IMEG

CASE STUDY:
University of Iowa Hospitals & Clinics Off-site CSS

The University of Iowa Hospitals & Clinics' modernization of its Central Sterilization Services (CSS) provides a case study for the conditions under which an off-site solution is justified and viable.

Prior to the modernization project, the hospital system had four separate CSS departments – one each serving its main operating rooms (MOR), the Stead Family Children's Hospital, and the John Papajohn Ambulatory Surgery Center (all in Iowa City, IA), and another serving the Iowa River Landing North clinic (in adjacent Coralville, IA). All CSS departments had been added over the years as part of each facility project. The existing operations were inefficient in terms of workflow, quantity of equipment, and redundancy of instrumentation. The mechanical, electrical, plumbing, and technology (MEPT) systems serving these spaces were lacking in ability to support new CSS equipment, and several deficiencies had been identified that were not easily fixable in-place.

IMEG served as prime consultant on the modernization project, which began with a

comprehensive study of the existing CSS by the design team (engineer, architect, CSS consultant, and logistics consultant). The study analyzed site conditions (including existing MEPT infrastructure, constraints, and challenges), workflow, tray volumes, and annual procedures. Using this information as a baseline, the design team provided the owner with evaluations for both an on-site renovation solution and an off-site solution – including pros, cons, construction duration, and construction costs. (Building an addition or new stand-alone facility on site wasn't considered since doing so would have carried significant cost to create the required space on an already space-restricted campus.)

While renovating the existing MOR CSS to serve all locations had many positive attributes, it also had many negatives, the most significant of which included:

- Significant cost for installation of new elevators and exterior shafts
- A limited footprint that would not allow for efficient process workflow
- Insufficient space to accommodate management and administration staff
- Requirement for extensive phasing and an extended construction schedule, creating significant costs and disruption to CSS functions and patient comfort
- Existing infrastructure requiring extensive upgrades
- Limited floor-to-ceiling height
- Additional costs due to temporary mobile CSS solutions

An off-site solution presented negatives as well, but also had many positives, the most significant of which included:

- Improved workflows and deliverables
- No costs associated with temporary mobile solutions
- No effect on current operations during construction
- No impact on adjacent spaces/departments
- Sufficient space for management and administrative staff
- All new CSS equipment and MEPT systems
- The ability for future expansion
- More accessible staff parking
- Better control of interaction with equipment vendors

IMEG made no recommendation between the two options, leaving the decision to the owner – who ultimately opted to build a new, greenfield off-site CSS. Though slightly more expensive to build new in comparison to renovating, going off site avoided temporary mobile solutions, phasing, and disruption to services, and allowed the hospital system to have the optimal layout and space design it needed instead of retrofitting into an existing space. Minimal renovation work would be required at each of the four existing CSS departments to accommodate the new processes and workflow. The existing loading dock on the main campus would be unchanged, however, and a CSS delivery schedule would be created based on a workflow study by a logistics consultant.

