the lighting. The occupancy sensors would now send an occupied/unoccupied signal back to the building automation system. When the building was unoccupied the system would cut the air change rate in half.

The building was modeled in Trane's TRACE program both with the original design and the suggested redesigns. It was shown that the redesign suggestions would save approximately 20% in annual energy use. The first cost for both systems was fairly similar with the redesign being slightly higher. The 20% energy savings resulted in a short payback period of .18 years which is very attractive. Another study was done into the energy savings associated with the occupancy sensors installed to control lighting.

Building Background & Introduction

Baylor College of Medicine recently laid out their "strategic plan" in which they plan to expand at a rate comparable to other top research schools in the country. They felt as if they were not doing enough to stay competitive in research and want to remain as one of the top schools. Their plan is to expand their research programs to retain the quality researchers they have and allow them to recruit other talented researchers. The first part of their "strategic plan" was to construct a new research tower.

The Albert and Margaret Alkek Foundation donated $31.25 million dollars to the college for construction of the new tower. For their donation the research tower shall be known as the Margaret M. Alkek Building for Biomedical Research. This is the largest donation Baylor College of Medicine has ever received to fund biomedical research. The research tower promises to have top of the line facilities that can accommodate the following programs; cardiovascular sciences, diabetes and metabolic disease, cancer, pharmacogenomics, imaging, informatics, and proteomics.

Construction of the Margaret M. Alkek Building for Biomedical Research began on September 15, 2005. The Margaret M. Alkek Building for Biomedical Research is an 8 story and approximately 170,000 square foot research tower. The building is to be located between the Jewish Institute for Medical Research and the Texas Medical Center Garage #6. The research tower will be constructed on top of an existing subterranean Transgenic Mouse Facility. The building's 8 stories will include 2 levels of animal research facilities, 5 floors levels of office and flexible laboratory space and one floor to accommodate the building's mechanical spaces. Levels 4-8 contain office and laboratory spaces which are divided by the main corridor, which is pressurized and contains the elevator systems at the north end of this corridor. Level 3 contains a majority of the mechanical equipment such as air handling units, pumps, heat exchangers, steam generators, etc, as well as the electrical equipment for the building. Levels 1 and 2 will house the animal research facilities. Level 2 is strictly animal housing units and animal research space. Part of level 1 contains the lobby to the Research tower and a small amount of office space. The rest of level 1 is made up of vivarium space and the animal facility cage wash.

Figure 1: Tower under construction (3-1-06)

Building Statistics

Project Team

Owner: Baylor College Of Medicine

Owner Representative: Fluor Enterprises, Inc.

Architect: Lord, Aeck & Sargent, Inc.

Construction Manager: Vaughn Construction

MEP Engineers: Bard, Rao + Athanas Consulting Engineers, LLC.

Structural Engineers: Walter P. Moore

Curtain Wall Consultants: Curtain Wall Design and Consulting, Inc.

Structural

The Margaret M. Alkek Building for Biomedical Research is being built on a drilled pier foundation and utilizing an existing foundation by underpinning its piers. The first elevated level is supported with one-way concrete pan joists framing into massive pre-tensioned concrete transfer girders. These girders are utilized to accommodate the mismatched existing and new column grids. Levels 2-8 are typical wide flange composite steel construction. Steel post-up columns support levels 2-8 and rest on the transfer girders. The slab is 3- 1/2" lightweight concrete on 3" 20 gage composite metal deck. Most beams are W21x44 while most girders are W36x135. The lateral force resisting system is a combination of moment frames and braced frames in a staggered configuration. The frames are located along grid lines D and E, in the towers core. The mechanical platform on the roof is framed out of HSS tubes.

Electrical / Lighting

A Double Ended unit substation will be installed in the tower to supply the tower and backfeed the subterranean research facility. The substation is rated at 4.16 kW primary – 277/480V, 3-phase, 4 wire, 60hz secondary. Each lab floor has a 480 to 208/120V stepdown. An emergency generator will be connected to the tower and installed on the lower level of the near by Texas Medical Center Garage #6. The emergency generator shall be able to provide 1,500 kW and is fed from a 8000 gallon fuel oil tank. The generator is connected to the fire pump, elevators and other essential components in the case of an emergency.

All lighting in the building spaces (lab, vivarium, office space, stairwells, and corridors) is fluorescent lighting. The only exceptions to this are in level 3 mechanical there is alludescent lighting and in levels 4-8 there are incandescent lighting in the conference room in the office side of the building. Lighting levels in all the spaces were required to meet Baylor College of Medicine guidelines as well as Illuminating Engineering Society's recommendations. A majority of spaces are equipped with occupancy sensors on levels 4-8. The major laboratory spaces are equipped with ceiling mounted occupancy sensors between each research lab workstation and

research bench section. Offices and meeting rooms are all equipped with wall mounted occupancy sensors light switches.

Fire Protection

Building is fully sprinklered based on NFPA 13, latest edition. Sprinkler spacing will be hazard group 1 occupancy for mechanical, laboratories and storage space and light hazard group occupancy for offices, corridor and toilet rooms. In the basement crawl space is a 5000 gallon fire protection break tank, and the jockey and fire pumps.

Plumbing

The research tower has an extensive plumbing system to support the lab and vivarium spaces. The vivarium has an animal water system that consists of two 600 gallon storage tanks, a pressurized 86 gallon storage tank and a few other tanks for treating the water. The building connects to the main water loop for domestic water use throughout the building. There is a low zone booster pump (for levels 1-3) and a high zone booster pump (for levels 4-8). The booster pumps pump up to the 3rd level where steam fired water heaters create the hot water for the building and is then sent either back to levels 1-3 or up to levels 4-8. Water purification equipment is on the 3rd floor creating Reverse Osmosis Deionized (RODI) water which is then pumped to the clean steam generator on level 3 for steam creation or to tunnel washers, glass washers, or up to the lab space for their use. There is also a lab waste which is treated in the basement level and ejected to the city sewer. The final element of the extensive piping system is natural gas and CO2 which is piped up to the lab spaces on levels 4-8 for use in experiments and research.

Transportation

The building is located right next to a parking garage which allows for easy vehicular access. Once inside the building there is a stair case on the eastside of the building. On the northern side there is a bank of 3 elevators that service the entire building as well as another set of stairs.