

UAMC Hybrid OR Project, Tucson, Arizona

Delivering predictable, quality results in highly challenging healthcare environment

The dynamic, congested and highly sensitive nature of a fully operational hospital facility makes it one of the most unpredictable and challenging places to perform a major renovation project. That was the environment in which a DPR Construction Special Services Group (SSG) team completed a hybrid operating room (OR) renovation project for the University of Arizona's University Medical Center – University Campus (UAMC) in Tucson this June.

In addition to the technical complexity that goes along with constructing a new hybrid OR and its related infrastructure, the project team encountered and overcame numerous other hurdles. Among them: extensive hidden conditions and added scope, technology-driven late design changes, and wide-ranging logistical issues. Collectively, those challenges were at the core of a project that proved to be the most formidable that many of the project team members had ever encountered.

In the face of all that, DPR delivered what it is known for—the ability to confront unpredictable circumstances and large-scale challenges and still produce a predictably high quality result, every time.

Hybrid ORs: A Growing Trend

Hybrid OR projects have sprung up in rapid succession across the U.S. in recent years, with approximately 100 U.S. hospitals reportedly now having hybrid OR capabilities. That trend continues to grow as the healthcare market has realized the major benefits from having a single room equipped with both full OR equipment and state-of-the-art imaging technology. This allows surgeons to diagnose issues while patients are in surgery and make quick adjustments that can provide life-enhancing consequences.

DPR teams bring with them a thorough understanding of facility and end user needs relating to issues such as infection control, safety, noise and dust control. Extensive pre-planning helps minimize any impacts on hospital operations and patient comfort. It is equally important to possess the technical expertise on hybrid OR infrastructure, routing and how to support critical tolerances such as a “super flat floor,” among many other things.



DPR's SSG team first began preconstruction of the \$9.1 million, 22,000-sq.-ft. modernization and renovation project for UAMC in Tucson approximately two-and-a-half years ago. It quickly became clear there wasn't going to be anything simple about this job.

Complex from the Start

The project is anchored around a hybrid OR with a Siemens Artis Zeego (an interventional imaging system with robotic technology) and a Robotics OR room equipped with a da Vinci Si (which translates surgeons' hand movements into smaller, more precise movements of tiny instruments). While currently a home for robotic procedures, this space is designed to have the flexibility to be converted into another type of hybrid OR in the future.

Project scope also included:

- a pre-op ready room (PRR) with 18 patient bays and four pediatric isolation rooms;
- a positive pressure room for special procedures;
- anesthesia work room and library;
- surgery waiting room;
- additional lab space;
- renovations to the existing post-anesthesia unit (PACU);
- major utility upgrades including a new 10,000 cubic feet per minute (CFM) air handling unit;
- new uninterruptible power supply (UPS) system with rotary flywheel; and
- a dedicated exhaust system for the new isolation rooms, among other things.

The work area shared a sterile corridor next to 16 existing and fully functioning ORs. It was directly above sterile processing and adjacent to Diamond Children's Medical Center and existing PACU and PRR space.

"It really couldn't have been much more difficult if we tried," commented Lynn Harris, senior project manager for the University of Arizona Health Network. "It was extremely difficult to plan the logistics of getting workers and equipment into the building through the construction zone, and keeping our operation running and maintaining the required sterility for air, dust and so forth. This project required a lot of sensitivity to what the hospital's needs were to stay in business, as well as a lot of construction knowledge about what could and could not be done."

Major Challenges: Hidden Conditions, Added Scope, Late Equipment Selection and More

That was just the beginning. According to DPR Project Manager Nathan Lentz, the project was severely hampered by the outdated drawings of the area to be renovated. It was unclear what was above the ceiling, and the breakneck pace of work left little time to find out.

The team eventually laser scanned the ceiling. They uncovered pipes in different places than originally thought, electrical discrepancies and ductwork shown on drawings that did not actually exist, among other things.

Adding to that complexity was the fact that the equipment selection and final design for the hybrid OR and the robotic rooms were not completed until six to eight months into the construction process. Equipment selection is often a challenge for teams working on healthcare projects that span over several years, such as this one. Medical technology is constantly upgraded, and owners justifiably want the latest and greatest on the market. However, equipment selection is typically committed to closer to a mid-design phase.

"When trying to get pricing together, you're just making educated guesses without the actual drawings from any of the vendors or suppliers," Lentz said. "DPR has had enough experience nationally that we know what it takes to put together a room."

Solutions: Creative Problem Solving, Teamwork, Self-Perform Work

Despite the major unexpected conditions and technology-related design delays, DPR remained focused on the bottom line and drew from its experience with previous hybrid OR projects. They worked closely with all of their subcontractors, consultants and the architect, Shepley Bulfinch, to navigate the many hurdles that arose.

Working together, they came up with numerous solutions that ultimately kept the project on track to a successful finish and created a highly satisfied owner.

"We had an extremely strict budget cap and DPR was very good at helping us manage that, despite all the unforeseen conditions," Harris said.

Some of the key solutions and approaches undertaken for this project included the following:

- **High Degree of Communication, Collaboration and Teamwork.** These proved essential factors in the project's overall success. Of particular note was a pivotal, daylong brainstorming charrette that occurred midway through construction to seek solutions to deal with various cost and schedule impacts to that point. A wide range of potential solutions from team members offered a positive path forward, said Lentz.

