


 Engineering Economics Inc

**Cx for Enhanced Healthcare Project Delivery**


**Rick Staley – Sr. Construction Manager PH&S**  
**Joe Webb – Construction Manager PH&S**  
**Richard Beam – Director, Energy Management Services PH&S**  
**Todd McGuire, PE - Sr. Project Manager EEI**

---

---

---

---

---

---

---

---

**Presentation Format**

Case Study of four facilities adopting Cx  
 Interview questions with PH&S staff  
 Audience Q & A

---

---

---

---


---

---

---

---

**Providence Newberg LEED™ Hospital and MOB Project**

**Project features and timeline**


- \$45M, 145,000 SF hospital, 37,000 SF medical office building
- Green building features: LEED, grants, incentives, and tax credits
- 4 years from concept to surgery

---

---

---

---

---

---

---

---

**Providence Newberg  
LEED™ Hospital and MOB Project**

**Commissioned Systems  
Scope of Work**



- Why commission?
- HVAC, building automation, emergency power, lighting control

---

---

---

---

---

---

---

---

**Providence Newberg  
LEED™ Hospital and MOB Project**

**Commissioning Deliverables**



- LEED program requirements
- Provider supplemental
  - Specification summary matrix
  - Schedule review
  - Pre-functional documentation binder
  - System readiness and resolution tracking documentation
  - Project communication reports

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
Central Utility Plant (CUP) Upgrade**

**Cx Procurement and  
Project Features**



- \$31M, 43,000 SF CUP to serve 1,400,000 SF
- 12 month design / construct
- Joining the old with the new

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
Central Utility Plant (CUP) Upgrade**

**Design Phase  
Support Activities**



- Design enhancement opportunities
- Specification integration with pre-purchase efforts
  - Defining Owner acceptance test and documentation requirements
  - Detailing Cx process for contractor support bidding

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
Central Utility Plant (CUP) Upgrade**

**Construction Phase  
Support Activities**



- Schedule review
- Installation checks and component testing
- Submittal reviews and functional test development
- 3<sup>rd</sup> party testing review
- Detailing temporary system configurations for functional testing

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
Central Utility Plant (CUP) Upgrade**

**Acceptance Phase  
Support Activities**



- Electrical Systems
  - Functional testing execution
  - Finalizing Owner acceptance requirements
  - Issue identification
  - Resolution and documentation

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
Central Utility Plant (CUP) Upgrade**

**Acceptance Phase  
Support Activities**



- Mechanical Systems
  - Temporary equipment configurations
  - Valve and VFD tuning
  - Control and monitoring system integration

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
Central Utility Plant (CUP) Upgrade**

**Lessons Learned**



- Early involvement of CA
- Design review and pre-purchase interview
- Participation in Value Engineering
- Balance of detail and brevity
- Documentation improvements
- Enhanced staff involvement

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
North Pavilion**

**Project Features**



- \$120m, 485,000 SF
- Cancer treatment and research hospital
- 250 patient rooms, 21 operating rooms
- Occupy fall 2007

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
North Pavilion**

**Cx Scope of Systems  
Design Phase Considerations**



- |                         |                    |                          |
|-------------------------|--------------------|--------------------------|
| Automated Controls      | Fire alarm         | Plumbing                 |
| Audio/visual/sound      | Fire protection    | Roofs                    |
| Building access         | Furniture systems  | Security                 |
| CCTV and Tel / Data     | Kitchen equipment  | Seismic                  |
| Computer room           | Laboratories       | Smoke control            |
| Critical power          | Lighting control   | Steam distribution       |
| DDC System              | Mechanical / HVAC  | Sterilization appliances |
| Electrical distribution | Medical gasses     | Vacuum systems           |
| Elevators / escalators  | MRI and CT Scan    | Vivarium                 |
| Emergency power         | Nurse call, paging | Water Features           |

---

---

---

---

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
North Pavilion**

**Cx Scope of Systems  
Construction Phase  
Determination**



- Mechanical Systems
  - Air Side equipment with all distribution & control
  - Hydronic equipment
  - Central cooling and heating POC's and performance checks
  - Mechanical controls

---

---

---

---

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
North Pavilion**

**Cx Scope of Systems  
Construction Phase  
Determination**



- Electrical Systems
  - Main generator and normal switchboards
  - Existing medium voltage switchgear interfaces
  - Automatic transfer switches
  - Electrical controls

