

The University of Medicine and Dentistry of New Jersey Makes Commissioning Business as Usual

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Synopsis

The University of Medicine and Dentistry of New Jersey has led the way in bringing commissioning to campuses throughout the state. With more than seven million square feet of high-tech medical research and educational space, UMDNJ grant funding is an important part of the state economy. When the campus wanted to improve building delivery, they looked to commissioning. Over time they systematically increased the scope of commissioning services, while instituting commissioning fees as a line item in all construction budgets. This paper provides an overview of their projects and how commissioning has helped them. The most recent project, the Child Health Institute of New Jersey, is a 150,000 square foot biomedical research facility including state-of-the-art lab facilities such as radio-chem fume hoods, bio-safety cabinets and a complete vivarium as well as public meeting facilities and a commercial restaurant. The project is now completed and occupied.

About the Authors

Ron Wilkinson, Business Development, The Dome-Tech Group

Ron Wilkinson is an ASHRAE Distinguished Lecturer, an AIA Continuing Education Lecturer, a member of the USGBC LEED faculty and is published in the ASHRAE Journal, HPAC, Energy User News, Engineered Systems and Engineering News-Record magazines. He co-chaired the NASFA "Building Commissioning Recommended Guidelines" committee in 2003, and his "Best Practices in Commissioning" was published by NEEA in 2000. He earned his BSMAE from the Chicago's IIT in 1971 and his MPA from the Evergreen State College in 1985. He is currently in charge of Quality Assurance and Business Development for the Dome-Tech Group of Edison, New Jersey.

Nick Fabbroni, Director of Construction, UMDNJ

Nicholas L. Fabbroni is the Director of Construction for the University of Medicine and Dentistry of New Jersey's (UMDNJ) Facility Planning and Construction Department. He is responsible for coordinating and directing project construction from planning through occupancy for all Central and Southern UMDNJ campuses in the state. With a focus on feasibility assessments, constructability analysis, request for proposals, risk management and schedule and

budget preparation, Nicholas is accountable for the performance and activities of the planning, project management, design and construction staff, and ensuring that projects are delivered on time and within budget. Nick is co-chair of the Green Design Team for NJHEPS and a board member and Secretary of the New Jersey Chapter of the U.S. Green Building Council.

UMDNJ - Medical Epi-Center of the Garden State

The State of New Jersey is home to the largest pharmaceutical and health care research establishment in the U.S. For example, the Johnson and Johnson Company started here, invented the concept of the sterile gauze dressing and introduced the Band-Aid® in 1921, which has since become a household name. International names as Pfizer, Schering-Plough, Novartis, Veridex, Hoffmann-La Roche, Bristol-Myers Squibb and Merck still maintain international headquarters and/or major research and development operations in the state.

The University of Medicine and Dentistry of New Jersey (UMDNJ) is a state-funded and operated multi-campus higher education complex with facilities stretching the length of the state. It is accessible to patients from Philadelphia to New York City and north into Connecticut. UMDNJ owns and operates the enormous UMDNJ University Hospital in Newark and its combined facilities counted over 2.2 million patient visits last year in calendar 2006. The facility owns and operates 64 buildings placed on 185 of the most densely populated acres in the U.S. Its facilities currently total 7.2 million square feet of space and are growing daily. It is the largest health sciences university in the United States.

UMDNJ's continued growth finds its basis in its grant management financial engine. Although this might surprise some, the ability to obtain and retain research grant funding is inextricably linked to the facility construction management and operations expertise of the university staff. The ability to deliver excellent, complex buildings on schedule is vital. This paper is co-presented by Nick Fabbroni, Director of Construction for the central and southern New Jersey campuses of UMDNJ. Nick has responsibility for four campuses, located from centrally located New Brunswick to southern New Jersey and the city of Camden. This area includes 4 million square feet of medical education related space. Nick and his staff has overall responsibility for the planning, design, bidding, construction, commissioning and acceptance of all newly constructed building in this region as well as additions and major upgrades and alterations.

Dave Schultz is Nick's counterpart for Northern New Jersey design and construction and Terry Polen, Assistant Vice President of Operations, oversees the design and construction in both regions as well as all maintenance and operations for seven million plus square feet of facilities. This is a remarkable task, especially considering the demanding nature of the world-class personnel that UMDNJ must attract and retain to capture the hard-earned research grants that fund most of the university operations. It is the never-ending circle of cooperation and reinforcement that starts with successful building construction followed by productive occupancy that supports the successful recruitment of experts and subsequent grant funding.

