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CM
Anumba
University of Maryland Physical Sciences Complex
College Park, MD
8/31/2012
Building Statistics

General Building Information

Building Name	University Of Maryland Physical Sciences Complex
Location and Site	College Park, MD
Building Occupant	University of Maryland
Occupancy Type	1A (PSC), 1B (Existing)
Size	158,000 SF
Floors	4 above grade, 2 below
Dates of Construction	June 3, 20120 – September 23, 2013
Overall Cost	$93 Million
Delivery Method	Design-Build

Primary Project Team

Owner	University of Maryland
Project Administrator	Gilbane Inc.
Design/Build	HDR Inc. (Formerly CUH2A)
Structural	Hope Furrer, LLC
Civil	A Morton Thomas and Assoc.
Mech/Elec/Plumbing	Global Engineering Solutions

(Part 1)

Architecture
The University of Maryland Physical Sciences Complex breaks the mold for conventional education buildings. It is set apart by a large elliptical opening that pierces the building all the way from the roof to the ground level. This architectural feat is designed to encourage scientific discussion and to open up the inner hallways to natural light. There are offices and several classrooms on the upper floors with a direct connection to this elliptical façade. The façade its self consists of custom made 1" glazing of several types which include ventilated, insulated, and tinted (red).

The Structure extends two levels into the ground and utilizes an array of vibration cancelling building techniques so that molecular experimentation can take place with high accuracy.

The UMPSC will attach to the existing Institute for Physical Science and Technology, which is undergoing renovations to accommodate the space.

National Code Models
IBC 2006
IMC 2006
IECC 2006
NFPA 2007

Zoning
According to the Maryland-National Capital Park and Planning Commission based out of Prince George's County Planning Department, the UMPSC is zoned as Rural Residential as of June 2010. As such, there are no height or lot limitations (I am contacting the department to get a confirmation of this, it does not seem accurate.)

Historical Significance
The UMPSC is a large addition to the existing sciences building and is intended to overtake the duties of the existing complex and also house several more departments.

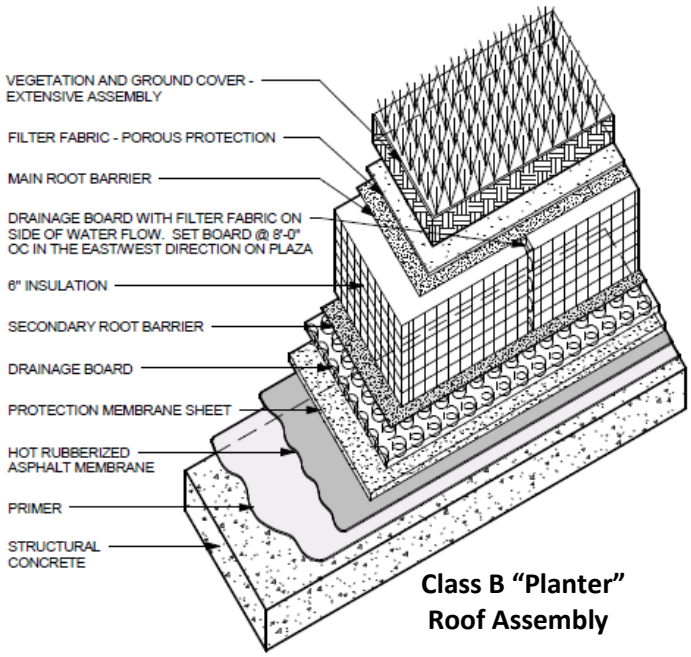
Building Facades
The elliptical opening and the north and south faces of the building consist of a metal and glass curtain walls. The glazing for the elliptical façade is 1" custom sized glazing while all other glass is insulated 1" glazing. The elliptical curtail wall glazing is arranged in a semi-checkerboard pattern between clear laminated glazing and red tinted glazing. Along the north and south faces of the building are aluminum sunshades and fins. The curtain wall also features an operable aluminum window with an opening limiter for ventilation and safety. The curtain walls are supported by a series of post tensioned concrete columns and beams.

Perspective of elliptical curtain wall from ground level

The west wing's exterior is a masonry wall system with a red brick veneer and features operable windows similar to those found on the north and south curtain walls.

Roofing

The roof largely consists of a green roof and utilizes five assembly types. Generally speaking, there is a planting assembly, a gravel assembly, a concrete paving assembly, a grass assembly, and a bituminous assembly for drainage. Each assembly consists of 6" tapered insulation and protective membranes. The difference between the planting and grass assemblies is a larger volume of soil for vegetation to take root in. The roof is intended as a social attraction. The *diagram* to the right showcases the grass roof assembly. The roofing systems will be supported by a concrete slab on metal deck.



Class B "Planter" Roof Assembly

Sustainability

The UMPSC is after a LEED Silver rating. The building has raised flooring, a sophisticated lighting control system, sunshades, and most notably a green roof. There is also a proposed reuse of the groundwater for circulation through the building.

