AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		41

2. AMENDMENT/MODIFICAITON NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicble)
AMENDMENT NO. 0002	08/23/17		17-0023

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than Item 6)	CODE
ROICC Camp Lejeune 1005 Michael Road Camp Lejeune, NC 28547-2521	ROICCF1	See Item 6	

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)	(X)	9A. AMENDMENT OF SOLICIATION NO.
	x	N40085-17-R-3114
		9B. DATED (SEE ITEM 11) 08/08/17
		10A. MODIFICATION OF CONTRACT/ORDER NO.
		10B. DATED (SEE ITEM 11)
CODE / FACILITY CODE		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[x] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers [ ] is extended, [x] is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a)By completing items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPIRATION DATA (If required)

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor [x] is not, [ ] is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

Project 17-0023 Interior and Exterior Repairs, BEQ HP513

This amendment should be acknowledged when your proposal is submitted. Failure to acknowledge the amendment may constitute grounds for rejection of a proposal.

~CONTINUED~

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA (Signature of Contracting Officer)	16C. DATE SIGNED

1. Sheet AD-103 Stored Furniture Requirement Notes: Delete the second Note #6 Furniture - Base Bid and Delete the second Note #7 Furniture - Deduct Line Item. Contractor shall provide furniture storage as outlined in the Stored Furniture Requirement Notes on Sheet AD-103 and include this furniture storage in Priced Line Item 0002. Prior to completion of the renovation the contractor shall place the stored furniture items back into the sleeping rooms (two sets per room) or as directed by the ROICC.

2. The attached commissioning plan is hereby incorporated into Solicitation N4008517R3114. Only the commissioning requirements for HP513 are applicable to this solicitation. The commissioning authority will be retained by the Government. The contractor's price shall include costs associated with vendor and subcontractor support for the commissioning process. The Contractor shall assume a 10 day duration for the Testing Phase once TAB is complete.

3. On Sheet A-607 delete requirement for one sleeping room door sign that incorporates Room Number, USMC logo and 8.5" x 11" sheet of paper. Replace with the following: provide two separate sleeping room door signs. One door sign shall have the Room Number and the USMC Eagle, Globe and Anchor logo and the other sign shall be an acrylic sign holder sized to hold an 8.5" x 11" sheet of paper. See attached Revised Sign Type 'F'.

4. On Sheet CS101 delete the new striping to designate "THRU TRAFFIC ONLY – NO PARKING AREA."

5. Question: Plan sheet A201 detail 2 A-101 - South Elevation has a note regarding the installation of an OSHA compliant fall protection system. No further details are included and there is no mention of this system in the specifications. Can you please provide further detail including the type and quantity of anchorages to be installed?

   Answer: Provide a cable lifeline system structural fall restraint and fall arrest system capable of withstanding loads and stresses within limits and under conditions specified in OSHA and other applicable safety codes. Provide fall protection anchors permanently attached to roof structure. Provide cable lifeline system to allow continuous travel past intermediate anchors.

   Design Requirements: Anchors and accessories comprising system of following types:

   a. Roof anchors, spaced as indicated by manufacturer, for safety snap connection by individual workers capable of withstanding a safety factor of 2 meeting the requirements of OSHA 1926.502(d)(8).
   b. Continuous stainless steel cable lifeline restrained by swaged terminations at anchor points, suitable for multiple safety snap connections along cable between anchors.
   c. Tensioning system.

d. Pass-thru technology allowing cable shuttle to run freely past intermediate anchors without the need to disconnect from the fall protection system.

Shop Drawings: Show layout, profiles, and anchorage details. Shop drawings and calculations to be stamped by a Professional Engineer.

The general contractor shall ensure that the fall protection manufacturer and the truss manufacturer coordinate connection locations, details, and loads to be resisted by the trusses, etc.

Acceptable manufacturers who provide OSHA compliant fall protection systems include but are not limited to:

Guardian Fall Protection
Peak Fall Protection, Inc.
Diversified Fall Protection
Flexible Lifeline Systems
Honeywell Miller

6. Question: Note 1 under the Core Air Handling Unit schedule on M-601 specifies direct drive plenum fans with variable speed fans. Due to the low CFM and space requirements, will ECM motors that modulate with a 0-10VDC signal be acceptable?

