Scoping and Specifying Commissioning Projects

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What Building Owners Should Be Paying For:

- A building that is designed for long life and high performance, a building that is designed for easy maintenance and low energy bills, and has been built to deliver those specified results

A BUILDING'S REAL COST

Operating expenses---things like lighting, cooling and maintenance—make up the largest cost of **owning** a building. First costs—initial construction-- typically account for less than 10 percent of the money that must be spent on a facility over its life; as much as 85 percent of the building's real cost (life cycle cost) is related to operating the facility.

A BUILDING'S REAL COST

- According to the National Institute of Building Sciences (NIBS), the operating costs of a commissioned building are 8 to 20 percent lower than those of a noncommissioned building. Properly commissioned buildings tend to be more energy efficient and their systems more reliable.

What Do We Look For in Commissioning Procurement?

- Ensure the facility meets the Owner's Project Requirements
- Provide a safe and healthy environment
- Provide optimum energy performance
- Provide a facility that can be efficiently operated and maintained
- Provide complete orientation and training to facility staff and occupants
- Provide improved documentation of system characteristics

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To Reach This Goal:

- It is necessary for the RFP process to establish and document Owner's Project Requirements, which are criteria for system function, performance, and maintainability; and to also verify and document compliance with these criteria throughout design, construction, start-up, and the initial period of operation. In addition, complete operation and maintenance (O&M) manuals, as well as training on system operation, should be an integral part of the procurement process.

Guideline 0 2005

"The Owner has adopted the Commissioning Process as his/her quality process to plan, design, construct, and operate this facility. As with any quality process, the Commissioning Process provides tools to enable everyone involved in the construction of the facility to verify that the final facility meets the Owner's Project Requirements."

Desired Qualifications for a Provider Guideline 0, 2005

- Has acted as the principal Commissioning Authority for at least three projects during the past year. [Note that the size of the project should be accounted for. Whereas one proposer may have done ten projects all small in size, another proposer that accomplished one large and complex project may have equal credentials].
- Experienced in quality processes.
- Knowledgeable in building operation and maintenance training.
- Excellent verbal and written communication skills. Highly organized and able to work with both management and trade contractors.
- A degree in Mechanical/Electrical Engineering or Architecture is strongly recommended, as is CCP, AIA and PE registration
- Commissioning Authority's firm will demonstrate depth of experienced personnel and capability to sustain loss of assigned personnel without compromising quality and timeliness of performance.
- The Commissioning Authority will be an independent contractor and not an employee or subcontractor of the General Contractor or any other subcontractor on this project, including the design professionals.

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What Special Qualifications Should We Look For?

Depending on the type of project:

- Quality process experience.
- Operation and maintenance experience.
- Design experience.
- Life-cycle costing.
- Copies of previous project forms and plans

What The Contractor Can Do To Minimize Costs Impact on His Bid!

- Confirms contract document requirements for clarity and completeness
- Works with construction team, i.e. Owner, A/E, Maintenance/Operations, Commissioning Provider to confirm Design Intent.
- Verifies sub-contractors and venders understand their requirements for commissioning.
  - Factory Inspections, systems operations certification, etc.
- Requires substantial coordination with subs.
  - Pre-functional tests, scheduling, documentation.

What The Contractor Can Do To Minimize Costs Impact on His Bid! (con't)

- Maximize efforts to get major components "commissioned" at factory. Manufacturers or assemblers can be held accountable before major components, like AHU's, Chillers, etc. are shipped.
- Consider pre-assembled components like pump skids with all controls and instruments or pre-assembled chiller plants rather than chiller plant components that require field assembly.

Creating the Scope of Work

- The Scope of Work should include **all tasks** to be performed and is essential in the procurement of a Commissioning Provider.
- Include all systems to be commissioned including envelope
- Beyond the scope of typical commissioning, sustainability requirements should be detailed.
- The tasks required for the Measurement & Verification system should be included in the Scope of Work

Creating the Scope of Work Cont.

The SOW should:

- Involved the provider from the pre-design phase to add commissioning-related requirements.
- Be detailed as to the requirements for each phase as follows:

Pre-Design Phase

- Develop the Owner's Project Requirements

  "The OPR form the basis from which all design, construction, acceptance and operational decisions are made". The OPR includes:

  - Project schedule and budget
  - Commissioning process scope and budget
  - Project document requirements (formats, training, reports, etc.)
  - Owner Directives
  - Occupancy requirements and schedules
  - Training, benchmarking, O&M and warranty requirement
  - Equipment maintainability requirements
  - Energy efficiency goals

Pre-Design Phase continued:

Develop the Owner's Project Requirements Continued

- Quality requirements
- Environmental and sustainability goals
- Community requirements
- Acoustical, vibration, environmental and seismic requirements
- Training, benchmarking, O&M and warranty requirements
- Accessibility and security requirements
- Constructability requirements
- Communication requirements
- Applicable codes and standards.

