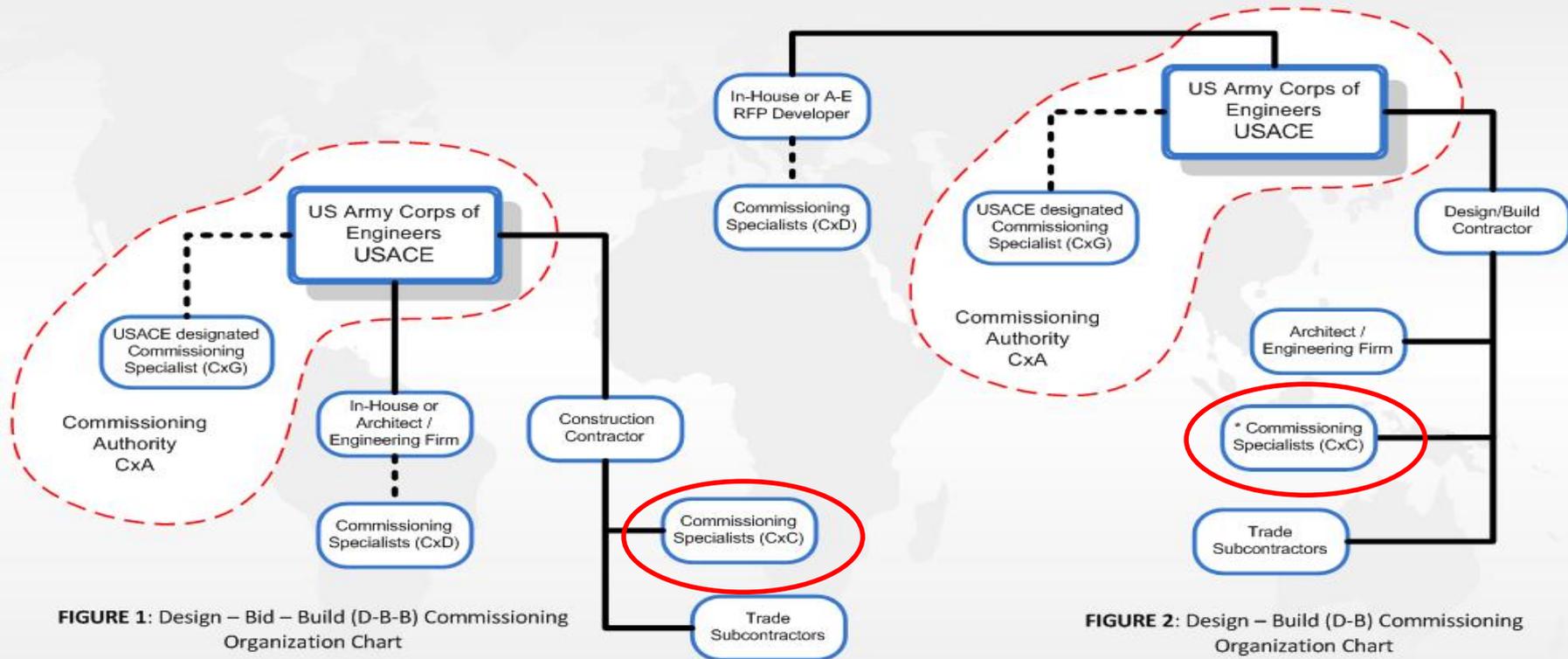




# Presentation Objectives



- ~~Introduce USACE Policy & Guidance for the implementation and execution of Total Building Commissioning~~
  
- ~~Provide a brief narrative of US Army Corps of Engineers~~
  - ~~USACE Commissioning Process: Then (HVAC Commissioning Only) & Now (Total Building Commissioning - ASHRAE 189.1)~~
  
- ~~Roles & Responsibilities of the Commissioning Team~~
  
- **Outline (USACE) approach to Total Building Commissioning**



\*For D-B contracts the CxC will also assume the responsibility for the design related commissioning tasks and duties associated with the design phase of the project.