   Answer: Provide direct drive plenum fans with variable speed fans as indicated on drawings.

7. Question: The 399 MBH boilers are scheduled as fire-tube style with at least an 8:1 turndown. However, almost all available boilers at that size are water-tube and offer a 5:1 turndown. Also, almost all of the boilers installed at the base over the past few years during steam decentralization are also water-tube with a 5:1 turndown. Will it be acceptable to keep the boiler types (and parts) consistent as well as for availability?

   Answer: Provide fire-tube type boilers as indicated on drawings.

8. Question: Section 23 73 33, paragraph 2.3.6 "Access Doors" tell us to "provide for access to volume dampers, fire dampers, plenum chambers, and where indicated." Will duct mounted access doors be required for volume dampers?

   Answer: No duct mounted access doors are required for manual volume dampers and control dampers.

9. Question: Drawings A-402, details 2 & 3, 2nd & 3rd Floor Core Reflected Ceiling Plans, have 5 each per floor square symbols in the sheetrock ceilings. These scale out to be 12" x 12". They appear to be access panels to serve the volume dampers for the ductwork above but do not match the access panel symbol in the Reflective Ceiling Plan

Legend. Specification section 05 50 13, paragraph 2.3 says to "provide access doors with a minimum of 14 by 20 inches...". Are these access panels and if so, what size access panels will have to be provided?

Answer: Provide six (6) 14"x20"access panels in the 2nd Floor Lounge and provide seven (7) 14"x20"access panels in the 3rd Floor Lounge.

10. Question: There is a mixing valve shown on the Mechanical Building New Work Domestic Plan on detail 3, drawing P-104. It is also shown on detail 1 on drawing P-502 and labeled MV-1. There is no schedule for this mixing valve. Please provide sizing schedule so that our suppliers can provide pricing.

    Answer: Mixing valve shall be sized per Specification Section 22 00 00.

11. Question: Section 23 73 33, paragraph 2.4.4 calls for heating hot water to have prefabricated fittings. Historically on Camp Lejeune projects, we have provided field supplied fittings that are field insulated with Factory supplied fitting insulation kits. Will prefabricated fittings be required?

    Answer: Prefabricated direct buried piping can have field applied fitting insulation.

12. Question: Does specification section 23 73 33, paragraph 2.4.4 also apply to the direct buried chilled water piping as well?

    Answer: Specification Section 23 73 33, paragraph 2.4.4 applies to both heating and chilled water piping.

13. Question: There are no specifications for the underground domestic heating hot water, underground domestic heating hot water return, and underground domestic cold water to be pre-insulated? Will these services be pre-insulated? If so, what types of materials are we to use?

    Answer: Yes, provide and install factory installed pre-insulated piping for domestic hot water and domestic hot water return piping. Underground pre-insulated piping for heating hot water and chilled water, size 4" and under to be type L copper.

    For buried domestic hot water supply and return piping provide expansion loops and expansion bends (Z- and L- type) factory fabricated of casing, insulation, and carrier piping identical to that furnished for straight runs. Properly design expansion loops and bends in accordance with the allowable stress limits indicated in ASME B31.1 for the type of pipe used, and size to accommodate pipe movement. Ship expansion loops and bends to the jobsite in the maximum size sections feasible to minimize the number of field joints. Make field joints in straight runs of the expansion loops and bends, keeping the number to a minimum. For steel pipe, cold springing is not allowed when sizing the

expansion loops and bends. Cold spring piping one-half the calculated maximum operational expansion during field assembly is allowed. Stresses shall be less than the maximum allowable stress from the ASME B31.1. Submit pipe-stress and system-expansion calculations for each expansion compensation elbow using a finite element computer generated 3-dimensional analysis, not later than 14 days after notice to proceed. Demonstrate with calculations that pipe stresses from temperature changes are within the allowable requirements in ASME B31.1 and that the anchors and the guides will withstand the resultant forces. Detailed design layout drawings shall include all analysis node points. As a minimum, computer analysis results shall include node stresses, forces, moments and displacements. Calculations shall be stamped by a registered Professional Engineer in the employ of the UHDS manufacturer. Detailed design layout drawings and stress and anchor force calculations shall be provided for all loops and bends. Locations of all anchors, guides and supports shall be shown. The calculations shall be based on design characteristics (pressures and temperatures) specified for both the supply and return lines.

