Building Statistics

Building Name|

Life Sciences Building

Building Location and Site|

The Life Sciences Building is located on the University Park Campus of The Pennsylvania State University in University Park (State College), Pennsylvania. The building forms a gateway at the end of Shortlidge Mall – which, before construction of Life Sciences, was a street that has now been closed, landscaped, and turned into a pedestrian only mall. The Life Sciences Building is connected to the Chemistry Building (completed one and a half years earlier) on the west side by a bridge on the two upper-most floors. Other campus buildings neighboring Life Sciences include the Eisenhower Auditorium – the university's largest performing arts space – to the north and Thomas Building – a general classroom building – to the south.

Building Occupant|

The Life Sciences Building is occupied by portions of various colleges and departments of Penn State University who are involved in Life Science Disciplines.

Building Occupancy and Function Types|

The entire Life Sciences Building was designed for BOCA 1996 occupancy group B with BOCA 1996 occupancy group A – 3 as an accessory space (less than 10% of the total area). However, the spaces within the Life Sciences Building are diverse and were planned and set up for various different functions and groups of users. The basement also houses various mechanical and electrical rooms and an animal research facility. The ground floor – because it is most easily accessed from the surrounding campus – contains an auditorium, student commons, classrooms and computer labs. Each of the first through fourth floors contains a diverse mix of offices, conference space and research labs. The fourth floor additionally has a rooftop greenhouse facility on part of the lower roof. The fifth floor (penthouse) is devoted entirely to mechanical electrical, and elevator equipment.

Building Size|

154,000 Gross Square Feet

Floors Above Grade|

A total of six floors of the Life Sciences Building are built above grade (1166'-8") giving the building a height of 97'-0". The breakdown of the floors is as follows:

Basement Level	1150' – 0"	Completely Below Grade
Ground Level	1166' – 8"	Partially Below Grade (One Side)
Level One	1180' – 8"	Above Grade
Level Two	1194' – 8 "	Above Grade
Level Three	1208' – 8"	Above Grade
Level Four	1222' – 8"	Above Grade
Penthouse Level	1236' – 8"	Above Grade

Owner|

The Pennsylvania State University www.psu.edu
University Park, PA 16802

Architects| (joint venture)

Payette Associates www.payette.com
285 Summer Street
Boston, MA 02210-1522

Bower Lewis Thrower Architects www.blta.com
1216 Arch Street
Suite 800
Philadelphia, PA 19107-2835

Construction Manager (at risk)|

Skanska www.skanskausa.com
518 Township Line Road
Suite 100
Blue Bell, PA 19422

Structural / Civil Engineer|

Gannett Fleming www.gfnet.com
207 Senate Avenue
Camp Hill, PA 17011

Mechanical / Electrical Engineer|

Bard, Rao, + Athanas www.brplusa.com
2002 Ludlow Street
Second Floor
Philadelphia, PA 19103

Landscape Architect|

Lager Raabe Skafte Landscape Architects www.lrsla.com
1610 Spruce Street
Philadelphia, PA 19103-6722

Construction Dates|

Program Development Begins:	September 1999
Notice to Proceed:	July 2002
Finished for Occupancy:	September 2004

Cost Information|

$37,790,085

The above cost reflects the price of constructing and finishing the Life Sciences Building. Items to note that are included in the above cost are window treatments and all built in lab equipment. The site was owned by the university and vacant so no site acquisition costs were needed or included. Fees paid to architects, engineers and other consultants are not included. Utility work also is not included. Also, the cost of furnishing the building is not included.

Project Delivery Method|

The project delivery method for the Life Sciences Building was construction manager at risk.

Architecture|

The Life Sciences Building, by using an above grade connection to the adjacent Chemistry Building forms a "gateway" to the sciences sub campus on the Penn State – University Park Campus. The Life Sciences building is a five story building with a mechanical penthouse with a footprint in the shape of an "L". The building is a modern design that blends in with the existing and historic buildings on campus by using a red brick façade, granite foundation, and punched windows. The south elevation, however, is a departure from most of the existing and adjacent campus buildings and uses a glass curtainwall system, along with sunshades and a glass canopy to create a Life Sciences Courtyard. The building is primarily organized along an east – west spine – with office space enclosed in glass to the south and lab space to the north.