- USACE is designated as the Commissioning Authority (CxA) and provides **oversight assurance** of the entire commissioning process
- CxG is the Commissioning Specialist for the Government and is either a qualified designated in-house Commissioning Professional or designated hired Commissioning Professional for the purposes of providing **oversight assurance** for the entire commissioning process.
- The **CxC is required for all projects.** *“Building Strong”*



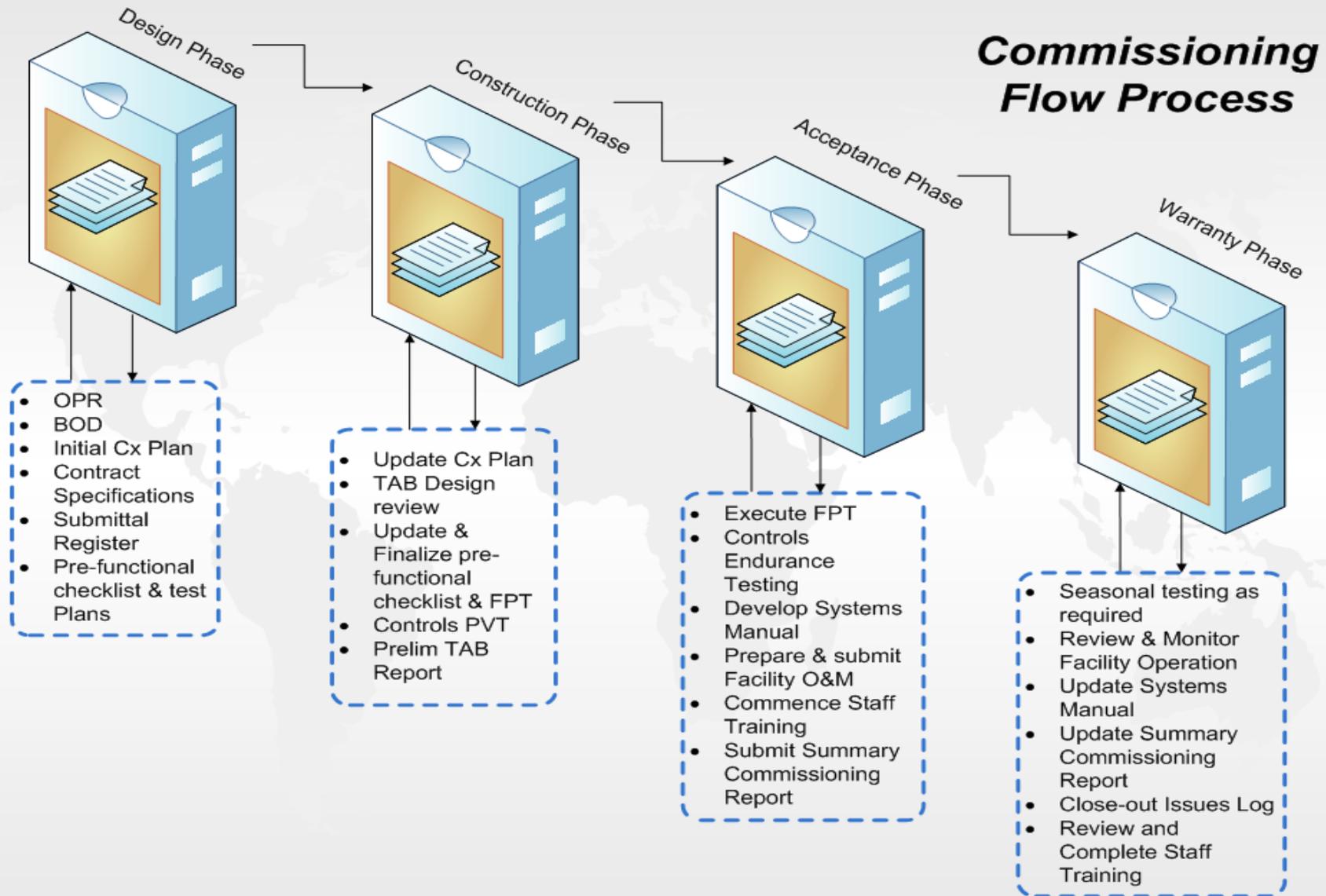
# USACE Commissioning



We USACE do not want to be driven by LEED. Ea3 is not mandated.