Provide buried preinsulated water piping in conduit complete and ready for operation. Install in accordance with fabricator's published literature. Provide copper tubing for carrier piping. Minimum depth of cover shall be 2 feet.

a. Factory-applied insulation: Provide polyurethane or polyisocyanate insulation, rated for not less than 250 degrees F service, completely filling the space between carrier pipe and conduit.
b. Factory-applied conduit: Provide each section of carrier pipe with insulation and conduit complete with waterproof conduit caps at both ends. Mark each section of conduit with fabricator's name, product identification, and publications to which the items conform. Provide same type of insulation and conduit material over field-insulated joints and fittings; provide waterproof shrink sleeves over field-insulated joints to overlap not less than 6 inches of each conduit section.
c. Bedding: Accurately grade trench bedding with minimum of 6 inches of sand. Backfill sand to minimum of 6 inches above and below conduit. Lay bedding to firmly support conduit along entire length.
d. Buried utility warning tape: Provide detectable tape for warning of buried piping.

14. Question: The detail on sheet A501 shows thin set wall application but the specifications notes mud set, which are we to apply?

    Answer: Utilize TCNA Handbook, Method W223 thin set wall tile installation.

15. Question: Specification 28 31 76, 3.6.2.1 states to provide 1 day of onsite training and 5 days if technical (FA/MNS) training at the manufacturing facility for 3 Government personnel. Will 5 days of technical (FA/MNS) training at the manufacturing facility be required for this project?

Answer: Specification Section 28 31 76, Paragraph 3.6 INSTRUCTION OF GOVERNMENT EMPLOYEES – Replace with the following: Equipment manufacturer or experienced training representative shall provide 2 days on-site and 5 days of technical training at MCB Camp Lejeune to the government.

Specification Section 28 31 76, Paragraph 3.6.2.1 Technical Training – Revise the first sentence to read: Equipment manufacturer or a factory representative shall provide 2 days of on site and 5 days of technical training to the Government at Camp Lejeune for three government personnel.

16. Question: Drawing FA101 indicated speaker/strobe devices in each sleeping unit but this is not a requirement on the UFC or NFPA. Can we install a speaker only device in place of the speaker/strobe devices in the sleeping rooms?

    Answer: No. Provide as indicated on Sheet FA101.

17. Question: Are sounder bases required for the smoke detectors in the sleeping units. There is no mention of sounder bases in the bid documents.

    Answer: All notification in sleeping units is provided by the speaker/strobes in each unit. Sounder bases are not required.

18. Question: Spec section 07 31 13 - Asphalt Shingles paragraph 2.1.1 states that the architectural shingles must weigh not less than 250 pounds per 100 square feet. Can a shingle of a lesser weight be used if the product meets the remaining requirements including warranty?

    Answer: Yes, a shingle of a lesser weight can be used if the product meets the remaining requirements including warranty.

19. Specification Section 08 33 23 Paragraph 2.2.1.4 calls for vision panels, but none appear to be shown on the drawings. Are vision panels required on this project, and if so, what is extent of glazing?

    Answer: Vision panels are not required.

20. Question: Specification Section 08 33 23 Paragraph 2.2.1.7 calls for slide bolt locks and then goes on to call for cylinder locks. Which is required?

    Answer: Provide slide bolt for locking by government-provided padlock.

21. Replace Specification Section 08 71 00 Revise Paragraph 2.3.2.2 Card Key System with the following:

The lock system shall be compatible with VingCard Signature RFID electronic lock system with SFIC key override, and a deadbolt. Provide alkaline battery powered, Signature RFID keycard locksets that are ANSI/BHMA A156.13, Series 1000, Grade 1, mortise locks, tamper resistant, UL listed with 1" throw deadbolt and 3/4" throw latch bolt, auxiliary deadlocking latch. The latch bolt and the deadbolt shall be operated simultaneously by rotating the inside lever.