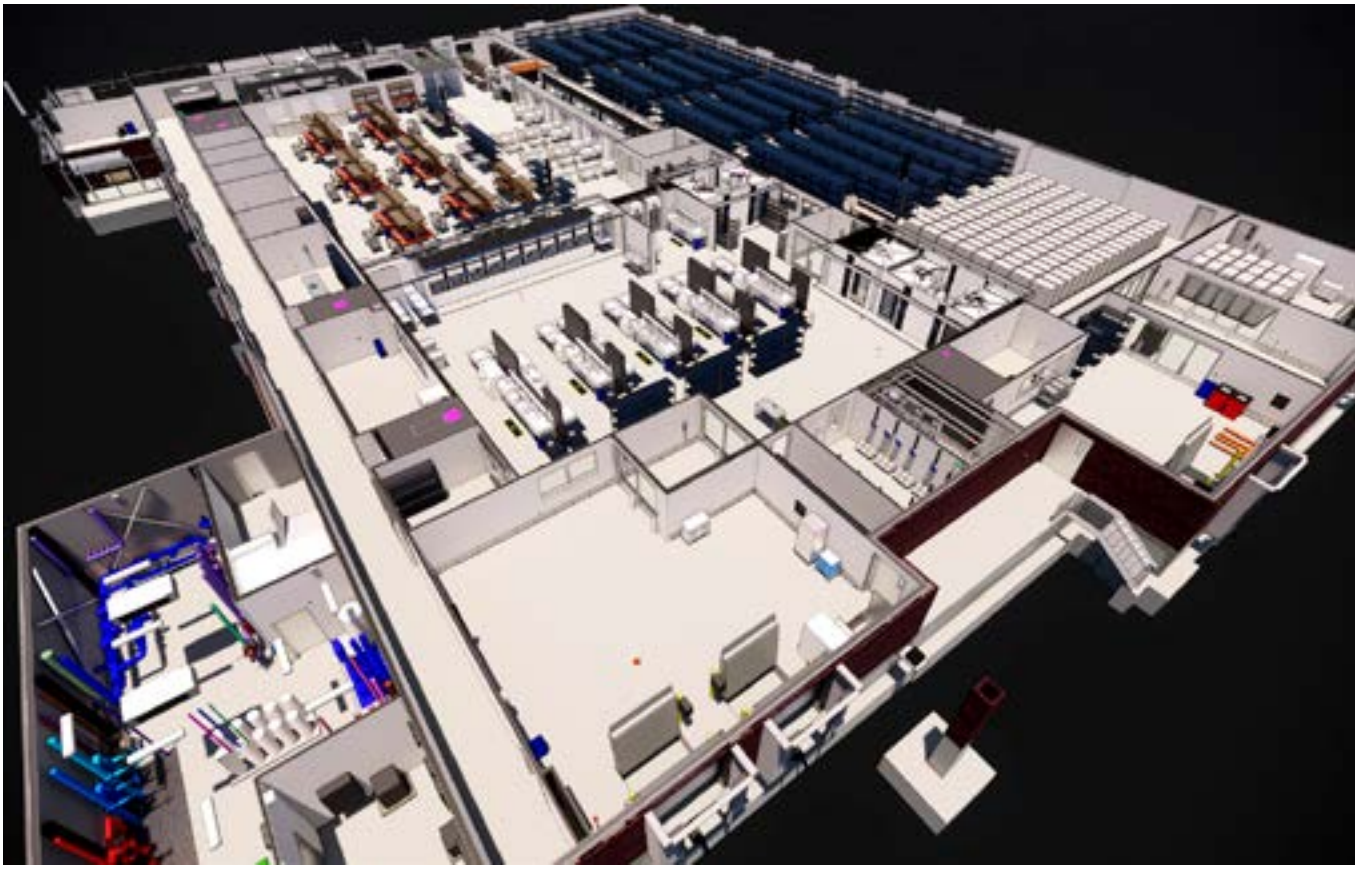
Following an evaluation of several potential off-site locations (including existing buildings UIHC was considering retrofitting and greenfield sites they were considering purchasing), the owner chose to build the new CSS roughly 10 miles from the main hospital on the university's Oakdale Campus in Coralville. In addition to building on land already owned by the university, the satellite campus' existing central plant removed the need and cost for new boilers, chillers, etc., as part of the CSS project.

Except for chilled water and steam service from the campus central plant, the building contains a complete MEPT design similar to a traditional stand-alone CSS facility. The building design includes provisions for redundancy including two steam services, two fiber services, emergency chiller connection, emergency steam boiler connection and emergency mobile generator connection (a local generator was provided and sized to handle critical loads during a power outage). The HVAC system was designed with sub-cooling capability to achieve ranges defined in the Association for the Advancement of Medical Instrumentation (AAMI) Standards and ASHRAE-170; this allows each of the process spaces to achieve lower temperatures while maintaining acceptable humidity levels.

One challenge associated with the proposed site was poor domestic water quality. Given the facility's significant water consumption and stringent water quality requirements, a complex water treatment system was required that included an iron filtration system, water softening system, and an underground brine storage tank. The facility design contains an advanced pure water system including redundant reverse osmosis (RO) systems with a side-stream deionized (DI) treatment system.

IMEG's medical equipment planners worked closely with the CSS consultant to eliminate Ethelyn Oxide (ETO) sterilization equipment and coordinate medical equipment requirements, capacities, and specifications. This allowed a medical equipment pre-purchase package to be issued to reduce lead times, reduce cost, consolidate construction schedule, and identify site-specific equipment MEPT requirements. IMEG's structural engineers worked closely with the architect and CSS consultant to strategically place columns within the decontamination area to coordinate with workstation locations and process workflow.

The owner and staff were heavily involved throughout the entire design process via several review and user group meetings. Stakeholders' preferences were fundamental to the design of all systems and infrastructure, with the collaborative approach resulting in a future-proofed, state-of-the-art facility with MEPT



infrastructure sized for future expansion. In addition to avoiding the issues associated with renovation, the off-site facility provides flexibility to serve the main campus and several satellite campuses.

The new 40,000-sf CSS (with an additional 8,000-sf mechanical penthouse) is a three-zone "U" shape layout and includes special attention to finishes and healthcare lighting, resulting in a work atmosphere promoting a positive and productive environment that will contribute to employee retention and reduced attrition. The project's CSS consultant provided four weeks of on-site staff training covering new processes and procedures; the existing CSS remained in full operation during training to avoid disruption of services.

The new site go-live occurred in early 2020, with the existing CSS remaining operable for a few months for "just in case" scenarios. Renovation and decommissioning of the existing CSS departments followed the new site's opening.

For more information, contact IMEG Healthcare Client Executive Josh Heacock.

ADDITIONAL READING

White paper: Central Sterile Modernization: A Guide to On- Vs. Off-site Facilities

Article: Typical CSS department configurations