

Technical Assignment 2

Executive Summary:

This report contains the building and plant analysis for the Center for the Arts on the University of Delaware in Newark, Delaware. The building is analyzed for compliance with the LEED Green Building Certification System and Standard 90.1-2004 building envelope and lighting power density sections. This report also examines the lost rentable space due to mechanical system spaces and well as the mechanical system first costs. Load and energy estimates were performed by Trace Trane 700 to determine annual energy consumption and costs. The energy consumption data is also used to determine the emissions associated with operation of the building.

The LEED Green Building Certification System consists of 6 categories in which points are earned toward 4 levels of certification. The Center for the Arts earns 15 points, however the minimum points required for the lowest level, Certification is 26 points.

ASHRAE Standard 90.1-2004 is used to provide minimum requirements to produce energy efficient designs for buildings. The building envelope method analyzes the wall constructions, roof constructions and fenestration of the building. The Center for the Arts complies with the standard 90.1-2004 specified maximum U-Values for a building located in Climate Zone 4a but fails to comply with the solar heat gain coefficient specified in the fenestration section. Standard 90.1-2004 also recommends maximum lighting power densities based on space description in order to design energy efficient buildings. Approximately 50% of the rooms in the Center for the Arts comply with the space-by-space method of analyzing lighting power density.

The mechanical spaces of the Center for the Arts compose approximately 10% of the gross floor area.

The \$3.9 million first cost for the mechanical and plumbing systems comprise 10% of the initial bid for construction.

The energy analysis from the Trace program yields a kilowatt per hour yearly rate from the spaces and systems entered into the program. The emissions analysis found that the Center for the Arts will produce 1680 lbs of particulates, 19600 lbs of SO₂, 11670 lbs of NO₂ and 3.5 million lbs of CO₂ each year.