Chicago Botanic Garden – Learning Center

Glencoe, Illinois

Image 1: Solar Panels

Image 2: Underground Ductwork

Renewable Energy

The solar photovoltaic system, with panels installed on the 2nd floor roof structure, is comprised of micro-inverters, 83 photovoltaic panels, rack system, grounding and web based monitoring, which is also integrated into the BAS. System output summary:

- 23,012 kWh/year *Estimated Solar PV Output*
- 78.52 Million Btu/year *Estimated Equivalent Solar PV Output*
- 7% *Estimated Total Energy Offset from Solar PV*

Construction Methods

The unique curvature of the Learning Center required innovative design strategies for implementation and installation of building systems and extensive coordination within available ceiling cavities, due to the angled light scoops and wells. Underground ductwork was used to minimize overhead space requirements. Use of flex connections for perimeter fin tube radiation and type K soft copper for plumbing mains allowed for each bend radius to be achieved.

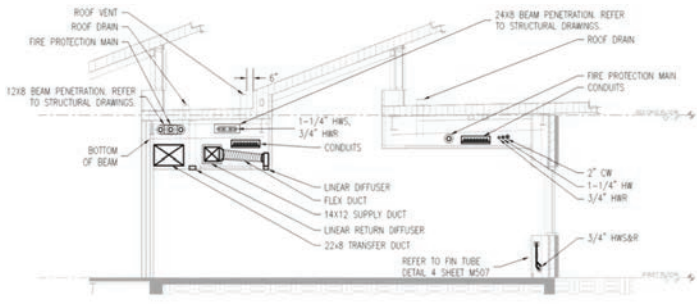

Image 3: Classroom Section View

Project Overview

The Learning Center is the center piece of the new Regenstein Learning Campus, serving youth and adults with an enhanced focus on educational and science based classroom and community programs. The Learning Center is a 26,700 ft^2 facility, for which ESD provided mechanical, electrical, plumbing, fire alarm, fire protection, and automation design services, and was designed to achieve LEED Platinum Certification.

System Description

The mechanical and plumbing systems are primarily contained within the basement level, which is also used as a tornado shelter. The first floor wings consist of classrooms, ITW kitchen classroom, and larger community program rooms; while the second floor consists of an office suite for staff.

Mechanical ventilation is provided from a single variable air volume air handling unit, serving VAV terminal units. The mechanical cooling system consists of a single air cooled chiller and variable flow chilled water pumps. The heating system consists of two high efficiency condensing boilers with a primary-secondary pumping arrangement. The domestic water system consists of high efficiency gas-fired water heaters.

Lighting Controls

The extensive use of light scoops and overall building design resulted in 90% natural daylight views. The lighting system includes LED fixtures, 90% occupant controllability, active daylight harvesting, and dimmable emergency lighting when the building is unoccupied for a minimum amount of time. Monitoring and control of interior lighting was implemented on a per fixture basis, and exterior lighting on a zone basis.

Energy Efficiency & Conservation

The facility is projected to achieve approximately 50% energy cost savings, as compared to the baseline model. In addition, the design achieved a 40% reduction in water use.

Rain water harvesting is performed by diverting water from the storm water management system into an existing storage system and is reused for irrigation.

Additional Features

The building automation system (BAS) is an expansion of the existing BACnet campus system, which drives efficient operation of the HVAC systems and integrates to various building systems including: natural gas generator, PV system, lighting, meters, etc. This data is also displayed real-time on a dashboard in main lobby as an educational tool for visitors, showing: actual consumption of lighting power, receptacle power, HVAC power, PV performance, gas usage and water usage.