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Pre-Design Phase continued:

- Identifying the scope and budget for the Commissioning Process
- Develop the design Phase Commission Plan
- Developing the initial Commissioning Plan
- Develop scope for Systems Manual
- Acceptance of pre-design Commissioning Process activities
- Review and use of lessons-learned from previous projects
- Prepare issues report
- Determine acceptance requirements
- Identify training requirements

Design Phase

- Verify the Basis of Design with the OPR
- Update the Commissioning Plan to include Construction and Occupancy and Operation activities.
- Develop Commissioning Process requirements for Construction Documents
- Develop draft construction checklists
- Update the scope and format of Systems Manual
- Define training requirements
- Perform commissioning-focused design review
- Acceptance of Design Phase Commissioning Requirements

Construction Phase

- Determine preconstruction and pre bid responsibilities
- During the Construction Phase the “systems and assemblies are installed, inspected, tested, and placed into service to meet the OPR. The scope should be sufficiently detailed to convey each task indicated;
  - Verification of submittals an Verification of each task and test

Construction Phase continued:

- Schedule Commissioning process activities
- Review submittals: (Determine at this time if the use a sample basis is acceptable to the owner. If deficiencies exist, review as required.
  - Coordination Drawings
  - Shop Drawings
  - Product Data
  - Systems Manual
  - Training Program

Construction Phase continued:

- Verifying the training of O & M personnel and occupants
- Acceptance of Construction Phase Commissioning Process Activities.
- Verify that systems and assemblies comply with the OPR through witness, verification, or test data verification.

Construction Phase continued:

- Determine and Explain Site Visit Requirements
  - Site Visits are the primary method to verify that the systems and assemblies comply with the OPR.
  - Verification of the Construction Checklists and record Documents.

Occupancy and Operations Requirements:

- Determine and schedule the training items to be accomplished during the first year of operation.
- Add requirements for:
  - warranty items to be checked during the first year of operation.
  - test requirements during occupancy, including periodic re-testing for a successful continuous operation of the facility.
  - lessons-learned workshop.
  - criteria to be included in the final Commissioning Process Report.
  - acceptance of Occupancy and Operations Phase commissioning.

Planning and Scheduling

- Contractor needs to ensure that their sub-contactors and venders have adequate time inserted into schedule for pre-functional testing and verification. This will require pre-planning meetings and follow-up with schedule.
- Item to add to schedule is a Preparatory phase meeting with Cx to ensure coordination.
- Cx must have input into schedule to ensure he has enough time to do his Functional Testing.
- Caution: Once schedule has been developed and the construction team has agreed to it, it must be diligently followed. ANY change to schedule must be communicated to all parties for their coordination for final completion.

Roles/Responsibility/Management Approach and Project lines of authority

- Ask specifically for the providers proposed approach to managing the project expertly and efficiently, including the owners team participation.
- Insert language and ask for examples of how the provider will integrate the Commissioning Process into the normal design and construction process in order to make it “business as usual.”
- Ask specifically how the provider will foster teamwork and cooperation from contractors and designers and what you will do to minimize adversarial relationships.

PERFORMANCE ENERGY-EFFICIENCY AND COMMISSIONING PROCESS OF THE BUILDING

- Performance energy-efficiency of the building, as well as the commissioning process should be specified in bids, negotiations and construction contracts.
- Problems encountered in the field are often created because roles and responsibilities are not understood during bid & negotiations with subs and venders. The requirements for Cx may be new to the subs and venders or not be fully understood. The Cx must communicate with the GC and his Subs what he is commissioning and how. Communication break down can lead to delays, retesting, rescheduling, etc. ALL Costs to somebody that must be addressed.
- Checklists are a great way of getting the Cx requirements to the GC and his subs/venders. These checklists should be developed during the design phase. Examples of checklists are available thru the BCA or other organizations/associations.

Quality Control & Construction Process Monitoring

- QC is an ongoing process that starts with Submittal Submission and continues thru Submission Approval, Material/Equipment Delivery, Installation, Construction Checklists, Test Procedures and Acceptance by Owner. If you wait to inspect until the CA is on site, you are too late!

Commissioning Components

- One of the components that is sometimes overlook in commissioning is the Building Envelope. This system includes window walls, roofs, doors, exterior coverings, etc. These systems all impact the energy usage of the building. It also impacts the Indoor Air Quality of the building which can impact productivity of the personnel in the building.
- Thermal and moisture barriers in the envelope are a Daily QC issue starting with shop drawings. How the flashings are installed, is there clear adequate air spaces to prevent thermal transfer from the outside as well as the inside? All of these issues are items to check and verify.
- Little problems caught early won't become big issues later!

Documentation

- Documenting the decision-making process is important. It records how the design progressed and keeps the owner and team members informed, thus avoiding the need to revisit decisions that have been made.

Commissioning & Maintenance

- Commissioning is one method to verify that the building will meet the Owner's Project Requirements and expectations.
- Commissioning will ensure that a building begins its life cycle in accordance with the Owner's Project Requirements
- They're better documented, making it easier to train operating personnel.

Successful Completion of Project

- Commissioning is critical to the successful completion of the construction process. The entire process, from pre-design to occupancy, is dependent on this process.

Why the Emphasis on the RFP/RFQ

- The Commissioning Authority should be closely involved in the all phases of the project. Unlike manufacturing where a single design is tested and refined and then thousands are built, every project is a custom design.
- The RFP/RFQ should also be modified for the specific project at hand.

Getting The Right Person

- When preparing the RFP/RFQ, the following should be considered:
  - **Experience**. Ask to see a list of the firm's commissioning projects for the past five years.
  - **Documentation:** Ask to review a copy of documentation from previous projects including the final report.
  - **Organizational Involvement** Ask to what professional commissioning organizations the firm belongs. The leading commissioning firms are members of the Building Commissioning Association (BCA).
  - **References**. Ask for and contact references of clients with buildings similar to the one being built.

Conclusion

- To effectively use the commissioning process to verify the Owner's Project Requirements, it is necessary for the Owner to properly procure this process.
- Tailor the RFQ/RFP to the individual skill sets required to complete the specific project

QUESTIONS