Green Building Doing Green Things

BY HOLLIE DUGAN & KENT MEYN

Site selection is important on all LEED projects. The new laboratory was built on Iowa State University property formally used as the band practice field. The lab is within walking distance for on-campus students, it is adjacent to a CyRide bus stop and includes several bike racks.

The groundbreaking ceremony for the new 70,000 square foot, four-story Biorenewable Research Laboratory (BRL) was held on September 8, 2008. This marked the first phase of the Biorenewables Complex on the Iowa State University campus. The $24,125,000 LEED Gold building will serve as the headquarters for ISU's Bioeconomy Institute.

"This is an excellent research facility for graduate students," comments Dennis Kenison, M & E Superintendent for Stahl Construction. The complex will eventually include two additional buildings that will house the Department of Agricultural and Biosystems Engineering. An open atrium will connect the three buildings. "Research projects that were scattered about the campus are now in one building," added Kenison.

The building incorporates a number of design elements that will help control operating costs while providing an eco-friendly design. Green practices were administered throughout each phase of this project, including the site selection, which is why the building is located within walking distance for students and on a CyRide transit route. Additional green practices include sustainable water management with a rainwater harvesting and reuse system. Rainwater is collected in a 25,000 gallon underground cistern then pumped back into the facility to flush toilets and urinals. Excess rainwater accumulates in an engineered rain garden. Reflective roofing materials and a 'green' vegetation roof help keep the building cool.

A stringent waste management program prevented ninety-five percent of construction waste, 282 tons, out of local landfills, as it was recycled into useable products. The interior finishes

The steam header serves the building's hydronic and domestic hot water systems. ACI prefabricated most of the welded pipe systems offsite.

The roof mounted duct system, penthouse and exhaust fans. Warm building air is exhausted through a heat recovery system which then preheats makeup air for the building. This type of system is normal on LEED projects, as it reduces building operating costs.

utilized renewable materials, like bamboo on door and cabinet veneers. Recycled paper was used in wall panels and scrap wood in acoustical ceiling panels. A custom build energy recovery unit extracts heat from exhausted building air and transfers it to the buildings two supply air handling units. To insure indoor air quality, the contractors used only low Volatile Organic Compound (VOC) caulking, adhesives, paints, PVC cements and duct sealants. A twenty-eight day 100% fresh air building flush insured VOC levels were low and ready for owner occupancy. Cornerstone Commissioning of Boxford, MA, performed meticulous performance checks on every system to insure the final product met the design documents, maximized energy conservation and operated in conjunction with the campus-wide Johnson Control Building Automation System.

Energy saving techniques were always in the forefront when designing this state-of-the-art research facility. Craig Longrecker, AIA, along with Brett Mendhall, AIA, with OPN Architects, Inc., co-managed the project. Particular attention was given to maximize the use of daylight when designing the building. "Placing the building on the site to harvest light to reduce heating and cooling costs as well as energy costs used by lighting," shared Longnecker. Special attention was given to the lighting controls. The perimeter light fixtures include photo electric sensors to control runtime. Occupancy sensors are located in the walls and ceilings to ensure lights are only utilized with the area is occupied. The lights in the labs are set to turn off if no motion is detected within thirty minutes. This is also the first project on campus to incorporate chilled beams. This unique air-water diffuser requires a lower air flow to heat and cool the office space. Lower air flow means smaller ducts, smaller air handlers and reduced energy usage.

ACI Mechanical of Ames, Iowa, held the $7,500,000 mechanical subcontract with Stahl Construction. ACI's Project Manager, Kent Meyn, states "In the 27 years I have worked on campus, this is my first opportunity to help construct a building that is truly cutting edge technology. This is the first ISU LEED project that incorporated the use of chilled beam technology and storm water reuse systems. Preservation of indoor air quality became one of our main

ABC OF IOWA MEMBERS INVOLVED IN THIS PROJECT WERE:

ACI Mechanical, Inc.
Engineered Thermal Insulation
Johnson Controls, Inc.
Commercial Automation Systems, Inc.
Hydronic Energy, Inc
C.H. McGuiness Co., Inc.
Hart-Hammer, Inc.
City Supply Corporation
Ferguson Enterprises, Inc.
United Rentals, Inc.
Plumb Supply Company
Capital R & D, Inc.
Brilco, Inc.
Electric Wholesale, Co., Inc.
Stetson Building Products, Inc.
Rist & Associates, Inc.
Kinzler Construction Services, Inc.
Star Equipment, LTD.