Provide an SFIC key over-ride cylinder to allow opening of the lock with a hard key in case of electronics failure. Use of a newly issued card key automatically re-keys the lock and voids the previous card key. The lock shall re-lock immediately after the outside lever is rotated and the latch retracted. Locks shall have an interrogatable memory that is capable of recording a minimum of 600 events, identification of the key card used to pass the lock, and the date and time of each entry. Interrogation information can be extracted at the lock by a dedicated Service Terminal and Contact Card unit that can be downloaded to the Front Desk Computer for review. Other components that are required for this system, in addition to the front desk PC are an RFID Encoder to program each key card.

System shall be capable of accepting a minimum of 12 key card access levels, security auditing and computer interfacing with the existing installation management system.

Provide the following:

a. One Front Desk System (Computer/Monitor/Ving Vision Software/RFID Encoder). The computer shall be loaded with the operating system and shall be incorporated with the minimum hardware/performance requirements necessary to run the card reader software and the RFID encoder hardware.
b. Four Spare RFID locksets.
c. Two Service Terminals and Two RFID Contact Cards.
d. 1500 1K RFID Cards (Resident Cards) Included and 100 4K Cards (Staff Cards).
e. 3-Day Training and System Setup. (Train Staff, Build Room Data Base, Setup Computer and Encoder). Ensure training is coordinated with the pertinent base maintenance (EMI) personnel at (910)934-0429 prior to scheduling the training. Training location, time and other persons involved shall be coordinated with the government.
f. One year warranty and One year 24 phone support agreement.

22. Sheet P-502, DHW Mixing Valve Detail 1: Add a ball type valve to vent/relieve water between the expansion tank and the expansion tank service valve. Pipe to a floor drain with an air gap.

23. Sheet M-503, Typical Expansion Tank/Dirt and Air Separator Detail 3: Add ball type service valve to expansion tank. Add a ball type valve to vent/relieve water between the expansion tank and the expansion tank service valve. Pipe to a floor drain.

24. Sheet MI101, Sleeping Room Air Handling Unit Sequence of Operation/Override modes/Dehumidification Mode – Delete the word “supply” and replace with “return” throughout the paragraph.

25. Sheet MI105, ERV Controls Diagram 1: Add air flow measuring station downstream of the exhaust fan.

26. Sheet E-403, Enlarged Electrical New Work Plan 1: Add note to extend circuit M1-9 to room 133 to power DDC controls for AHU-1C.

27. Sheet E-403, Enlarged Electrical New Work Plan 3: Add note to extend circuit M2-9 to room 233 to power DDC controls for AHU-2C.

28. Sheet E-403, Enlarged Electrical New Work Plan 5: Add note to extend circuit M3-9 to room 333 to power DDC controls for AHU-3C.

29. See attached revised floor drain design for the new mechanical building. The mechanical building plumbing vent system was redesigned as a combination waste vent system covered by the IPC 2015 section 915. This is a combined waste vent design, and the contractor shall not exceed the slope requirements for the combined waste vent pipe as specified in section 915.

30. Sheet E-401: Connect type F2 fixture located outside of central stairs 132, 232, 332 and type F2 fixture located on landing of central stairs 232, 332 (total of 5 fixtures) to circuit C-31. Connect circuit through ceiling mounted occupancy sensors located outside of central stairs 132, 232, and 332 (total of 3 sensors).

31. Sheet E-601: Provide 20amp-1pole circuit breaker in panel ‘C’, space 31, to feed central stair lighting circuit.

32. Sheet E-403, Enlarged Electrical New Work Plan 1: Add note to extend circuit M1-9 to room 131 to power DDC controls for AHU-1C.

33. Sheet E-403, Enlarged Electrical New Work Plan 3: Add note to extend circuit M2-9 to room 231 to power DDC controls for AHU-2C.

