
EXECUTIVE SUMMARY

The Landscape Building at Janelia Farm Research Campus is a 546,436 square foot world-class biomedical research facility owned by Howard Hughes Medical Institute. The facility is built into the side of a large hill overlooking the Potomac River on the grounds of the history Janelia Farm Mansion. It is currently beginning its third year of construction in Ashburn, Virginia located 45 minutes outside of Washington, D.C.

This report looks into the design of the mechanical system by analyzing the system starting at the conceptual phase through competition and operation if possible.

The primary design requirement is to separate the mechanical and electrical systems and equipment from the laboratory, office, and other primary occupied spaces was the principal design consideration. HHMI researched and studied many other scientific campuses around the world, such as the Medical Research Council Laboratory of Molecular Biology (MRC LMB) in Cambridge, England, Cold Spring Harbor Laboratory, the European Molecular Biology Laboratory, the Carnegie Institution of Washington's Department of Embryology, and AT&T's Bell Laboratories in Murray Hill, New Jersey. After concluding existing building studies, HHMI determined that in order for the scientists and researchers to perform at the highest levels, it would be necessary to locate all mechanical and electrical equipment and controls to isolated areas. This allows maintenance to be done without entering laboratory or office space and therefore, research can be continued uninterrupted.

In addition to the owner's requirements, the engineers followed ASHRAE design standards and The National Institutes of Health's HVAC Design Requirements. The latter have a medical facility focus that is applicable to the Landscape Building.

The mechanical system used central boiling and chiller plants to condition air for the variable air volume (VAV) distribution system. Due to the nature of the building, 100 percent outdoor air is required to decrease the risk of contamination. Supply air must pass through a prefilter and filter on the upstream side with efficiencies of 30% and 95% respectively, based on ASHRAE Standard 52-76. The system has pressure-independent hot water terminal reheat devices and individual laboratory and office area temperature zone control. It is also designed to maintain the proper temperature, humidity, differential pressure, outdoor air exchange rate, and acoustic criteria within the building.

The laboratory spaces are arranged with supply air distributed by multiple air handlers to ensure that fresh air is supplied 100% of the time. This concept is also applied to the exhaust fans. If one piece of equipment is not working properly or needs to be serviced, the load can be transferred to other equipment. The ventilation rates must be sufficient to remove and/or dilute volatile compounds present in the laboratory spaces. Concentrations can be determined using methodology found in National Institutes of Health's (NIH) HVAC Requirements.