---

---

---

---

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
North Pavilion**

**Design Phase Experience  
Mechanical & Electrical  
Systems**



Review of 100% Design Documents,  
50% and 99% Construction Documents

Drawings

---

---

---

---

---

---

---

---

**Providence Portland Medical Center  
North Pavilion**

**Design Phase Experience  
Mechanical & Electrical  
Systems**



Review of 100% Design Documents,  
50% and 99% Construction Documents

Specifications

---

---

---

---

---

---

---

---

**Providence St. Vincent's Medical Center  
East Tower Expansion**

**Project Features**



- 72,000 SF of new construction and 8,000 SF of renovation

- 72 beds on 6 new floors

- Occupy fall 2006

---

---

---

---

---

---

---

---

**Providence St. Vincent's Medical Center  
East Tower Expansion**

**CX Authority  
Involvement and  
Scope of Work**



- Mechanical Systems
  - Heating, Cooling & Heat Recovery Systems (w/ CP chiller)
  - 2 fan wall AHU's, 100+ Phoenix supply and exhaust valves
  - DDC system
  - Leak detection and fuel polishing systems
  - Central plant chiller

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**What has the commissioning process done to enhance the development, execution, close-out and operation of your projects?**

Provided a standard for GC & subs to ensure successful completion of their project.

Each step of the project was proven out and verified before getting to the end and finding out what had been missed by each trade.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**What are your criteria for determining whether to do formal commissioning on a project?**

- 1) LEED requirement
- 2) Project scope significant enough with new or replacement of multiple MEP systems.
- 3) Significant risk / reliability considerations
- 4) When a quick occupancy is expected

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**Do you feel that commissioning has brought actual dollar savings to your project?  
If not, can you describe other tangible benefits?**

Troubleshooting these complex projects could end up costing us more than if we had the commissioning done up front.  
We were assured the systems would work once we took occupancy.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**Do you feel that commissioning has brought actual dollar savings to your project?  
Can you describe other tangible benefits?**

I'm not sure how to quantify the savings, only peace of mind, which in many cases could prove to be priceless.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**Do you feel that commissioning has brought actual dollar savings to your project?  
Can you describe other tangible benefits?**

Engineering staff that operate the facility have participated in the process which provides them with an understanding of the design, installation and operation of the building.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**Do you feel that commissioning has brought actual dollar savings to your project?  
Can you describe other tangible benefits?**

The Cx process has significantly reduced the operational failures of our systems.  
Systems are running at peak performance, saving dollars on our energy consumption.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**Has the commissioning process enhanced the internal working of your company's design / construction staff? Facilities staff?  
If so, how?**

It has given us another tool to ensure that we are able to task the contractors. I'll continue to hold our Engineers responsible for their part in the design, but I think that you're one more set of eyes which, when engaged up front of a project, can also flush out problems / issues before they become apparent in the field.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**Has the commissioning process enhanced the internal working of your company's design / construction staff? Facilities staff?  
If so, how?**

Increased facilities skills with understanding every element of each system.  
Increased performance of contractors with better team work.  
Provided an avenue for better communications and understanding of how each trade interfaced with the installation and testing process.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**What recommendations do you have for selecting a commissioning provider?  
Do you have a preference as to whether the provider is an employee of the design firm, the construction company or a third party?**

I believe you need an independent third party involved, as a direct report would certainly not tell on his own company / peers. This would be the same with the engineering or construction company doing this work. I certainly know that a third party to the owner is going to keep the owner more abreast of issues that the others may want to hide or delay in telling an owner.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**What tips can you pass on to other health care facility Owners to optimize their commissioning experience?**

Start early.  
Ensure bidding contractor understands the Cx process and their responsibilities to it.  
Ensure that GC builds in appropriate placeholders on the schedule for the Cx process.  
Get your engineers involved with the commissioning.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**What tips can you pass on to other health care facility Owners to optimize their commissioning experience?**

Keep everyone on track – schedule can easily slip when deadlines are not met with each phase of Cx.  
Be prepared to react quickly when failures are identified. You will need to identify a work-around to solve an identified failure, whether equipment or software programming.

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**What tips can you pass on to other health care facility Owners to optimize their commissioning experience?**

**Include a Cx line item in capital project budget planning process .**

**Engage a commissioning firm early, even if not driven by LEED.**

---

---

---

---

---

---

---

---

**Owner Representative Interviews**

**What tips can you pass on to other health care facility Owners to optimize their commissioning experience?**

**For an owner to fully believe the value and goal at the end of a project has been met, it's a must to fully understand what the Cx company can provide and from that menu make good choices to fulfill expectations.**

---

---

---

---

---

---

---

---



**Cx for Enhanced Healthcare Project Delivery**



**Rick Staley – Sr. Construction Manager PH&S**  
**Joe Webb – Construction Manager PH&S**  
**Richard Beam – Director, Energy Management Services PH&S**  
**Todd McGuire, PE - Sr. Project Manager EEI**

---

---

---

---

---

---

---

---