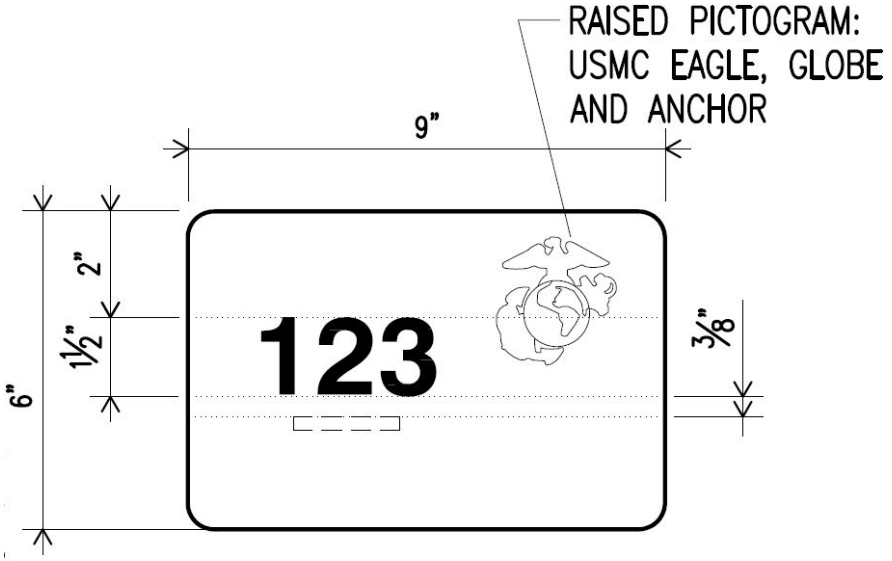
34. Sheet E-403, Enlarged Electrical New Work Plan 5: Add note to extend circuit M3-9 to room 331 to power DDC controls for AHU-3C.

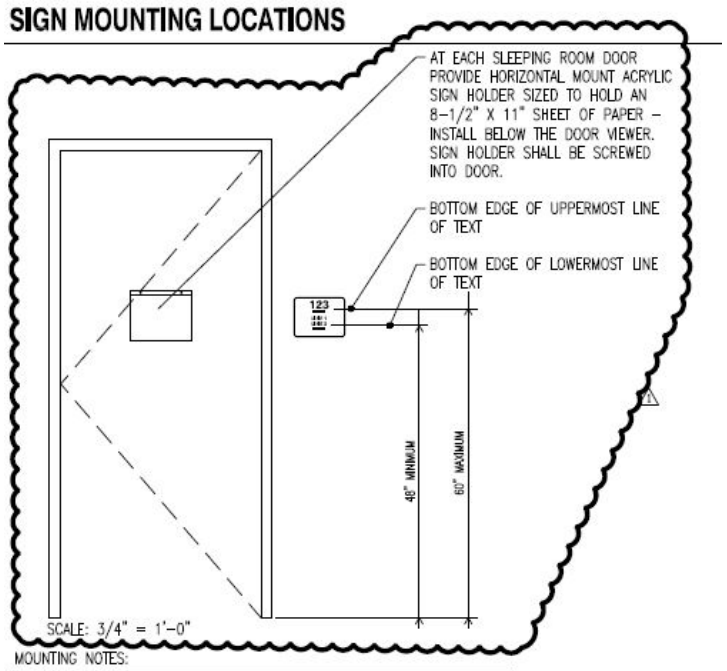
35. Sheet E-604, detail 2: Remove #1/0G from feeder from service transformer to panel ‘H1’.

36. Sheet E-501: Fixture type ‘G’ shall be 16watt, 3500K, LED, 120-277volt, with LED emergency battery backup. Fixture shall be high abuse with pearlescent lens and 10 year warranty.

