Project Overview

1. Project Team

This project is being completed under a design-build arrangement between Widener University and HSC Builders and Construction Managers. Widener informed HSC that they wanted a high quality, LEED™ rated residence hall and were willing to spend up to $18 million for it.

In order to get several design ideas for the building, HSC conducted a design competition between four reputable architects. The resulting schematics were presented to representatives from Widener, who chose the design submitted by CuetoKearney Design LLC. HSC then hired the partnership of CuetoKearney and Wallace, Roberts, and Todd, LLC to complete the design for the building. The architects then brought Catania Engineering Associates, O'Donnell & Naccarato, and Alderson Engineering into the project as consulting engineers. HSC broke the construction of the project into trades and bid out each trade.

2. Construction Schedule

After 3 months of drilling the wells for the geothermal heat pumps, the building finally broke ground at the end of July 2005. The project is expected to be completed by August of 2006 so that it can be occupied by students in September for the fall semester. It is critical that the building be finished on time because students have been assigned to the building. This is reflected in the contract by charging liquidated damages if the project would be late. The full construction schedule for the building as well as a layout plan is included in Appendix D.

3. Construction Cost

The cost of the building is set by the guaranteed maximum price of the design-build contract between HSC and Widener. This $18 million maximum price limit is broken down into $14.5 million for the building and $3.5 million for the site work. The building size is approximately 92,000 square feet. This gives a cost of $157.61 per square foot for the building or $195.65 per square foot for the entire project.

The information on actual costs of individual systems was not available, so RS Means estimating data was used to get an idea of what the costs should be for the mechanical, electrical system, and structural system. The mechanical cost for a residence hall in the upper quarter of quality is $27.80 per square foot. Adjusted for the area of this building this becomes $31.58 per square foot, or $2.76 million for this project. The electrical cost for a building in the upper quarter of expenses is $14.20 per s.f. Adjusted for the size of this building the result is a cost of $16.13 per s.f. or $1.41 million. If the quality of the building were to be reduced to median quality, the costs would be brought down to $1.93 million for the mechanical system and $1.25 million for the electrical system. Using detailed estimating procedures, the structural cost of this building should be approximately $1.85 million. For calculations of structural costs, see APPENDIX D.

4. Building Architecture

The 92,000 square foot building, located on the corner of 17th and Melrose Avenue in Chester, PA has an L shape that allows it to make the most of its corner location. To keep the building from becoming an obstacle to pedestrian traffic, an open air walkway runs through the building at the corner of the L. The exterior is to have a mostly brick facade with some glass curtain wall and a large limestone signage wall to carry the university name at the corner. The roof structure is 8" hollow pre-cast plank which is covered by rigid insulation sloped to roof drains. The insulation is protected by a fully adhered single ply roofing membrane. The interior is made up of repeating apartment style dorms. Generally the apartments contain three large double rooms, a living area, a kitchen and two full bathrooms.

The building was required to meet IBC 2003 codes as part of the Statewide Building Code (Uniform Construction Code) adopted by Pennsylvania in April of 2004. The building is being constructed in an R-2 residential zoning district, which limits it to a height of 45 feet. This was difficult to achieve with four floors and ruled out using a steel framed building.

Previously this site had been an open area, a field hockey field, so there were no historical requirements. However, as part of a university campus it was assumed from the beginning that the building would blend in with and compliment the buildings around it.

5. Structural System

The structural system is 8" hollow core pre-cast plank flooring with spans ranging from 23 to 30 feet. The planks rest on the exterior walls and one of the hallway walls at the center of the building. The load bearing walls supporting the planks are 8" concrete masonry units. The CMU walls are grouted solid from the foundation through the first floor and in the shear walls. From the second floor up to the roof the walls are hollow, only needing reinforcement at the end of the walls. The walls then rest on shallow footings, typically 3'6" W x 12"H under the outside walls and 5'W x 14"H under the inside wall. The shear walls rest on huge 6'6"W x 36"H footings. The only exceptions to this system are the clubhouse building, which uses steel to support some areas because of openings in the ceiling, and the open walkway, which also uses steel to support the pre-cast concrete due to the longer spans involved.

6. Electrical System

Power will come from a feed connected at an existing transformer at nearby Moll Hall. The feeder will run underground in a 4" conduit at 13.2 kV. This will be carried by 3 #2/0, Type 133% EPR conductors with the capability of handling 15 kV. It will be reduced to a 208/120V, 3 phase, 4 wire power supply by a transformer at the entrance to the building; inside the mechanical room. This power will then be distributed by a switchboard to a fire pump, jockey pump, TVSS, and other distribution switchboards that will send power to the individual panelboards. The emergency system will be a generator capable of producing 1000kW at 125kVA. This power will be distributed in the form of 3 phase, 60 Hz, 208/120V power to the life safety systems panel and the elevator.

7. Lighting Design

All lighting for the building is fluorescent. This allows most of their lights to be under 40 Watts. There are 14 different lighting manufacturers used for the building but most of the lights are typical. In public areas, where there is a suspended ceiling, 2 x 2 or 2 x 4 Columbia fixtures are used. In the apartments themselves most of the light is provided by 6” compact fluorescent downlights. For this use, fixtures manufactured by either Lightolier or Prescolite are used. In the bedroom, where more general rather than focused light is needed, Cooper indirect wall lights are specified.

8. Mechanical System

The air intake and discharge for the building is on the roof in the form of 4 Greenheck ERV-521H heat recovery units. The units send the air to geothermal heat pumps located in the mechanical closet of each apartment unit. The heat pumps are part of a loop that receives water from 72 – 500 foot deep wells located in the rear of the building. From the heat pumps the air is ducted into the bedrooms and hallway of the building. Then the air travels through the living areas and is returned through the bathroom exhaust system into a vertical chase that takes it back to the rooftop heat recovery units and out of the building.

9. Fire Protection System

The fire protection system consists of a main fire pump and a jockey pump to provide water to the building. The building is to be fully covered by a sprinkler system with the ability to provide .10 GPM per square foot over the most remote 1,500 square foot area with 100 GPM reserved for hose streams. Sprinkler heads are to be released at a temperature of 165 degrees Fahrenheit. There is also to be a dry fire protection system covering the roof of the building.

The annunciator panel is located in the vestibule at the main entrance to the building. The entire system must meet the requirements of NFPA 13.

10. Inter-Floor Transportation

There will only be one elevator for the building. This elevator is to be a Schindler 2500 lb. hydraulic elevator. This will be located at the corner of the elbow of the building so that it is directly across from the main entrance to the building and approximately the same distance from each of the wings. The elevator is much larger than would be required simply for handicap accessibility so that it can accommodate freight tasks and students moving into and out of the building every year.