



# The Hetzel Union Building (HUB)

Pennsylvania State University, University Park

## Building Statistics

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Lighting / Electrical

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# BUILDING STATISTICS

## General Building Data

### BUILDING NAME

The Hetzel Union Building (HUB)

### LOCATION

Penn State University, University Park

### BUILDING OCCUPANT NAME

The HUB

### OCCUPANCY TYPE

Multi-Purpose

### SIZE OF BUILDING

107,000 S.F.

### NUMBER OF STORIES

Three stories above grade

### PROJECT TEAMS

Owner: Penn State University

Construction Manager: Gilbane Building Company

Architect: Gund Partnership

Landscape Architect: Andropogon Associates, Ltd.

MEP Engineer: Vanderweil Engineers

Civil Engineer: Sweetland Engineering and Assoc.

Structural Engineer: LeMessurier Consultants

Acoustic Consultant: Acentech Incorporated

# BUILDING STATISTICS

AV/IT Consultant: Vantage Technology Group

Lighting Consultant: Horton Lees Brogden Lighting Design

## CONSTRUCTION DATES

May 2013 - May 2015

## COST INFORMATION

Project cost: \$44,600,000

## PROJECT DELIVERY METHOD

Design-Bid-Build

## Architecture

### DESIGN AND FUNCTIONAL COMPONENTS

The design of the HUB addition both compliments and stands apart from the rest of the HUB. The terra cotta shell is reminiscent of the masonry brick façade on the older portions of the building, but maintains a strong identity as a newer and improved space. The large use of glass helps to create a lighter feel both visually and structurally to the addition as a whole.



*Atrium: Courtesy of Gund Partnership*

There are a variety of spaces within the HUB, including the campus bookstore, various food vendors, THON offices, and various gathering spaces. The bookstore features a design that is both inviting and open. The first story acts as the main store, while the mezzanine level connects to the main floor of the HUB and is more of a study space and casual reading area. The main atrium is the main pathway through the building, connecting the new addition to the old HUB. The main floor also functions as a seating area for the food court. A main stair is positioned in the center of the space that is both for bleacher style seating and a means of getting onto the mezzanine level. The mezzanine is a ring that spans the perimeter

of the atrium and is lined with conference rooms and offices that take advantage of the abundance of daylighting with curtain wall like glazing.

## MAJOR MODEL CODES

The codes used in the designing of the HUB include IBC 2009, ASHRAE 2010, NEC 2011, IECC 2009, IEBC 2009, ISBC 2009, and IPC 2009.

## ZONING

A-1, 2: Assembly - Theaters, Restaurants

B: Business

M- Mercantile

## Building Enclosure

### FACADES

The three main building facades for the building are terra cotta, curtain wall, and masonry brick. A large portion of the atrium and attached spaces is clad in terra cotta panels, which vary in texture from smooth to corrugate. The masonry brick is the main façade of the bookstore. These bricks vary in color considerably, from a rich crimson to a much lighter rose color. Behind the masonry is 2.5” cavity wool insulation and 8” metal studs that are 16” on center to hold everything up.

