

Independent Commissioning as an Energy Measure and Project Management Tool

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Summary

GSA's Design Excellence in HVAC for Federal Building program was initiated by the GSA Office of the Chief Architect in recognition that many of GSA's award winning buildings are not working as well as expected. Experience at a large, recently completed GSA project in Boulder, Colorado found that performance can be as much a problem of construction and building operation as design, and that the problem can be effectively addressed by establishing independent quality assurance oversight.

Project Description

The General Services Administration's (GSA) Rocky Mountain Region's new 372,000 square foot David Skaggs Research Center, in Boulder, Colorado, delivered a unique user oriented facility that successfully fulfilled a major project goal of providing a 24/7 environment where the National Oceanic and Atmospheric Administration (NOAA) scientists can conduct science and research. As part of the project, GSA implemented Executive Order 12759 that encourages participation in utility demand side management and shared energy savings projects. GAS entered into such an agreement with the local utility, Public Service Company of Colorado (PSCo), now Xcel Energy. PSCo proved to be a knowledgeable and valuable partner who agreed to provide project financing for energy measures that had a 10-year or better simple payback.

One of the major items on GSA's list of energy measures were variable speed drives for the facility's 75 horsepower axial-vane fans. PSCo's energy calculations showed only a 12 year payback, and despite significant projected operational and maintenance savings over this period, PSCo could not fund the measure. However, PSCo was able to provide financing for a number of other measures including control upgrades and several mechanical items. Additionally, PSCo offered to fund commissioning as an energy measure with a 3 to 4 year payback. GSA accepted the offer.

This combination of energy efficiency measures and commissioning was recognized with a GSA Citation year 2000 award for Engineering/ Technology/ Energy to the CC.

Creating an Independent Quality Assurance Program

Because of the Utility's involvement, the commissioning effort was inherently independent. The service, financed by the Utility, created a Commissioning Coordinator (CC) position with no authority to change, modify, or accept contracted work. Under this arrangement, the CC operated as an unbiased observer not subject to the influence of GSA, the construction contractor, or GSA's construction manager. Contractor responsibilities to provide personnel, manpower, and tools to perform quality control, acceptance testing, and startup procedures were unaffected.

Project Management

The independent CC status provided some unique and effective project management benefits. CC field and design observations and attendance at construction meetings provided a common source of expert information to all parties. This was done via special reports and the periodic publication of a tracking report called the FONs (Field Observation Notes™). "Observations" differ from punch list items as they carry no direct authority and they are often focused on identifying potential and developing problems.. During the course of the project, the CC identified 387 individual "observations" many of which resulted in significant work corrections at no cost to GSA. The process also benefited the CM who acknowledged a reduction in re-work, change orders, and an improvement in meeting milestones objectives.

From a project management perspective, the independent CC structure appeared to balance out the management equation and put GSA into a strong Owner role. The CC acted as a quality "strawman" making it easier for Contractors to give quality an equal footing with budget and schedule issues. This assured that quality issues stayed on the table in a non-contentious and open manner.

Who is responsible for quality?

On this project GSA retained both a Construction Manager (CM) and General Contractor (GC). The CM was responsible for contract administration, monitoring the GC, and being GSA's "eyes and ears". Traditionally, this has also included responsibility for quality. However, as discussed in this paper, this relationship contains an inherent conflict of interest when combined with the other responsibilities of budget and schedule. A CM can provide quality assurance but to be truly independent this function must be kept distinctly separate from normal quality control and project management responsibilities. With no direct authority or work responsibility, the CC role did not effect the responsibility of contractors to provide their own quality control, testing, and commissioning programs as required to assure compliance with contract documents. The CC responsibility was to audit the level of compliance. Responsibility for acting on CC provided information remained with the Owner and CM.

Follow through – The Post Occupancy Optimization

When NOAA began occupying the facility in 1999, GSA’s building managers faced a steep learning curve due to the complexity of the systems and inexperience with the building. To address these problems the CC was brought back to continue the commissioning process with a post-occupancy optimization program having four major goals:

1. Improved occupant comfort
2. Sustained and increased energy and environmental efficiency
3. Reduced maintenance burden and costs
4. Extended equipment life

Much of the post-occupancy optimization was performed remotely by retrieving information from the Building Automation System (BAS) and analyzing the buildings operation. While the original commissioning effort was performed with a vacant facility, the building operated differently when occupied. This process identified some significant operational problems that, if left undetected, would have resulted in premature equipment failure. Other problems corrected resulted in significant energy savings. The process cost \$35,000 (approx. \$0.10/sf), and is yielding annual energy savings of approximately \$100,000 (\$.30/sf)

Cost

The cost of the CC service was less than 1% of the construction budget -- less than one month’s rent.

Summary - Why was the commissioning process on this job so effective?

GSA has long identified commissioning as a critical construction element. This project corroborates that perspective by finding that an independent commissioning process can be both effective and economical. Program elements that contributed to this success are believed to include the following:

1. The CC was truly independent.
2. The CC had no direct authority or work responsibility.
3. Contractors retained responsibility for quality control and testing as required to assure compliance with contract documents.
4. Timely, open, and objective reports were distributed to all project participants allowing problems to be identified and addressed early enough to take action.
5. Creation of a quality “strawman” assured that quality issues retained a peer relationship to the “thousand pound gorilla” issues of schedule and budget.
6. The CC had significant technical knowledge and field experience. This allowed the CC team to “hit the ground running” and establish and maintain peer relationships with the contractors and designer. All of the CC personnel had extensive commissioning experience and the senior representative had been responsible for

commissioning 20 facilities in the previous year. This was contrasted with the experience of the contractor and construction manager whose experience was typically less technical and covered fewer projects.

7. The CC focused their efforts on mechanical, control, and electrical system issues where construction managers are historically weak.
8. Follow through into the operating stage of the building in order to optimize systems, provide continued operator training, and identify warranty issues not found during the construction phase.

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