Biomedical Sciences Research Building - Research Building

Project Description

The facility will house Medical School laboratories on six different levels while a basement and penthouse will contain the buildings mechanical and electrical equipment. The building will include wet research laboratories and laboratory support spaces, principal investigator offices, interaction spaces, and conference auditorium facilities. This will replace and supplement certain sections of the Kresge complex, which sections will be demolished when this building is complete.

University of Michigan

Biomedical Science Research Building

Unique Environmental Design Features

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The following environmental design features are unique to U of M's Biomedical Science Research Building… that is to say, they are not typically incorporated into the design of similar buildings:

- Double glass façade for full length of office ribbon. This passive façade includes a three ft wide space that provides a seasonal heating and cooling benefit to the building. During winter, dampers at the top of the double wall are closed. Heat from sunlight hitting the double wall is captured within this void, effectively reducing the heat load on the south face of the building. During summer, dampers at the top of the double wall are opened. Heat from sunlight hitting the double wall is flushed out via the stack effect, effectively reducing the cooling load on the south face of the building. And while the double glass façade is a cost-effective environmental design feature, it also produces a striking visual statement about the use of technology in a highly technical building.

- Extensive computational fluid dynamic studies were used to optimize (and therefore minimize) the flow of air through critical areas of the building, such as near fume hoods.

- Sophisticated energy modeling programs were used to properly size heating and cooling equipment. This has resulted in a reduction in initial equipment cost and in optimized system energy efficiency.

- Sound modeling was completed for exterior noise generators at the building (such as exterior fans and cooling towers) to assure that the increase in contributed noise would be nearly imperceptible.

- Exhaust air was modeled, first by analytical methods and then by testing a mock-up of the building in a wind tunnel. This ensured that the new building will not adversely impact air quality at the building or in the surrounding community. As a result of this modeling, roof-mounted cooling towers and outside air intake louvers were significantly modified from the original design.

- A detailed study of the chilled water system was completed. This resulted in design of a unique chilled water system that utilizes two fundamentally different types of chillers. Absorption chillers have been placed upstream of electrical centrifugal chillers. This combination of chillers allows the highly efficient absorption chillers to operate at peak performance, and will lower the total electrical demand of the

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building.

- During procurement of the chillers, prospective manufacturers were required to provide detailed energy performance information. Manufacturers supplied data that showed not only the chiller's projected energy consumption based on the load profile of this unique building, but also the energy use of supporting equipment (such as pumps and motors). The chillers were then selected based on lowest life cycle cost of the chiller and accessories.

- Vivarium (animal) rooms utilize an animal housing system that pipes supply air directly to each rodent cage. This ventilation system will require significantly less air than a traditional room-supplied system. It will also maintain a more constant temperature for the animals and decrease the noise level of the ventilation system (a benefit for both animals and staff). Ganging multiple ventilated racks on a single air valve also reduced the initial cost to install the ventilation system. It is believed that UM's Life Sciences Institute vivarium was the first animal housing facility to utilize this sophisticated animal housing ventilation system.

- In a number of critical areas within the building, including the energy intensive vivarium cage and rack washing room, automated systems will sense when active washing is taking place. During periods between wash cycles, the volume of conditioned air supplied to the cage and rack washing room will be automatically reduced, effectively reducing the energy cost of the building.

The following environmental design features are employed in most UM buildings, including in BSRB, but are less often employed in commercial buildings of similar function:

- Exhaust air energy recovery,

- Free cooling of chilled water during appropriate outdoor conditions,

- Use of laboratory air flow controls that vary the volume of supply air based on load conditions,

- Use of specialized fan-coils in linear equipment corridors where equipment that generates a great deal of heat is located,

- Use of a sophisticated chilled water distribution system that varies the rate of chilled water flow based on load conditions,

- Use of a heating hot water distribution system that varies the rate of hot water flow based on load conditions,

- Use of special sensors that automatically increase the volume of supply air when higher-than-desired levels of carbon dioxide are measured in returned air (non-lab areas only, since all lab air is exhausted), and

- Extensive use of sensors and remotely-monitored control systems.