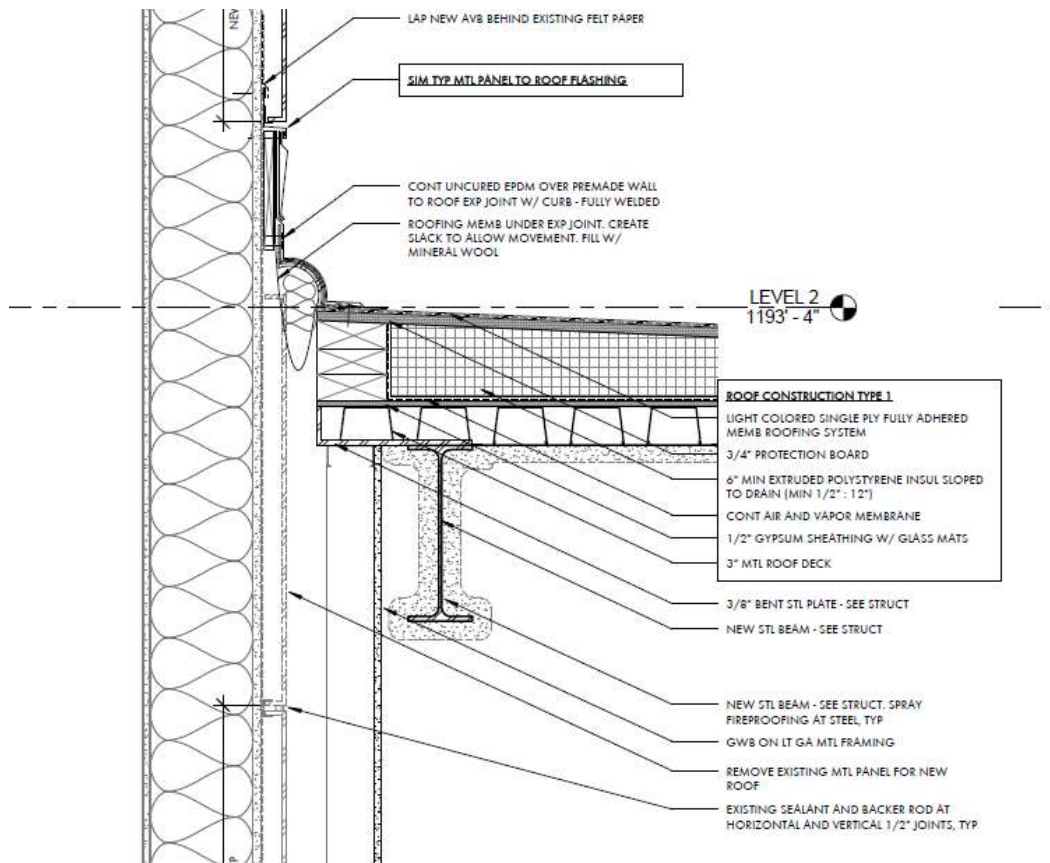


The two main curtain wall facades, made up of low-e reflective glazing, provide daylight to the bookstore and to the main atrium space. The upper panels of glass in the atrium space also have frit to help control the amount of direct sunlight that enters the space. In addition to the curtain wall there is also a skylight like system in the atrium space with a metal scrim over top of triangular glass panels.

### ROOFING

The roof of the bookstore is a green roof construction that will have the ability to accommodate occupants. The atrium roofing system is comprised of sloping metal panels that give way to glass panels in

the middle portion. The glass panel portion takes on a much more organic sloping in contrast to the more conventional continuous slope of the surrounding metal panels.



Ref: A4.32 (8)

Typical roof construction consists of a single ply membrane, 3/4\" protection board, 6\" min extruded polystyrene insulation, air and vapor membrane, 1/2\" gypsum sheathing with glass mats on a 3\" metal roof deck.

## Sustainability Features

An inhabitable green roof over the book store will help with drainage as well as acting as a heat sink for the spaces below. High performance glazing is used for the curtain wall systems to help mitigate solar heat gain. The use of scrims on some of the glass roof panels also helps to lessen glare and solar heat gain coming from above.

## Primary Systems

### CONSTRUCTION

Gilbane Building Company acted as the general contractors in charge of constructing the HUB. Construction began in May of 2013 and the project was completed in May of 2015. The project was bid using a guaranteed maximum price (GMP) for \$44,600,000. A Design-Bud-Build delivery method was used.

Due to the bookstore being renovated, a temporary store was set up on the HUB lawn south of the site using conjoined trailers. Construction trailers were set up on the HUB lawn as well. There were two construction entrances, one at the bookstore and the other off of Pollock road on the north east side of the building. The main concern was the limited size of the site as well as access to said site.

### ELECTRICAL

The current electrical system stands separate from the existing electrical systems of the old HUB. The building utilization voltage is set at 480Y/277V. The main feed into the building comes in at 12.7 KV, supplied by the campus distribution system. A 1600A, 42 kAIC, switchgear distributes power throughout the building. There are two main breakers that are keyed, so only one can be operated at a time.

Depending on the voltage utilized by the panel boards downstream, a step-down transformer may be needed to further reduce the voltage to 208Y/120V. These lower voltage panels would service the various receptacle and lighting loads, as well as other low voltage loads. The mechanical equipment is supplied with 480Y/277V.

