

CASE STUDY



GEISINGER MEDICAL CENTER LABORATORY FACILITY

Satisfying Owner
Project Requirements in a
Mixed-Use Medical Building

CHALLENGE

When Geisinger Health System started the process of planning for a new, five-level laboratory and office addition on their main medical campus in Danville, Pennsylvania, they faced the challenge of designing a building that would meet various operational needs under one roof – blending together an expansion of their food and cafeteria services, staff and employee offices, and clinical laboratories including a stem cell research laboratory, phlebotomy areas, histology and cytology laboratories, open laboratories, and a cleanroom BSL-3 laboratory. The 158,000-square-foot building would also contain 8,000 square feet of shell space for future use and an 18,000-square-foot penthouse for the HVAC systems serving the laboratories.

With a diverse building use came the need to understand the systems that could support this mixed-use effort on an existing campus with a central utility plant providing steam and chilled water distribution systems. To assist them with this effort, Geisinger brought on MBP as an independent, third-party commissioning authority to develop, manage, and coordinate the commissioning process. This included verifying that the building systems were designed, installed, and tested to meet the owner's project requirements (OPR) for operations and maintenance (O&M) throughout the life of the building.

Initially, Geisinger brought on MBP as a commissioning authority early on during the project's design phase to help define the various levels of requirements and performance criteria for the OPR that would be incorporated into the construction documents for this project. Focus was placed on the systems to be commissioned which included mechanical, electrical, plumbing, building automation, and building enclosure. In addition, the project was designed to achieve a minimum of LEED Silver certification for which both the fundamental and enhanced commissioning requirements were pursued as part of the LEED certification plan.

As MBP prepared the commissioning plan and project requirements, there was special attention given to the challenging, sensitive need of the laboratory and surrounding areas of this mixed-use building. This included the safety of laboratory technicians and employees to verify that the systems and subsystems seamlessly worked together.



SOLUTION

MBP worked closely with Geisinger and the project team not only to verify that the building systems performed according to the design intent, but that the building systems were safe, protected occupants and the surrounding environment, and collectively worked as a coordinated system. The nature of this laboratory building was unique, as the system needs for the food services expansion and personnel offices differed quite drastically from the systems and subsystems needed in cleanroom BSL-3 and supporting laboratories. There was careful attention to the owner's requirements to protect the laboratory technicians, provide redundancy to improve the reliability of the laboratory systems, and maintain consistent pressure control throughout the laboratories and adjacent area. Because of this, testing the systems prior to occupancy was critical.

To accomplish this, MBP had a very active role on the project team through the design, construction, and warranty phases for the project. In order to meet the LEED commissioning scope, MBP's services included multiple reviews of the basis of design and construction documentation, preparation of the commissioning specifications, concurrent reviews of equipment submittals with the design team, site observation visits to monitor the progress of construction and required pre-functional testing, the completion of functional performance testing (FPT) and integrated system testing (IST), and oversight of training and record documentation for the O&M team. Throughout this process, MBP completed four design reviews of the construction documentation and over 40 site visits during the 18-month construction duration to identify over 1,000 issues which were resolved with the project team.

As an additional part of the commissioning process, MBP developed a trends, alarms and graphics (TAG) matrix to clearly define the OPR for monitoring and notification requirements for the building's HVAC equipment and building automation system (BAS). Throughout the design and construction phases, MBP worked with the project team to identify the criteria, including controls setpoints, tolerance ranges, alarm points, and system trending requirements. The TAG matrix was also used to define the priority of alarms for critical 24x7 "red" systems to be monitored by both campus security and the O&M team due to safety concerns, versus less critical "orange" systems to be monitored by the O&M team only. The requirements for the TAG matrix were verified by MBP during the FPT and IST process for use by the Geisinger O&M team after the building was operational.

"MBP's work identified over 1,000 issues during the design, construction, and acceptance phases, and tested for review with the project team for resolution and verification of corrections."

Dave Watral
Senior Project Coordinator
Geisinger Health System

THE BSL-3: "COOKING YELLOW FEVER"

One of the key challenges for the project was the protection of lab technicians in the BSL-3 space. In order to maintain the required make-up and exhaust air flows required for proper control of the pressure within and adjacent to the BSL-3 space, a combination of redundant air handling units (AHUs), phoenix valves, lab hoods, and exhaust fans were utilized to maintain the required environmental conditions.

During start-up and initial testing, issues with the sequence of operation for the periodic lead/lag change-over of the AHUs were observed resulting in extreme negative pressurization of the space. To resolve this issue, MBP worked with the controls programmer and design professional to adjust the sequence of operation to minimize the ramp up/down time for the AHUs for better control of the air pressure to be maintained within the laboratory.



RESULT

“99% of my building works!”

By working together with Geisinger and the project team, MBP was able to identify and solve potential systems issues prior to occupancy. During the tenth-month warranty visit, the facilities operations manager for the Danville campus was happy to make the statement, “99% of my building works and my team knows how to use it.”

Throughout the project and the commissioning process, MBP worked with the team through a collaborative approach with support from the owner and timely participation from the contractors and installing vendors. MBP’s participation as the commissioning authority assisted the project team to meet its requirements to turn over a functional, mission-critical medical laboratory facility on time.



THE KITCHEN: “DON’T SMELL THE BACON”

Another area of concern in the mixed-use building was occupant comfort, and in particular, patient comfort and care in the adjoining patient tower. Preventing kitchen odors from mixing into patient occupied areas was a key OPR criteria for the Geisinger team.

To achieve this goal, a dedicated variable volume make-up air handling unit (MAU) with an interlocked variable speed kitchen exhaust system was provided to maintain the required ventilation and exhaust air flow rates required for cooking. At the start-up of the system, operational issues for the kitchen hood exhaust controller receiving false airflow signals led to the MAU being energized when it wasn’t required to be engaged, resulting in over pressurization of the space and the potential cooking odors to escape the kitchen area. MBP helped to resolve this issue by working with the TAB contractor to recalibrate the sensor for the kitchen hood controller, as well as with the controls programmer to adjust the interface between the local kitchen hood controller and the BAS to prevent unnecessary operation of the MAU.