extra weight of the rooftop condenser. It also involves examining the beams under the mechanical rooms to determine if they can be sized smaller since the air handlers will be smaller and possibly moved to the roof.