A second feed into the building from the campus distribution system acts as the emergency circuit. There is no generator in the building. Using a series of automatic transfer switches power is transferred over the emergency service. The emergency transformer steps the voltage down to 240/120V, which then feeds the various emergency panels that handle the life safety and legally required systems.

The HUB uses a combination of panelboards that range from main lugs only to main circuit breakers. All panel boards are rated for NEMA1 enclosures. Thermal-magnetic circuit molded-case breakers are used throughout the system. Copper was used exclusively for the wiring in the building and conduit varied from EMT to LMFC depending on the application and location of the conductors.



## LIGHTING

The lighting for the HUB addition is comprised entirely of LEDs. Many of them are recessed downlights to light the mezzanine level and other public areas with low ceilings. The main entry way, if you're coming from downtown, has both linear LED lighting and cylindrical pendants that extend from the book store. The bookstore itself has a similar lighting composition, with pendants in areas with high ceilings and linear fixtures in the low ceiling areas. The main atrium space is lit by LED high bay fixtures with an industrial finishing that blends in with the exposed steel structure. The conference rooms are lit primarily by linear LED fixtures with point sources that could act as either accent or supplemental task lighting.

The flexibility of LED lighting allowed for controls to be installed that react to the amount of available daylight in the space. This is accomplished using an open-loop photocell with a range of 1-10,000 foot candles with a dead band to prevent cycling of the lights. Most corridors also have occupancy controls to dim lighting when no activity is detected. All lighting is linked to a time clock that will automatically adjust dimming levels of all secondary fixtures to further drive down energy usage.

Daylighting is used extensively in the bookstore and atrium areas, pictured below. This is accomplished with a curtain wall system and supplemental skylights. There are many glass walls inside the space as well to take advantage of the abundance of natural daylighting in the atrium area.

## MECHANICAL

7 air handling units supply the building with conditioned air. AHU-1 and 2 supply the bookstore at 16,000 CFM each. AHU-3 and 4 supply the atrium spaces at 18,000 CFM each. AHU-5 is a multipurpose supply, supplying multiple areas with 12,500 CFM. Lastly AHU-6 and 7 service existing areas at 20,000 and 6,600 CFM respectively. The system is a variable air volume system that provides the necessary volume of air to the spaces at a constant temperature. AHU-1 through 4 are located in the second level basement mechanical room, while AHU-5 is located on the second floor.

Both hot and chilled water is supplied to the building through the campus loop. This is the primary source of both heating and cooling for the building. All AHUs are equipped for both heating and cooling loads.

## STRUCTURAL

Composite decking consists of light weight concrete, supporting 3,000 psi, on top of 1.5”-3” galvanized steel deck. The concrete is reinforced with #14 and # 18 A615 grade 60 steel rebar. These are supported by wide-flange steel beams that range in size from W10X12 to W24X84. Normal weight concrete, supporting 4,000 psi, make up the footings, columns, and floor slabs on grade.

Inverted V HSS bracing is used in conjunction with concrete floor slabs to form the structure of the atrium space. These steel bracing systems also frame the outside of the flex theater space. 10 HSS trusses mounted on 18” round concrete columns with HSS 10X0.375 tops form the main support for the atrium roof.

## Support Systems

### FIRE PROTECTION

This building is built as a type 1B building. This means that exterior walls, structural framing, and ceiling/floor separation must have a minimum of 2 hours of fire protecting and ceiling/roof assemblies must have at least a 1 hour rating. The maximum travel distance to a common path of egress is 100’ with a maximum dead end of no more than 50’ allowable.

The HUB is a fully sprinkled space, with water coming from a wet pipe system, with all sprinklers complying with NFPA 13 requirements. Smoke detectors and fire alarms are located in every space and controlled by an MLX addressable system. The fire alarms sound and strobe.

### TRANSPORTATION

The addition of the HUB now has two main stairways and three elevators. The grand stair in the center of the atrium connects the second and mezzanine levels. The other stairwell is located on the north eastern side of the addition and connects all five floors, two below grade and three above. Two elevators accompany the northeastern stairwell, while the third is located in the bookstore.

### TELECOMMUNICATIONS

There are stacked telecom rooms on the western side of the addition. These house telecom racks that service the data needs of the building. Additional telecom rooms are provided to the independent

businesses that rent out space in the HUB, such as PNC bank and the credit union. These rooms were stocked by the clients.