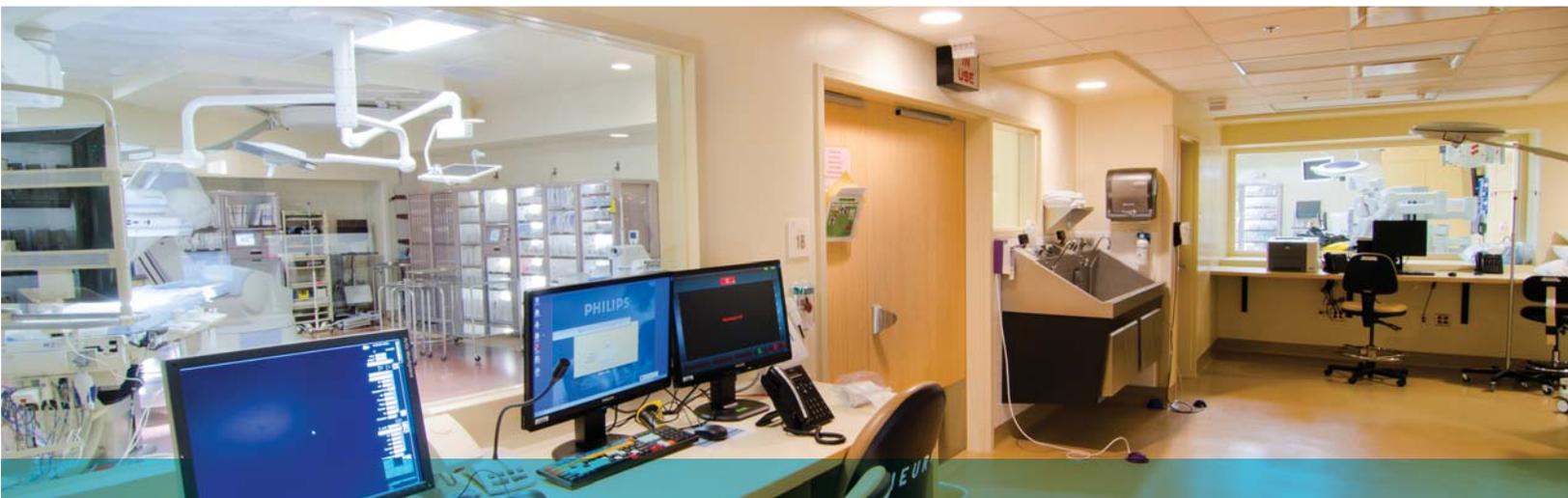
The high degree of collaboration on this project extended well beyond the core project team, according to Harris. "DPR managed their subs very, very well," she said. "Not only were they able to make everybody follow the rules and 'play well together in the sandbox,' but they were able to get subs to come together and coordinate possible solutions to problems as they arose. The whole team attitude from start to finish was extremely cooperative."

One example of the collaboration among team members occurred during an extensively pre-planned water main shutdown to relocate a main water line. Despite the intricate planning, the valves did not work as planned. "It was just one of those things we couldn't anticipate," Lentz said. "So we had to come up with another solution. No one pointed fingers or handed out blame."

- **Creative Problem-Solving and Flexibility.** Despite a carefully planned schedule that originally comprised four phases, it became clear as the project progressed that the original phasing plan would not accommodate all of the necessary shutdowns and relocations. The team adjusted their strategy to break the project into 14 phases instead.

In addition, the team gave careful attention to ensuring that they were using the best and most creative ideas, particularly after the mid-project charrette session. "We challenged costs and came up with a lot of creative ways to do things," said Lentz.

- **Self-Perform Work.** DPR's self-perform work for metal stud, drywall and framing work proved to be a major benefit in controlling schedule and costs, with top quality results. "It turned out when we got into a time crunch and deadlines in various phases, it was an advantage to have self-perform workers quickly available to jump in and help," said Lentz.
- **Extensive Preplanning.** Any and all shutdowns to hospital operations were elaborately planned and scheduled to minimize inconvenience to patients and hospital staff. That included removal of a 20-ft. structural wall, all done while hospital operations continued in full swing. By the end of the project, despite the extremely close proximity of construction activities to sensitive patient operations, the staff had fielded only a handful of calls regarding noise issues.



- **Innovation.** From building information modeling (BIM) to lean processes to the use of various technology tools such as iPads and FaceTime to communicate and resolve issues quickly and remotely with an East Coast-headquartered architect, the team used technology and innovation to improve efficiency in their day-to-day interactions.

In the End: A Successful Delivery

In June 2013, DPR completed the project and turned over the state-of-the-art hybrid OR to UAMC, receiving rave reviews from the owner and its user groups.

“All of our staff—facility, IT, surgical department and on—ended up really happy with the work they did here,” said Harris. “The comments I’ve gotten back from the staff, including the people who were most inconvenienced—the surgical staff—was that everybody that works for and with DPR was sensitive to their needs. Plus, we enjoyed working with them. DPR would be welcomed back any time as far as we’re concerned.”

CUSTOMER: The **University of Arizona Health Network** is Arizona’s first academic medical network. Nationally recognized for providing exceptional patient care, it teaches new healthcare professionals and conducts groundbreaking research through the physician-scientists of the University of Arizona College of Medicine.

ARCHITECT: Shepley Bulfinch

PROJECT HIGHLIGHTS:

- This project was a \$9.1 million, 22,000-sq.-ft. hybrid OR modernization and renovation.
- The work area shared a sterile corridor next to 16 existing and fully functioning ORs. It was directly above sterile processing.
- Project scope: PRR with 18 patient bays and four pediatric isolation rooms; a positive pressure room for special procedures; anesthesia work room and library; surgery waiting room; additional laboratory space; renovations to the existing PACU; and major utility upgrades.

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