Executive Summary

Energy consumption in buildings has become an increasingly relevant topic in recent times as a trend towards sustainability grows in the United States and around the world. Energy models can be used to benchmark the energy usage of buildings and provide a basis for economic comparisons of systems. This report uses an energy model created in Trane Trace 700 that analyzes building design loads, energy usage and annual energy costs for HITT Contracting Headquarters. All load sources, including Room dimensions, wall areas, wall assemblies, lighting power densities, ventilation rates, occupancy densities, window types, and mechanical equipment details, were all taken from the mechanical design documents provided by the MEP design firm KTA Group.

The cooling loads modeled in the Trace 700 model, were within 10% of the capable cooling load of designed system. The total modeled cooling load was calculated to be 363 Tons, whereas the designed load was 420 Tons. This is a reasonable model, judging by the fact that the designer has to move up slightly in unit size to ensure operation at the desired load.

The total annual energy cost for HITT Contracting Headquarters was estimated by the model to be $340,748. HVAC systems consume a large piece of the total building energy at total of 27.4%. The HVAC design engineer also performed an energy model of their own on the building. The economic results of their model were close to those calculated in the model developed for this paper and had a total annual energy cost of $351,557. The cooling cost per square foot was also determined to be $0.50 per square foot for the model prepared for this paper and $0.57 per square foot for the model prepared by the HVAC engineer. The graph below depicts the breakdown of the total energy consumption between Heating, Cooling, Fan, Lighting, and Miscellaneous (Receptacle) loads for the model created for this report.

Modeled Building Energy Consumption