ISU and Stahl Construction were able to maintain a ninety-five percent construction waste management program that kept the following anticipated types and quantities of demolition and construction waste materials out of the landfill:

Concrete, Asphalt, CMU, and Brick (site demolition) = 190 tons

Concrete, Asphalt, CMU, and Brick (building construction) = 20 tons

Metals (scrap, steel, metal) = 16 tons

Wood (dimensional lumber, plywood) = 8 tons

Fiber (cardboard, paper) = 4 tons

Gypsum Board = 44 tons

General Trash (not recycled) = 10 tons

focuses. We worked closely with Stahl Construction's scheduling staff to ensure no ductwork was installed until the building was 'in-the-dry' and work areas were kept free of excessive construction dust. Fabricated ductwork was shipped from our shop with interior surfaces cleaned and ends sealed with plastic, which was only removed at the time of installation. In addition, we provided our field staff with special training on LEED requirements, so they would understand the need to reseal all openings within the duct system at the end of each day. In addition, they were diligent to only incorporate low VOC products."

The Biorenewable Research Laboratory will be a positive addition to the ISU campus. "This building is primarily a research facility that will offer students an efficient space to continue their education and enhance personal abilities to discover new technologies for the next generation," comments Mike Fields, ISU Construction Manager.

"ISU has adopted sustainable initiatives for the campus, this building upholds and implements those ideas, reducing the campus' carbon footprint," shares Longnecker.

Iowa State University President Gregory Geoffroy has scheduled the dedication for this building to be held on September 17, 2010, at 3:00 p.m. As part of his announcement, President Geoffroy stated that the BRL is phase one of the two phase $140.3 million Biorenewables Complex. BRL houses the Bioeconomy Institute, the NSF Engineering Research Center for Biorenewable Chemicals and Biobased Industry Center. The BRL is headquarters for Iowa State University's research, education and outreach in biorenewables. Construction was made possible through an appropriation from the state of Iowa".

Hollie Dugan is the Communications & Marketing Specialist for Associated Builders and Contractors of Iowa. Kent Meyn is the Project Manager for ACI Mechanical, Inc.

ABOVE This photograph shows the main entryway for the facility. Open ceiling designs reduce extensive dropped ceiling systems and provide visual interest while saving costs. Open designs expose the piping, ductwork and electrical systems.

RIGHT This is the first project on campus to incorporate chilled beams. This unique air-water diffuser requires a lower air flow to heat and cool the office space. Lower air flow means smaller ducts, small air handlers and reduced energy usage.

To reduce fresh water consumption, the site utilizes a storm water reuse system. Rainwater is collected in a 25,000 gallon cistern, and is then treated and used in water closets and urinals.

ABOVE This shows the large heat recovery duct being craned to the roof and installed as part of the heat recovery systems. When the system is put into operation it will reduce energy costs by preheating the makeup air serving the building.

LEFT This is only a small portion of the buildings complex heating, cooling and exhaust dust systems. To insure good indoor air quality, open ducts are covered to prevent dust or airborne particles from entering the HVAC system. This photo also shows the trash separation recycle bins that were placed on each floor. Over 95% of this project's waste materials were recycled.

Portions of the new roof is green. Green roofs keep the building cooler, absorb rainfall and reduce storm-water runoff.

The control cabinets and pneumatic air systems are utilized as part of the buildings DDC control system. This system allows the University to see and adjust the building HVAC systems from a remote location.

This photograph shows the complex piping and heat exchangers utilized to provide domestic hot water and hydronic heating water to the building. Notice the excellent insulation installation which reduces operating costs and protects personnel from the high temperature piping system.