- If what we do on a specific project cannot achieve the requisite points for LEED - then it should have been planned out well in advance where the requisite points for Silver will be achieved if not from Ea3.
- Our mission in executing commissioning should be:
  - we are commissioning the facility.
  - we are commissioning the project consistent with USACE directives and regulations.
  - we turn over a facility that is satisfactory to the owner/user with supporting documentation that we have produced and delivered a fully functioning facility consistent with the owners expectations and consistent with the design and contract requirements.
- If in the process in executing commissioning for the project, the project attains requisite points for LEED silver in this regard, then that is a plus.
- To reiterate, **when it comes to total building commissioning lets us not be driven by LEED.**

# Commissioning Process





# TBCx Criteria & Process Synchronization



- 1. USACE is CxA, designate CxG (in-house or hired contractor)
- 2. Document Owner's Project Requirements (OPR)  
Responsibility: Owner or CxA
  - USACE Policy
    - ✓ Planning Charette Report
    - ✓ Design Charette Report
    - ✓ Commissioning Procedures (ER 1110-345-723)
- 3. Develop Basis of Design (BoD)  
Responsibility: Design Team
  - USACE Policy
    - ✓ Design Analysis (ER 1110-345-700)
    - ✓ Commissioning Procedures (ER 1110-345-723)
- 4. CxA reviews OPR and BoD  
Responsibility: CxA
  - USACE Policy
    - ✓ BCOES : Bidability, Constructability, Operability, Environmental and Sustainability Review (ER 415-1-11)
    - ✓ Independent Technical Review (ER 1110-1-12, Chapter 4)



# TBCx Criteria & Process Synchronization (cont)



- 5. Document and implement Cx Plan  
Responsibility: Project Team or CxA
  - USACE Policy
    - ✓ Commissioning Procedures (ER 1110-345-723)
    - ✓ UFC 1-200-1 Sustainability (reference to ASHRAE 189.1)
    - ✓ DBB: UFGS 23 09 23: Commissioning
    - ✓ DB: ASHRAE Guideline 0
  
- 6. Incorporate commissioning requirements into construction documents  
Responsibility: Project Team or CxA
  - USACE Policy
    - ✓ UFGS 23 08 00: HVAC Commissioning
    - ✓ Commissioning Procedures (ER 1110-345-723)
    - ✓ UFC 1-200-1 Sustainability (reference to ASHRAE 189.1)
  
- 7. Conduct commissioning design review prior to mid-construction CD's  
Responsibility: CxA
  - USACE Policy
    - ✓ BCOES : Bidability, Constructability, Operability, Environmental and Sustainability Review (ER 415-1-11)



# TBCx Criteria & Process Synchronization (cont)



- 8. Reviews contractor submittals applicable to systems being commissioned  
Responsibility: CxA
  - USACE Policy
    - ✓ Submittals Procedures ER 415-1-10
    - ✓ DBB: HVAC submittals require Government Approval (ER 1110-1-12)  
Equipment, Controls, and Cx Plan
    - ✓ DB: Quality Assurance Review of 10% of all for information only  
submittals (ER 415-01-10)
  
- 9. Verify installation and performance of commissioned systems  
Responsibility: CxA
  - USACE Policy
    - ✓ USACE Quality Assurance Personnel will witness testing and/or  
review the results. (ER 1180-1-6).
    - ✓ Commissioning Procedures (ER 1110-345-723)
  
- 10. Develop systems manual for commissioned systems  
Responsibility: Project Team or CxA
  - USACE Policy
    - ✓ Systems Operation & Maintenance Documentation (ER 25-345-1)
    - ✓ Systems manual in ASHRAE Guideline 0 & 1.



