FOCUS on FACILITIES
Diocese of Cleveland Facilities Services Corporation

Third Party Commissioning

This past January in our Facility Management focus we discussed Energy Retrofit and Retro-Commissioning and this month in this Asset Management focus we are going to discuss **building commissioning**. Whenever a person, management firm, or some organization or institution is tasked with asset management and these assets are buildings they should be familiar with building commissioning.

What is building commissioning? It is the building program process of planning, documenting, scheduling, demonstrating, verifying, and training, to provide a fully functional system(s) per the owner's project requirements. It applies to heating, ventilating, and air-conditioning (HVAC), electrical power and lighting, plumbing, fire protection, and security systems, and the building exterior itself. Commissioning applies to new construction and building renovations with the goals to assist in the delivery of a construction project that will result in an efficient, safe and healthy facility; optimizes energy use; reduces operating costs; ensures adequate operation and maintenance (O&M) staff orientation and training; and improves installed building systems documentation.

When an asset manager wants to tune up a building there is the option of fulfilling an energy retrofit/retro-commissioning initiative as discussed in the January column or, if the building has been initially commissioned when built, then it can be re-commissioned. Whichever application, the same goals apply as noted above.

The first commissioning job in the United States is believed to be the commissioning of the first ship in the Continental Navy back in 1775 in Philadelphia. It took more than a hundred years to pass before the building industry and more specifically the HVAC industry, to begin to embrace commissioning starting with ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineering Society) to form its HVAC

Commissioning Committee in 1984. Since then there have been several organizations creating their own interpretation of commissioning and their standards, guidelines, and procedures. Organizations include but are not limited to ASHRAE, BCA (Building Commissioning Authority), BES (Building Energy Sciences, LLC), and three different testing, adjusting, and balancing organizations.

In the simplest terms the steps taken to procure and apply building system commissioning are:

- Building owner agrees to contract for commissioning services
- Building owner agrees to have the project LEED (Leadership in Energy and Environmental Design) certified where commissioning is mandatory
- Request For 3rd party commissioning services
- Award the commissioning agent
- Design Phase commissioning
- Construction Phase commissioning
- Post Construction commissioning
- Continuous commissioning

In years past building owners, building committees, and capital project departments often asked the question, "Why am I paying for this?" Over time, experience has proven that without 3rd party commissioning the goals noted above were usually not achieved to the fullest and so today most building owners have come to recognize its benefits and have accepted commissioning as a necessity.

So with acceptance granted, let's review the steps in the commissioning process beginning with the design phase and the commissioning team kickoff meeting with all required personnel on the building owner's team and the design team. Depending on the scope of commissioning services e.g., HVAC systems, some of the design team members such as the plumbing consultant, do not need to participate. In this initial meeting the commissioning agent will facilitate the meeting outlining the scope of work that will include:

- **Owner's Project Requirements** – a document produced by the owner and design team and reviewed by the commissioning agent
- **Basis of Design** – a document produced by the design team, which in this discussion would be the HVAC consultant engineer
- **Design Intent** – produced by the commissioning agent to document the design criteria of the equipment, as well as the design criteria of the system as a whole
- **Design Review** – strategically targeted reviews by the commissioning agent usually at the end of the concept/schematic phase, end of the design development phase, and then a final design review prior to the construction documents going out to bid. The commissioning agent shall write a **Design Review Report** for the commissioning team for response as needed based on this report
- **Meeting Minutes** - to be maintained by the commissioning agent

During this design phase the commissioning agent will be responsible for creating the **commissioning specification** to be included in the contract documents that will go out to bid. This specification describes the commissioning process and includes:

- Draft **pre-functional performance test** (PFPT) documents, which are requirements the contractor (s) must complete, as well as document results on these PFPT checklists.
- Draft **functional performance test** (FPT) documents, which describe sequence-by-sequence how the system shall act and react e.g., demonstrate HVAC system at "maximum cooling", "average cooling", etc.
- **Preliminary commissioning activity** (PFPT's and FPT's) **schedule**, to be updated by the contractor as the project is being built, and routine commissioning meetings held with those involved with the commissioning process in the construction phase.
- **Contractor requirements** as they pertain to attendance at commissioning meetings on site, commissioning agent site visit reports, and other requirements noted below.
- **Re-test demonstration**(s) due to corrective actions required resulting from the FPT system demonstration(s) that the commissioning agent will keep track of in a corrective action log.
- **Seasonal commissioning requirements** where FPT documents require the contractor to demonstrate the heating components of the HVAC system in the heating season, etc.

When producing the PFPT and FPT documents it is important to note that there are no industry standards for identifying the method of confirming equipment and system startup associated with the PFPT process. Quite often these documents are simple checklists noting pass -fail, set points design-to-actual, etc. The FPT process is similar where it may be a series of checklists or narratives identifying how the system is to be demonstrated and how it is required to react. Within the commissioning specification quite often will be a requirement by the contractor to implement system control point trending for a specific period of time leading up to the FPT demonstration so that performance can be reviewed via this trending, reinforcing the system is operating per the design intent.

The **seasonal "deferred" FPT demonstration** e.g.,

operating the heating system in the heating season is critical to the commissioning process. While one can trick the HVAC system e.g., react to a "freeze" condition in the air-conditioning season this doesn't guarantee the problem won't occur during the winter.

It is not unusual for the commissioning agent to be involved with responsibilities found in the contract document General and Supplementary Conditions (Division 1 of the contract specification). Those responsibilities can include:

- Review training plan associated with educating the O&M staff on the systems being commissioned
- Review O&M manual, which can also be part of the O&M staff training requirements
- Warranty phase monitoring and reporting on how the systems commissioned are performing
- Review and comment on the equipment manufacturer's submission of their equipment shop drawings to the Design Engineer for the Engineer's approval of the equipment

During the construction phase, the requirements specified in the contract documents above will be fulfilled. The commissioning agent shall be responsible for maintaining commissioning meeting minutes and distributing correspondence to the building owner's representative(s), the design team, and the contractor's team.

Other commissioning responsibilities include:

- Site visits and associated field reports
- Response to Division 1 Commissioning requirements and where require, participate in these activities
- Spot checking the contractor's PFPT initiatives and receipt of these completed PFPT documents
- Facilitate the FPT system demonstrations by the contractor(s) and maintain the "corrective action log"
- Make sure the O&M staff is an active participant in the PFPT and FPT demonstrations as part of the O&M training

At the completion of the project, including any seasonal deferred FPT system demonstrations the commissioning agent shall complete and submit to the building owner the following **Commissioning Report**:

- Copies of all commissioning documents produced as record documents
- Final/updated FPT documents that the building owner's O&M staff or a future commissioning agent to use when the time comes to re-commission the system(s)
- Completed documents during the construction and warranty phases:
  - ⇒ PFPT sheets
  - ⇒ Trending graphs
  - ⇒ FPT sheets
  - ⇒ Corrective Action Log
- Executive Summary Report

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