The Quality Imperative

The campus is currently in the final stages of the most aggressive capitol construction program in its history. Approved in 1999 and started in 2000, the expansion and modernization program was originally envisioned as a \$350 million capital spending program. Now in its final stages, the plan has grown to over \$500 million and is adding an additional 1.7 million square feet of clinical, research and education space. During the previous capital programs of the 1990s, it

became apparent to the program management staff that traditional design and construction methods were not producing the results needed for the state-of-the-art facilities required by the campus. Buildings were not being turned over on time and when they were turned over they were plagued with interior environmental control problems. Although these problems did not necessarily threaten the core mission, they made it harder to attract top-notch talent to the campus and threatened the schedules of some vitally important research operations. The goal was a familiar one, to get the buildings built correctly, the first time, and to get them occupied on schedule.

At the same time the campus embarked on a major reorganization. The Physical Plant Operations, Construction and Planning Departments were all separate in the year 2000 and this appeared to cause a disjunction between the planning of buildings and their final suitability for academic and research staff. The Design and Construction functions were initially most concerned with building the required square footage for the least cost, using Value Engineering and similar processes. It was felt that the campus needed to bring the end users closer to the design and construction teams in order to encourage communications and feedback about building suitability and schedule. To this end, Terry Polen, originally from the facilities planning and construction side of campus facilities, was named Assistant VP of Operations and oversaw all of the previously separate design and construction functions. This sent a clear message that final building function was the issue at hand, not simply building aesthetics or design. The campus was shifting the imperative to “bottom-line” building function.

The first step attack was made by instituting additional design reviews. The campus design and construction team felt that many of the issues that caused problems in the final stages of construction could be mitigated with a secondary review of the bid documents. The designs and specifications were not bad, but a second review for topics that needed further consideration could make them better. Nick had heard about the new commissioning quality assurance process and knew that it included a design review. The need for secondary design reviews led the way to fully integrated commissioning.

This design review process was used on Behavioral Health Sciences Building and the Cancer Institute of New Jersey Expansion and the RWJMS Research Expansion Building. After the apparent success of additional reviews, the construction group felt that perhaps they should put pressure on the Building Automation (BAS) contractors to improve their services since the BAS seemed to be at the heart of many of the problems. To this end, their major controls contractor suggested that commissioning be added to their normal installation services. It would be offered as an extra service, of course, not as a part of their scope of work. At this point, Dome-Tech met with the staff to discuss the benefits of third party commissioning. The idea took root as the campus realized the commissioning process was a way to systematically implement design reviews and field testing in the same package.

As a result of this initial research and the success of the design reviews, the operations, design and construction department began to add commissioning into projects during the construction stage. Beginning 2002, Nick tightened the construction budgets of four projects to add start-up and functional testing commissioning as budget line items, in addition to design reviews. The

projects were four medium-sized medical school, office and lab projects that were completed in 2002 and 2003.

The first project to prove the effectiveness of full scale, integrated commissioning was the Child Health Institute of New Jersey, a 148,600 square foot biomedical research facility in New Brunswick. For this project Dome-Tech completed design reviews, Design Intent and Commissioning Plans retroactively during the construction phase. The project included state-of-the-art lab facilities such as radio-chem fume hoods, bio-safety cabinets and a complete vivarium as well as public meeting facilities and a commercial restaurant. The project was completed in 2005 and is now fully occupied.

In 2003, some of Dave Schultz' northern New Jersey construction projects experienced a delay. Knowing about Nick's successes, Dave was able to insert commissioning into the project budgets as a line item. Although the funding had been officially approved by the board, Dave was able to tighten the budget enough to fund commissioning. These projects included:

- Ambulatory Care Center – commissioning started during design. The Ambulatory Care Center frames the health care gateway to the Newark Campus of UMDNJ. Located in front of University Hospital and south of the Doctors Office Center, the facility is a six story, 185,722 sf medical office building for ambulatory outpatient services. The project was completed in June 2005.
- New Jersey Medical School\University Hospital Cancer Center – commissioning started during design. The NJMS/ UH Cancer Center provides a distinctive visible presence to accommodate cancer research, clinical treatments and administrative functions required for a comprehensive, multidisciplinary Cancer Center. The facility includes clinical and research space as well as research lab expansion and a vivarium. The building is 211, 615 sf and was completed in 2006.
- The Norfolk Deck Expansion in Newark - commissioning started during design. This is a 14-story, mixed-use residential, commercial and parking garage facility of about 500,000 square feet in area. It includes 234 studio, one, two and three bedroom apartments and parking for several hundred cars. The project was completed in 2004 and is fully occupied.
- The Dental School Addition - commissioning started during construction with planning and design tasks, carried out retroactively. It is a 100,000 square foot dental educational facility with shell spaces on three levels and a fully occupied dental patient clinic on the fourth level. There is a provision for future lab research areas, classrooms, clinical space and offices.
- The Regional Bio-Containment Lab (RBL) which is a joint project of UMDNJ and the US Department of Health and Human Services - National Institutes of Health. The project includes 35,000 square feet on two floors with a penthouse. This cutting-edge, high security hazardous substance lab will support research of potential terrorist bio-agents and emerging diseases and will include BSL-2 and BSL-3 Labs, ABSL-3 animal facilities and office and research support facilities.

