

The people mover track runs parallel to the south façade, increasing efficiency by providing transportation and integrating the pneumatic tube into the track.



Clarian Pathology Laboratory

# The Future of Clinical Lab Design

The future of clinical laboratory design and administration is here. It is located at the head of a canal in downtown Indianapolis, tethered to a pneumatic tube system, adjacent to a people mover, highly automated, and remote from where blood is drawn and tissues samples extracted.

Recently completed, the Clarian Pathology Laboratory (CPL) is a highly automated sample processing and analysis machine wrapped in a window-filled skin to create a bright, efficient and collaborative work environment for its 450 physicians, faculty, clinical laboratory scientists and support staff. The 164,000-square-foot facility replaces overstressed clinical laboratories at Methodist, Indiana University and Riley hospitals, all part of the Clarian Health system. It also serves as a reference laboratory for other Clarian satellite hospitals and ambulatory facilities, including two new freestanding hospitals—Clarian West and Clarian North—in suburban Indianapolis. Clarian Health is Indiana's largest health system, comprising 16 hospitals and health centers across the state. The system includes approximately 1,600 beds.

Several options were considered during the planning process. These included expanding existing laboratory facilities, developing a new laboratory at one of Clarian's three major downtown hospital campuses, relocating the laboratory into



an existing non-hospital structure along a planned people mover route or constructing an entirely new facility, remote from the hospital complexes. The solution chosen was to build a new laboratory on the people mover route, a half mile away from the hospitals at the end of the vibrant Central Canal area in an emerging life sciences district of Indianapolis.

This solution presented a number of advantages. Elimination of duplicate operations and increased use of robotics result in significant cost savings and decreased turnaround times. The use of robotics also means fewer errors and lost specimens. In addition, the laboratory consolidation allows Clarian to convert vacated space into patient areas, including an expansion of Methodist Hospital's Level 1 trauma center—one of only two in the state. Also, Indiana University's organ transplant program, which led the coun-

**The Clarian Pathology Laboratory is located off the vibrant Central Canal in Indianapolis.**



**The robotics area is designed around automation for speed, efficiency and accuracy.**

**A conference room provides a view to downtown Indianapolis.**



try in 2005, now has room to grow its program into the vacated space.

The number of tests Clarian conducts has risen each year—momentum that will continue as Baby Boomers increasingly access healthcare and require more testing. Clarian expects to perform more than 10 million tests per year at the new facility. As testing volume grows and testing methods change, a flexible interior design—with minimal walls and large, open spaces—will make it easier to reconfigure spaces.

### **A Difficult Site**

Although the site was ideal from laboratory logistical and operational points of view, it was a challenging site from a construction perspective. The tight 2.5-acre site required underground storage of storm water runoff and construction had to take place while the adjacent people mover—only 17 feet from construction—remained operational. While a 320-vehicle above-ground parking structure located below the laboratory floors provides users with convenience, its post-tensioned construction, together with conventional reinforced concrete construction of the laboratory floors and the steel-framed penthouse, created three different construction methods in one building.

### **Highly Automated**

Laboratory officials, together with the architects and engineers, toured a number of automated labora-



tory facilities around the country to gather information about what worked and what didn't, and to see the latest equipment in operation. In addition, part of the programming and planning process included gathering nursing, administrative and medical input so that the laboratory would also meet their needs and expectations.

There were timing and flexibility challenges in committing to a highly automated, robotics-driven sample processing system. Robotics technology is rapidly evolving. A system chosen two years prior to opening might well become outdated by the time the laboratory is completed. Therefore, the equipment was purchased at the last possible moment. Construction began in the fall of 2003, and the automation vendor was selected a year later. The team then made some adjustments so that the utilities would work with the equipment's needs. The automation wasn't installed until most of the construction activities were complete.

The building's linear design helped with flexibility. Its elongated shape—390-by-180 feet—allowed

the testing spaces to be designed around the robotics units rather than configure the 100-foot-long systems to fit the space. This flexibility on the processing floor would accommodate whichever system and configuration was chosen at the last minute.

An evaluation of the three areas of testing—receipt to placement on the instrument, the instrument analysis time and post-analytical activity—revealed that, by far, the time spent moving samples from central processing to the instrument was the longest component of the process. Prior to automation, the average turnaround time for a test was approximately 75 minutes from the time the sample arrived to the time the result was reflected in the medical records. The system has the capacity to complete 19 billable tests per minute, 24/7, year round. With automation, the laboratory continues to see improvement but it will take a few months to work out processes to get the total benefit.

### **People Mover**

Several years ago, Clarian Health made plans to develop an elevated \$40-million people mover dual monorail transportation system to connect its three main hospitals and make it easier for staff to travel

**The design of the Clarian Pathology Laboratory responds to its location and site.**



among facilities. Planning for CPL was taking place before the people mover route had been finalized. Once the site was chosen, it became apparent that the addition of a station at the laboratory would greatly enhance operations and efficiency. A key element in the success of the laboratory was the ability to use this existing 1.5-mile linear transportation system under which to run the pneumatic tube system.

The laboratory was configured for the best access to the people mover station. Before the laboratory was built, it often took 30 minutes for employees to travel by car from Indiana University Hospital to Methodist Hospital, and they did so two to three times daily. Now, it takes approximately seven minutes to travel to the laboratory on the people mover. Samples, which travel by pneumatic tube under the people mover from the hospitals to the laboratory, arrive in a matter of minutes.

The innovative pneumatic tube system is the largest of its kind in the United States. It currently has 245 sending and receiving stations, with nine additional in the new laboratory building. The two specimen





processing stations, located at the automated line, are high-speed units that can send and receive carriers every 10 seconds. More than 50,000 feet of six-inch tubing was installed under the existing people mover, with a total of six high-speed lines between the new laboratory building and each of the two hospitals.

As new facilities come on line throughout the three campuses, the pneumatic tube system will grow. There are plans to expand the system to the new Indiana University Cancer Center, which is currently under construction, as well as a major expansion at Riley Hospital for Children, adding as many as 55 additional stations to the global system.

### Contextual Design

Located at the city's urban edge, the building's context and design create an attractive gateway and window to the downtown.

An arc of blue-green glass on the north façade is a counterpoint to the flow of traffic on the interstate and responds to the curve of the site, serving as a gateway marker for those entering the city from the north.

Windows at the ends of the corridors provide natural light and assist with wayfinding. Neutral finishes and seating choices in the cafeteria and conference room create a subtle foreground, making the skyline view the focal point. The south façade, which acts as the headpiece to the canal axis, is organized in three

sections in response to the canal, a nearby historic building, and the roof flourish of the adjacent people mover.

The building's spatial design enhances efficiency through key adjacencies. For example, the anatomic pathology laboratory is closest to the people mover to make it easier for doctors who come from other facilities to review patients' biopsy specimens with the pathologist. In addition, the building allows pathology and management staff to have only one office, avoiding the need to work at two sites. In the laboratories and cubicle areas, flexible modular systems foster collaboration and provide flexibility to accommodate new and evolving programs.

CPL brings hospital laboratory testing out of windowless basements to environments with ample windows and natural light. The lower three-story garage elevates the building, brings the working floors above the adjacent interstate highway and creates panoramic views from all windows. Large window walls at the ends of the corridors provide exciting vistas and a positive distraction as employees travel down the hallway. A light-filled cafeteria provides views of the city's skyline.

Only in operation since May 2006, this unique combination of state-of-the-art robotics, extensive pneumatic tube network, people mover, and light-filled spaces heralds a truly efficient clinical laboratory of the future. ■



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