# TBCx Criteria & Process Synchronization (cont)



- 11. Verify that requirements for training are complete  
Responsibility: Project Team or CxA
  - USACE Policy
    - ✓ Commissioning Procedures (ER 1110-345-723)
    - ✓ DBB: Training in various UFGS
    - ✓ DB: Each system requires training.
  
- 12. Reviews building operation within 10 month after substantial completion  
Responsibility: CxA
  - USACE Policy
    - ✓ Warranty Inspections of 4 & 9 months after government acceptance. Transfer and Warranty (ER 414-345-38)
    - ✓ Conducted by Contractor, USACE, & Customer Representative
  
- 13. Completes a systems commissioning summary report  
Responsibility: CxA
  - USACE Policy
    - ✓ Commissioning Report by CxC
    - ✓ USACE approval of Cx Summary Report
    - ✓ Building will not be accepted until Cx is complete

## Sample Commissioning Plan and OPR

[documents to be opened on screen listed below ]

### ➤ OPR

- ASHRAE Guideline 0 Annex J- matrix to develop OPR
- Sample OPR

### ➤ COMMISSIONING PLAN SECTIONS

- Generic Commissioning Plan (D\_B\_B)
- Battalion HQ CP- good check list
- Barracks commissioning Plan- Good plan and roles and responsibilities



# Construction Quality



***Commissioning is a quality assurance process.***

Contract documents spell out roles, responsibilities, processes and deliverables to ensure quality.

- Based on ER 1180-1-6, Construction Quality Management
  - Contractor Quality Control (QC)
  - Government Quality Assurance (QA)
- UFGS 01 45 00.10 10, Quality Control System
  - Management and administrative requirements
- UFGS 01 45 00.00 10, Quality Control
  - Contents of QC Plan
  - Processes, documentation, deliverables

- NTP
- Preconstruction Conference
- Schedule review (coordinated with Customer)
- Submittals & Review
- Three Phase QA/QC
  - Preparatory Inspection
  - Initial Inspection
  - Follow Up Inspection
- Attend Progress Meetings

➤ QC/QA process here is complementary to the commissioning process in the construction phase of a project



# Construction Phase Commissioning Deliverables



- CxC Commissioning Qualification for approval
- TAB firm Qualifications
- Commissioning Plan
- Pre-Commissioning checklists
- Functional Performance Test (FPT) results
- TAB report
- Controls Performance Verification Tests (PVT)
- Commissioning report
- O&M manual
- Systems manual
- Training verification



# Project Closeout



- Collect trend logging data per Commissioning Plan
- Complete alternate seasonal testing
- Verify all owner training requirements for Operation personnel and building occupants are completed.
- Schedule the post occupancy commissioning visit with the warranty visit (4 & 9 month post BOD)
- Update Commissioning report including problems or concerns identified during inspection



# TBCx Criteria & Process Synchronization



## *Alignment to ASA policy on Sustainability*

- Tri-Service commissioning specification effort at 90% completion stage
  - ✓ New Div 01 General Commissioning Requirements
  - ✓ New Div 22 Plumbing Commissioning
  - ✓ Update Div 23 HVAC Commissioning
  - ✓ New Div 26 Electrical Commissioning
  
- RFP Wizard for D-B projects updated
  
- Update to current USACE ER 1110- 345-723 Commissioning Procedures in progress
  
- Update to current USACE ER 1110- 25-341-1 Commissioning System Manual in progress
  