Commissioning was added to the Norfolk and RBL project budgets before final board approval. Because of success of design reviews, the board was already primed for the consideration of expanded quality initiatives and the full commissioning process. The board accepted the budgets and made the decision to implement commissioning on a wider basis for the 5-Year Master Plan. This meant that commissioning could be officially inserted as a line item and was “baked in” to the overall budget, which could not be altered without additional board approval.

This formal acceptance is critical to the purchasing and enforcement of the commissioning process. Once formally accepted, a budget line item cannot be removed even if it is attacked in favor of adding equipment or square footage without an additional meeting of the board. This is vital to the protection of the commissioning quality assurance process and to the prevention of its removal by future arbitrary decisions.

Commissioning is a mandatory part of the budget for all current projects at UMDNJ. In fact, at this time both LEED Fundamental and Enhanced Commissioning are a standard part of all projects. Already a requirement for New Jersey public K-12 schools, LEED Enhanced Commissioning is not a mandatory part of the LEED Certification process. UMDNJ’s requirement for it further stands as a testimony to the bottom line benefits of commissioning all by itself. While we often see LEED standards pave the way for commissioning, in this case commissioning paved the way for LEED.

In 2005, UMDNJ decided that all new construction and large addition projects would be built to achieve LEED Certification or LEED Silver status. As the RBL was designed before 2005, it did not achieve LEED certification. However, the RWJMS Camden Academic Research Building and the SOM Stratford Clinical Research Centers will be certified. These LEED facilities total 260,000 square feet of new state-of-the-art research and medical teaching space.

UMDNJ does not stop their quest for quality assurance and efficiency with LEED Certification. Their requirements go far beyond LEED standards to include extensive communications, data and security verification. Extended training initiatives and fully edited and produced operations and maintenance documentation on DVD media are under way.

Bottom Line Benefits

Due to the reorganization of the campus and breaking down of departmental “silos,” the commissioning function now is linked to the ownership of the building and the operations and maintenance (O&M) staff. The third party commissioning authority (CxA) has ownership in the building and is expected to be there when problems arise, even after the building is occupied. As a result of this shift in policy at UMDNJ, the design and construction process is much more integrated with the operation of the building. These improvements notwithstanding, the university still sees problems at acceptance and during the first year of occupancy. But they are minor problems instead of “catastrophes” and there are far fewer of them. The drop in complaints to the current level is described by Nick as a “near miracle.”

Other benefits of commissioning include the monitoring of duct and pipe installation to ensure they kept clean during the construction process. If a problem occurs after installation and is traced to the pipes and ducts, the CxA will be on the scene to help determine a solution and assist with the development of new testing processes. As a recent example, an installed sewer line was designed to be large enough to handle the flow of water from the automated cage washer. In actual practice, the flow from the cage washer included bedding material and other waste products that created a slurry flow from the cage washers. Increased friction of the flow caused unacceptable back up through other drains. The lesson learned from that example is that future tests must not simply include water from the assembly, but a simulated waste mixture – including foreign material – that will actually simulate the machine in action.

What UMDNJ Looks for in a CxA

A main part of selling commissioning to upper management is demonstrating a competitive market of service providers. The market must be defined by skill sets and buyers must be able to establish the competency of the service providers through objective means such as training, certification and equipment inventory. Specifically, when hiring a commissioning authority, UMDNJ looks for:

- Past experience with projects of a similar size and complexity
- Project team resumes with specific experience required for the specific project, and
- Proximity to the job site, encouraging frequent and efficient presence

The UMDNJ is very cognizant of being in the public eye. As such they must follow strict selection procedures that ensure the selection of a qualified commissioning provider and also ensure the taxpayers of the most effective use of their dollars. For this reason, the university uses a Request for Proposal (RFP) procedure that requires fees to be sealed separately from the general qualifications package of approach, resumes or other general information. The selection team evaluates the qualifications and chooses the three most qualified firms for a short list. After that, the fees are opened and compared to the university's estimated pricing and closeness of their grouping. If the fees vary considerably from the university's estimates, or if the fees vary considerably from each other, the selection team may convene interviews to obtain a better understanding of the vast differences. If the fees are in line with expectations, including quality and value, the firm with the lowest fee is chosen for the work.

Overall, in a commissioning authority, the school wants:

- A good Cx plan at the start of the project, demonstrating strong leadership and command of the project
- Design comments that show an in-depth understanding of the project's interrelated systems and the consequences of key design decisions
- An organized and concise contractor kick-off meeting that commands respect for the quality assurance process while conveying a hands-on, cooperative attitude towards the installers
- A strong presence on site for verification, start-up, testing and training

- A continued presence after occupancy, especially during the first year