37. All other terms and conditions remain unchanged.

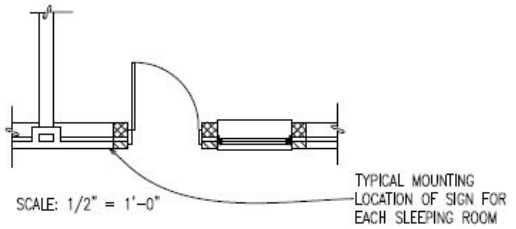
Revised Sign Type F:

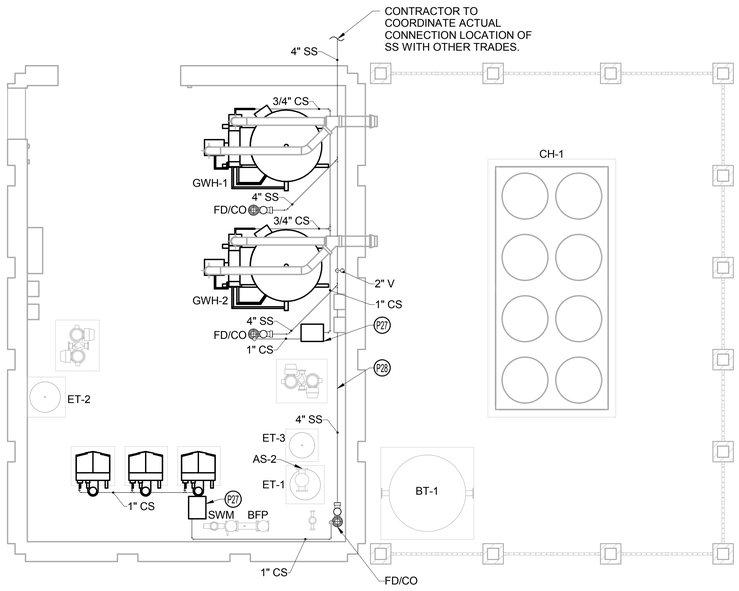




MOUNTING NOTES:

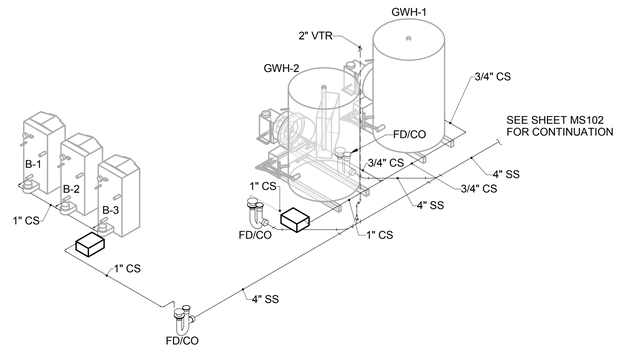
1. WHERE A TACTILE SIGN IS PROVIDED AT A DOOR, THE SIGN SHALL BE LOCATED ALONGSIDE THE DOOR AT THE LATCH SIDE.
2. WHERE A TACTILE SIGN IS PROVIDED AT DOUBLE DOORS WITH ONE ACTIVE LEAF, THE SIGN SHALL BE LOCATED TO THE RIGHT OF THE RIGHT HAND DOOR.
3. WHERE THERE IS NO WALL SPACE AT THE LATCH SIDE OF A SINGLE DOOR OR AT THE RIGHT SIDE OF DOUBLE DOORS SIGN SHALL BE LOCATED ON THE NEAREST ADJACENT WALL.
4. SIGNS CONTAINING TACTILE CHARACTERS SHALL BE LOCATED SO THAT A CLEAR FLOOR SPACE OF 18" MINIMUM BY 18" MINIMUM, CENTERED ON THE TACTILE CHARACTERS, IS PROVIDED BEYOND THE ARC OF ANY DOOR SWING BETWEEN THE CLOSED AND 45 DEGREE OPEN POSITION.





1 MECHANICAL BUILDING NEW WORK SANITARY PLAN

SCALE: 1/4" = 1'-0"



2 SANITARY PLUMBING RISER

SCALE: NOT TO SCALE

NEW WORK KEYNOTES:

NO.	DESCRIPTION
P27	PROVIDE SEPARATE CONDENSATE NEUTRALIZATION TANK FOR DHW AND HHW BOILERS. PROVIDE TANK WITH A MINIMUM HOLDING CAPACITY OF 0.5 CUBIC FEET OF LIMESTONE AND EACH TANK SHALL HAVE A REMOVABLE LID FOR INSPECTION AND MAINTENANCE WITHOUT TAKING THE TANK OUT OF SERVICE OR DISCONNECTING PIPE. PROVIDE A COMMON CPVC INLET PIPE TO EACH NEUTRALIZATION TANK FROM THE HHW BOILERS OR DHW BOILERS. ROUTE CPVC DISCHARGE PIPE TO FLOOR DRAIN SUCH THAT CONDENSATE DOES NOT DRAIN ON CONCRETE FLOOR.
P28	DO NOT EXCEED 1/2" FALL PER 12" OF HORIZONTAL DISTANCE FOR COMBINATION WASTE AND VENT PIPE. SEE IPC 2015 SECTION 915.