The Life Sciences Building features classrooms and an auditorium on the ground floor, a mix of office, labs and conference space on the upper floors and a basement that was left unfinished but prepared for future use. The building is topped off with a mechanical penthouse.

Major National Building Codes|

BOCA 1996
PA L&I Title 34 1996
IPC 1995
IMC 1996
BOCA Fire Prevention 1996
NEC 1996

Zoning|

Borough of State College, PA – University Planned District #5

Historical Requirements|

(Not Applicable)

Building Envelope

The majority of the exterior walls of the Life Sciences Building consist of face brick backed up by a 6" metal stud / glass mat faced gypsum board wall with 2" of rigid insulation between the brick and gypsum board. Some of the building is enclosed by an aluminum and 1" thick insulating glass panel curtainwall system – mostly occurring on the south and east façades and bridge to the Chemistry Building. Windows are similar in design and construction to the curtainwall assemblies. The mechanical penthouse (top level) is faced entirely with zinc coated copper sheets (both standing and flat seams) mounted on a wall consisting of ¾" thick plywood on 6" metal studs. All 6" metal stud walls are filled with fiberglass batt insulation. The roof of the Life Sciences Building is a single ply roof membrane adhered to tapered rigid insulation supported by 1 ½" metal decking.

Structural System

The Life Sciences Building foundation system consists of steel H – piles (using HP12X74 and HP10X57) for the columns and spread footings around the perimeter. The H – piles are driven for each interior column in groups ranging in number from 2 to 14 in vertical or battered orientations. The piles are topped with reinforced concrete pile caps that range in thickness from 3' to 5'. The perimeter spread footing is constructed from reinforced concrete ranging in depth from 1'-6" to 3'-3" and in width from 5'-6" to 17'-6".

The floor system for portions of both the basement level and ground floor level consist of 6" thick reinforced concrete slabs on grade. Additionally, in the basement, the mechanical / electrical vault space has a floor slab on grade that was designed as a mat foundation capable of supporting a load of 2,500 PSF. The basement mechanical / electrical vault floor slab is heavily reinforced and 2'-6" thick.

The floor system for the upper floors in the building is fairly typical throughout; consisting of normal weight concrete on 2" deep, 18 gage, composite metal deck for a total floor thickness of 6 ½". The metal deck is then supported by composite wide flange steel beams and girders. To achieve composite action between the steel beams and girders and concrete slab ¾" diameter, 5" long shear studs are welded to the beams and girders. The size of the beams used throughout the building typically consist of W14 and W16 shapes with W14x22 and W16x26 being the most representative of the entire construction. The beam spans are typically about 31' for the W16 shapes while the W14 shapes typically span about 21'. Spacing for all beams is somewhere close to 8.5'.

The mechanical penthouse floor is framed with deeper and heavier steel beams and girders, also using composite action. The beams framing the mechanical penthouse floor are primarily W18x46, W18x50, W18x60 shapes again spanning about 31' with a spacing of around 8.5'. The floor system once again consists of normal weight concrete on 2" deep, 18 gage, composite metal deck for a total floor thickness of 6 ½". The roof of the Life Sciences Building is framed with various W16 infill beams being supported by W21 girders. These roof beams and girders then support 20 gage, 1 ½" deep steel roof deck.

The lateral force resisting system (and system of columns) is made up of a combination of braced and moment resisting frames. Due to the complex geometry of the footprint of the building numerous lateral force resisting systems are located throughout. The building is shaped roughly like an "L" with the long side of the "L" running east to west. A steel moment resisting frame runs along

each of the long exterior walls of the building in the east – west direction. Additionally in the east – west direction are three combined moment / braced frames located internally in the short leg of the "L". One moment frame runs east –west on the end of the short leg of the "L". Two smaller moment frames also run east – west to support a section of the building that is isolated due to an expansion joint. The total number of frames providing lateral support to the building in the east – west direction is eight.

