Breadth Topic #2: Penn State Sustainability

One of the areas that seemed to be slighted in the original design of the Gen*NY*Sis Center for Excellence in Cancer Genomics is that area of sustainable principles. In an effort to encourage green building practices, Penn State University has adopted its own version of the LEED principles, which is why the proposal relocated the building to the Hershey Medical Center. Penn State has issued a checklist to follow for new construction on Main Campus and all branch campuses.

Figure 21 : *Google Map* of Hershey Medical Center

Sustainable Sites

As seen in Figure 21, the building has been placed on the Hershey Medical Center Campus mainly to gain from the solar rays that the large windows of the curtain wall can benefit from. Not only does this provide an affect of bringing the outside atmosphere inside, but it helps keep the building heated in the winter. Another benefit of this plot is that it is easily accessible from the road, and as displayed in Figure 21 , the bus route (the red arrows) passes by one of the entrances of the building, encouraging the use of public transportation. To go along with public transportation, bike racks are also a necessity to encourage bicycle traffic rather than automobile traffic. Another application of the LEED principles is the use of bioswales which is can be implemented adjacent to the road or setback off the main building. Building these into the site in the beginning of construction can allow for the creation of a very green atmosphere and view from inside and outside. Another aspect of a sustainable site is avoiding the use of light pollution, which simply means using light fixtures that either focus down in order to not waste energy by sending the lumens up into the sky.

Water Efficiency

Flow Fixture Type	Water Use (gpm)	Duration of Use (sec).	Amount Used
Conventional Lavatory	2.5	15	0.625
Low-Flow Lavator	1.8	15	0.450
Kitchen Sink	2.5	15	0.625
Low-Flow Kitchen Sink	1.8	15	0.450
Shower	2.5	300	12.500
Low-Flow Shower	1.8	300	9.000
Janitor Sink	2.5	48	2.000
Hand Wash Fountain	0.5	15	0.125

Figure 22 : *Comparison Chart* of ordinary vs. water efficient appliances (courtesy of http://www.csemag.com/article/CA504173.html)

This category is one of the LEED categories that could and should be applied to all newly constructed buildings. A couple of solutions include waterless urinals, special reduced water dishwashers, greywater systems, and water filtration equipment. Figure XX shows how much water can actually be saved using the water efficient technology. It is difficult to retroactively fit these kind of systems into a building which is why they need to be implemented during the design period of building construction. In the case of the CFG building, these types of appliances can definitely be used and designed into the architectural and mechanical layout.

Energy and Atmosphere

This section is to promote the use of alternative energy sources as opposed to fossil fuels. One way that the CFG can fulfill this credit is to apply solar shading to the curtain wall system. Sunshades are used to subtly shade from the harsh light of a summer day while still gaining the heat from the sun to heat up the building and save on energy costs. An example that can be applied to the CFG can be seen in Figure 23. While this system takes advantage of solar power, it is also possible to achieve these points by implementing bio-fuel based electrical systems (agricultural crops or waste, landfill gas, animal waste or other organic waste, untreated wood waste), low-impact hydro-

Figure 23: *Metal Mesh Shading* created by Cambridge Architectural (http://www.cambridgearchitectural.com/System.aspx?ID=21#)

electric power systems, or wave and tidal power systems. This is also known as green power.

Materials and Resources

There is a big campaign across the Penn State communities right now to push towards recycling. This criterion requires that the construction waste be collected and removed without question. Of that waste, at least 10% must be recycled by Penn State standards. In order to keep transportation and the use of gasoline to a minimum, LEED points are given if materials are used that are located within a 500 mile radius of the project. In this case, the redesign of the building was done with precast concrete and Nitterhouse is a well-known company for precast concrete materials for the Mid-Atlantic region. In fact, the plant is only about 70 miles away from the Hershey Medical Center.

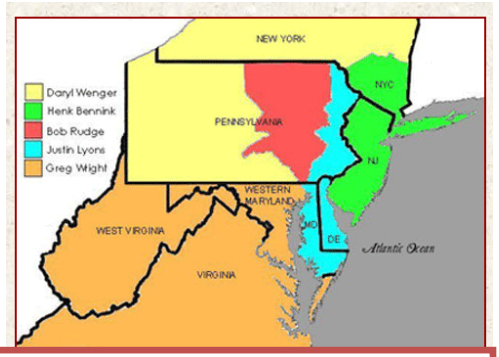

Figure 24: ***Regions Serviced by Nitterhouse***

Indoor Environmental Quality

Because the labs need to be in a controlled environment, the building is mechanically ventilated. In order to satisfy this LEED point, it helps to install carbon dioxide monitors in spaces with 25 people per 1000 sq. ft. or more. Also, outdoor airflow measurement devices help to make sure that the mechanical system is not overworking and wasting energy. Observing these factors should be done during construction and before occupancy just to monitor the well being of building occupants. Another important part of this section is that the materials used in the building are low-emitting materials to keep all occupants safe. As well as safe, there is an order for occupant comfort with lighting and temperature. Part of the occupant comfort for the CFG is the use of daylight and the view that occupants get from the two-story atrium with the curtain wall.

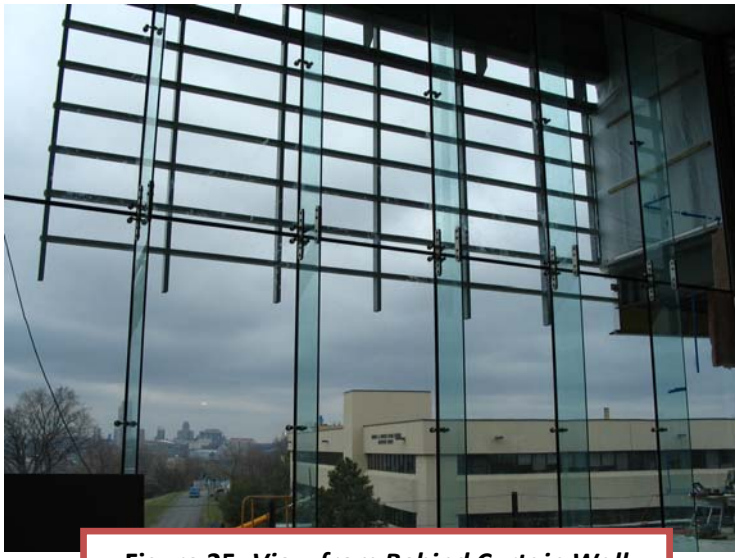

Figure 25: ***View from Behind Curtain Wall***