Millennium Science Complex

KGB-Maser	BIM*ception*	Building Stimulus
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Option
Construction Management
Structural
Mechanical
Lighting/Electrical

The Pennsylvania State University
Life & Material Sciences Laboratory& Research Facility
275,600 SF
Whiting-Turner Contracting Company
Rafael Viñoly Architects
Thorton Tomasetti
Flack and Kurtz

Owner
Function
Size
CM
Architects
Structural
MEP

With Support from:
Thornton Tomasetti Foundation
The Leonhard Center
Penn State

Construction Management

Project Delivery Method:
- Design-Bid-Build

Building Enclosure:
- Precast brick masonry panels with rows of glass curtain wall windows.
- The roof system is a built-up green roof system.

Sustainability Efforts:
- Over 90% of all construction waste has been diverted from landfills.
- Local materials used for a majority of the project.

Lighting/Electrical

Power Distribution:
- Campus 12.47kV through two pad-mounted service transformers to two 480Y/277V switchgear in main-tie-main configuration
- Emergency is fed through two additional switchgear from University backup power.
- Electrical distribution frames are cladded with aluminum shielding to prevent electromagnetic frequency interference with sensitive equipment in adjacent spaces.

Lighting:
- All lighting is supplied at 277V
- Occupancy and daylight sensors are present in perimeter spaces.

Telecommunications:
- Combination voice and data outlets integrated into furniture
- Above-ceiling wireless access points
- Basket-type cable tray for bulk routing

Security System:
- Card reader access to lab zones
- Cameras at main entrances, delivery and tunnel access, and some research areas

Mechanical

HVAC:
- Nine 100% Dedicated Outdoor Air Systems deliver air to the Vivarium, Clean Rooms, and Laboratories. Energy recovery wheels and run-around coils reduce energy usage.
- Three 33,000 CFM air handlers serve the office areas.
- Campus steam provides heating for process and building loads through perimeter heating and terminal reheat.
- Campus chilled water provides cooling from three variable speed split case pumps.
- Laboratories are supplied with process chilled water and lab gases. Quiet rooms are cooled with radiant panels.

Sustainability:
- Designed to be LEED Gold Certified.
- 60,050 SF of Green roof and 43,000 SF of black EPDM roofs help manage energy loads and storm water runoff. Storm water is collected in a large under ground cistern for site landscaping.
- At least 20% reduction in water use from high efficiency and waterless fixtures.
- Exterior louvers and overhangs control solar gain.

Fire Protection:
- Automatic alarm and sprinkler system throughout the building including the first floor exterior atrium.

Structural

Sub Structure:
- Cast in place reinforced concrete foundation consisting of pile caps, at the base of the columns, placed on 7 in. diameter micro piles and connected by grade beams. Foundation walls line the footprint of the building.

Super Structure:
- Steel framing on 22 ft. square bays. Typical steel construction utilizes wide flange columns and beams. Floor systems are composite steel beams supporting concrete slab on metal deck.

Lateral Force Resisting System:
- The primary system consists of concentric braced frames. Moment frames and shear walls also exist on both wings. Two 30 in. concrete c-shaped shear walls poured integral with two bays of braced frames, extending from foundation to the fourth floor, also contributes.

Special Systems:
- Supports 155 ft. cantilever connecting the two wings on the North West Corner. Two truss frames extend from each wing transferring all loads down to the foundation through the c-shaped shear walls.

IPD/BIM Thesis 2010-2011

Integrated Project Delivery | Building Information Modeling