In the north – south direction three braced frames located inside the long leg of the "L" provide lateral support. Also, on the end of the long leg of the "L" a braced frame provides north – south lateral support. In the short leg of the "L" one moment frame runs along each exterior wall. Additionally, in the north – south direction, a braced frame located at the outside corner where the long and short legs of the "L" meet provides additional lateral support. Finally, two braced frames provide north – south lateral load resistance to the portion of the building that is isolated due to an expansion joint. The total number of frames providing lateral support to the building in the north – south direction is nine.

The columns – some are part of lateral force resisting frames – range in size from W10 up to W14. The weights generally vary from 33 lbs/ft to 311 lbs/ft.

Mechanical System|

The building is served by six air handling units (AHU); three in the penthouse and three in the basement. One AHU provides 64,000 cubic feet / minute (CFM) to the office areas of the building, providing at least 50% outside air at all times. Two AHUs provide 81,000 cubic feet / minute of 100% outside air to the lab areas. Three additional AHUs are located in the basement and provide a total of 30,000 CFM of 100% outside air to the vivarium areas of the building.

Control of temperatures in individual spaces is provided through the use of 36 variable and constant volume boxes. Two package air handling units in the basement provide conditioned air to the remainder of the building at the rates of 5,000 and 20,000 CFM each. The building also has two 75 ton air cooled chillers and utilizes the university's steam system for heat. Several high efficiency (HEPA) air filters are used for both intake and exhaust air due to the biologically sensitive nature of the lab spaces.

Electrical / Lighting System|

The Life Sciences Building distributes a 15kV incoming service through the main 4000 ampere switchboard to both 480Y/277V and 208Y/120V transformers throughout the building. The building electrical system is also equipped with a indoor, diesel fired, 750 kilowatt, 480Y/277V emergency generator. At least one of every three lights in the path of egress and all of the exit signs are wired through a life safety panel so that they can never be turned off. Additional emergency outlets are provided in the labs for equipment that cannot ever lose power.

Most of the interior of the building is illuminated with fluorescent light fixtures that are recessed into plaster or tile ceilings. Incandescent fixtures are used, but only as accent lights – never to provide light for tasks. Special light fixtures are provided for dark rooms, greenhouses and in different laboratories. The southern side of the building with its full glass curtainwall and external sunshades takes full advantage of natural daylighting. The majority of the lighting fixtures used in the building are 277V.

Fire Protection|

The building construction is classified as BOCA – 1996 Type 2A Protected. It is also classified by the Pennsylvania Department of Labor and Industry as Fire Resistive Construction. The building is subject to all of the code restrictions involving construction, occupant loads, egress distances and general building size limitations that are applicable to its construction classification. Notable variances from BOCA and PA L&I are as follows; two story opening designed according to BOCA 713.3, elevator recall in compliance with BOCA 3006.2, and dead end travel distances exceed the PA L&I recommendation by 8' in some cases.

The building is fully sprinkled with a system designed according to NFPA 13. The sprinklers are assumed to cover 130 square feet per sprinkler head. The design density is .15 GPM per square foot. Two hydrants are provided on the rooftop for fire fighting purposes. There is also a standpipe located in each of the three stairwells and a central standpipe located in the middle of the main hall on all floors for a total of four standpipes.

Transportation|

The building has 4 major entrances; one being on the east end (top of the "L"), one each on both the inside and outside of the angle of the "L", and one at the end of the short (south) side of the "L". The building has three major stairwells that serve every floor. There are also several stairwells that provide convenient links between two floors. Three total elevators are located in the building in two locations. The main elevator bank is located in the angle of the "L" so that it conveniently serves both entrances and the all of the hallways of the building. The main elevators serve all floors, except the basement. To provide elevator access to the basement of the building, an elevator is provided near the entrance and staircase on the east side of the building (top of the "L"). This elevator on the east side does not travel to the penthouse level.

Telecommunications|

Because this is a classroom and research building telecommunications outlets (one or more data outlet, one television outlet, and one telephone outlet) are provided throughout the building. At least one telecommunications outlet is located in every room. Typically there are two of more of these combined outlets per room. Telecommunications outlets are also provided in hallways and other common areas. They are a combination of wall mounted, floor mounted, furniture mounted and wireless telecommunications devices.