(Part 2)

Construction

The most notable construction method for the PSC is the location of the single tower crane for all work. It is located in the center of the ellipse façade in the interior of the building. The building is erected around this tower crane, and upon completion of the roof, was removed with another mobile crane. Other notable concerns for construction include the tie-in to the existing CSS building. This required a minor retrofitting and renovation of the existing CSS building.

Structural System

The structural system of the PSC is primarily post-tensioned concrete beams and slabs. The basement levels are framed with 14" thick concrete slabs with #4 epoxy coated bars at 12" on center top and bottom in the lab enclosures, and 8" thick slab in the hallways. This reinforced slab bears on top of a 3" unreinforced slab that rest on 6" of granular base material. Moving up, the ground floor framing consists of a 12" thick two-way concrete slab with a mixture of post-tensioned and conventionally tensioned beams. The other floors have 7" slabs as well as post-tensioned and conventionally tensioned beams. The post-tensioning tendons are #7 bars. A typical drop panel bay for the slab system is approximately 11'x7'x10". There are also several HSS steel columns to reinforce certain areas of the building.

Electrical/Lighting Systems
Power is supplied to the building via the local utilities that pass through the main switchboard for the PSC. A 480Y/277V, 4000 amp, three phase switch board is used to distribute power to the other secondary panels. In total there are approximately 160 panels with supply the building with power from the main switchboard. The system is designed to carry a maximum of 17KVA and a continuous current of 600A. Power is backed up by a generator for the PSC rated at 750KW and 938KVA.

The lighting in the PSC is comprised of fluorescent track lighting, metal halides, and LEDs. The LEDs are primarily used in landscape element, exit signs, and façade lighting effects. The fluorescent lighting, rated at 32W and 54W and 3500K, are used to light the labs, offices, corridors, all of which utilize electronic ballasts. The metal halide fixtures are outdoor and enclosed in low temperature emitting enclosures so that they can be walked over by pedestrians.

Mechanical System
The PSC utilizes standard variable air volume systems to supply heating and cooling to zones. Three 23,000 (6,000 outside) CFM air handling units are dedicated to the Type 1 laboratories, two 48,000 (20,000 outside) CFM units for Type 2 labs, three 21,000 CFM (5,000 outside) units to the under floor systems, and one 13,500 CFM unit for the mechanical building. Type 1 labs are above ground, exposed to light, and will be used for small scale experimentation and learning. They are located on the second and third floors of the building and consume more square feet than Type 2 labs. Type 2 labs will be used for laser based experiments, biochemical research, and micro-matter research. It is imperative that the air quality, flow, and pressure of these underground labs remain absolutely stable if accurate research is to take place. Two 24,000 CFM heat recovery units will work in conjunction with the air handling units to conserve energy.

Two custom made centrifugal water chillers are located in the mechanical wing of the PSC. The chillers each have a capacity of 800 tons and a nominal flow rate of 1,600 GPM. A single 2-cell cooling tower will be located on the west roof of the PSC with a flow capacity of 4,800 GPM.

Sixteen 625 CFM fan coil units, located several mechanical rooms through the structure will supply both warm and cool air using the water from the chiller and the heat exchanged water (from the campus steam lines) respectively.

Fire Protection
Fire protection comes in the form of a wet pipe system for the entire building. Stairwells are equipped with standpipe risers and fire hose connections at each level of the PSC. The wetpipe system is a quick response system in areas where fire suppression is critical including Type I and Type II labs. The alarm system is an all-electronic system that monitors conditions in the building. It is capable of automatically pressurizing stairwells, releasing magnetic fire and smoke doors, recalling elevators to safe floors, and closing appropriate dampers. The pumps themselves are electrically driven centrifugal fire pumps rated at 50 psi. They are capable of delivering 500 gallons per minute and operate at 25 horse power and 1770RPM.

Transportation
The PSC is equipped with two full service elevators that are encased in 4 layers of 3/16” aluminum shielding. Each elevator travels the whole height of the building including the two basement levels. There are also six sets of staircases in total. Two of which are entirely new and travel to each floor including basement levels. Two other sets are tied into the existing CSS building and stop at the ground

floor of the CSS building. The remaining two are located at opposite corners of the interior space that houses the interior elliptical façade. These staircases are not fire rated, and are semi spiral stairs that travel from the 1 floor to the third (excluding ground floor).

Communications/Security

The PSC is equipped with the standard array of communication hardware and wiring. Included in each lab and office space are the appropriate wall mounted jacks for ethernet and phone. Tied into the typical telecommunications systems is a state of the art security system. This security system is designed to connect to the existing police command center on campus and is capable of monitoring access controls, alarms, CCTV (video surveillance), identification credentials, and store digital surveillance records.