- Improve commissioning competencies within USACE ranks
  
- Develop a Continuous Commissioning Process



# Training Opportunities



➤ Association of Energy Engineers (\$1350) This program will examine all aspects of building commissioning, including, roles and responsibilities of the project team, new building commissioning, retro and recommissioning of existing buildings, system by system commissioning requirements, **TAB and verification procedures**, the LEED rating system, building code issues, and commissioning tools and technologies. **Recommended for Construction QA personnel**

[http://www.aeepgrams.com/store/detail.cfm?id=807&category\\_id=4](http://www.aeepgrams.com/store/detail.cfm?id=807&category_id=4)

➤ The PECEI has recently developed with the Building Commissioning Authority (BCA). It is a 24 course on-line curriculum (24-48 hrs) that can be taken over the period of a year as a prerequisite to a 5 day long hands-on laboratory (\$2800 or \$2400 without the laboratory). The courses can also be taken individually for about \$70 up to \$265 each.

**Recommended for personnel wishing to act as the Commissioning Authority.** <http://learn.peci.org/register.php>

➤ ASHRAE instructor led course (6hrs) on the Commissioning Process

<https://www.ashrae.org/education--certification/instructor-led-courses/the-commissioningprocess-in-new-and-existing-buildings>

**Recommended for all personnel; but specifically Project Managers and Design Managers**



# USACE Prospect Course 327 HVAC Commissioning



USACE Prospect Course 327 HVAC Commissioning (\$2,200)

This is a **5 day course that includes 2 days of hands-on laboratory. The course provides** practical technical information to fulfill construction quality verification duties for commissioning of mechanical systems.

The course identifies procedures for startup, sequence of operation and testing that pertain to mechanical equipment and repetitive deficiencies in system performance.

Through lecture, visual aids, conferences, and testing, this course presents the following mechanical HVAC subjects: commissioning of mechanical systems, cooling systems, heating systems, air side systems, and control systems.

<http://ulc.usace.army.mil/downloads/PurpleBook2014.pdf>  
(Recommended for the 0800 government series employees)



**Resources: Whole Building Design Guide, PECl, Veteran Affairs, GSA and NEBB has prepared detailed guidance on commissioning as shown in the links below:**

**a. Guidance documents:**

i. WBDG- General Guidance

[http://www.wbdg.org/project/plan\\_comm\\_process.php](http://www.wbdg.org/project/plan_comm_process.php)

ii. PECl's Functional Testing Guide <http://www.peci.org/ftguide/>

iii. VA May 2013 150 page manual

[http://www.wbdg.org/ccb/VA/VACOMM/va\\_cxmanual.pdf](http://www.wbdg.org/ccb/VA/VACOMM/va_cxmanual.pdf)

iv. NEBB 2009 manual 155 page procedural standards for whole building commission

[http://www.nebb.org/assets/1/7/PST\\_BSC\\_2009.pdf](http://www.nebb.org/assets/1/7/PST_BSC_2009.pdf)

v. 2005 GSA 83 page commissioning guide

<http://www.wbdg.org/ccb/GSAMAN/buildingcommissioningguide.pdf>

**b. Certification programs are available from a wide variety of organizations.**

**The link** provides a table that describes the requirements for certification.

[http://www.cacx.org/resources/provider\\_cert.html](http://www.cacx.org/resources/provider_cert.html)

**c. Commissioning Tools - sample plans**

<http://www.cacx.org/resources/cxtools/index.html>



- **USACE Center of Expertise in Sustainability (CXS) for Commissioning provides a web page** for reference and future criteria updates such as those planned for the ER

<http://www.usace.army.mil/Missions/Sustainability/CentersofExpertiseinSustainability/Commissioning.aspx>

Working on a Public web page that should be available soon

<http://www.usace.army.mil/Missions/Sustainability/CentersofExpertiseinSustainability/Commissioning.aspx>

Address for specific questions and requests for help      [commissioning@usace.army.mil](mailto:commissioning@usace.army.mil)

# Questions