DISCLOSURE OF INFORMATION

CONTRACTOR SHALL COMPLY AS FOLLOWS:

A. THE CONTRACTOR SHALL NOT RELEASE TO ANYONE OUTSIDE THE CONTRACTOR'S ORGANIZATION ANY UNCLASSIFIED INFORMATION, REGARDLESS OF MEDIUM (E.G., FILM, TAPE, DOCUMENT), PERTAINING TO ANY PART OF THE CONTRACT OR ANY PROGRAM RELATED TO THIS CONTRACT, UNLESS-

1. THE CONTRACTING OFFICE HAS GIVEN PRIOR WRITTEN APPROVAL; OR
2. THE INFORMATION IS OTHERWISE IN THE PUBLIC DOMAIN BEFORE THE DATE OF RELEASE.

B. REQUESTS FOR APPROVAL SHALL IDENTIFY THE SPECIFIC INFORMATION TO BE RELEASED, THE MEDIUM TO BE USED, AND THE PURPOSE FOR THE RELEASE. THE CONTRACTOR SHALL SUBMIT ITS REQUEST TO THE CONTRACTING OFFICER AT LEAST 45 DAYS BEFORE PROPOSED DATE FOR RELEASE.

C. THE CONTRACTOR AGREES TO INCLUDE A SIMILAR REQUIREMENT IN EACH SUBCONTRACT UNDER THIS CONTRACT. SUBCONTRACTORS SHALL SUBMIT REQUESTS FOR AUTHORIZATION TO RELEASE THROUGH THE PRIME CONTRACTOR TO THE CONTRACTING OFFICER.

P-XXX

CEMS ENGINEERING | ARCHITECTURE
320-C Midland Parkway, Summerville, SC. 29485 843.875.3637
300 N. 3rd St., Suite 110, Wilmington, NC. 28401 910.363.1640
CEMS Project No: 15150L Project Manager: R. Alvar

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND

MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

INTERIOR & EXTERIOR REPAIRS AT BEQs
HP475, HP145, HP503 and HP513

Unnamed

DES. Designer
DR. Author
CHK. Checker
SUBMITTED BY:
DESIGN DIR.
APPROVED: PWO OR OICC DATE
SATISFACTORY TO: DATE

ISSUE DATE:24 JULY 2017

SIZE	CODE IDENT NO.	NAVFAC DRAWING NO.
E1	80091	CONSTR. CONTR. NO.:

SCALE: AS NOTED SPEC. SHEET OF 145

JACOBS

Commissioning Services

Commissioning Plan

Design Phase

Issued August 3, 2017

3rd Party Commissioning
Infrastructure Reset Projects

17-0011 Bldg FC515

17-0012 Bldg HP475

17-0015 Bldg HP145

17-0016 Bldg 523

17-0017 Bldg 901

17-0022 Bldg HP503

17-0023 Bldg HP513

17-0025 Bldg 500

17-0026 Bldg 1140

17-0034 Bldg HP175

17-0046 Bldg 527

17-0063 Bldg 1810

Marine Corps Base, Camp Lejeune

JACOBS

Table of Contents

REVIEW AND APPROVAL 3

REVISION HISTORY 3

PART 1 - OVERVIEW 4

1.1 Purpose of the Commissioning Plan 4
1.2 Project Specific Information 4
1.3 Project Description 5
1.4 Commissioning Scope 5

PART 2 - SYSTEMS AND DOCUMENTION SUMMARY 9

2.1 Commissioned Systems 9
2.2 Commissioning Documents 9

ABBREVIATIONS AND DEFINITIONS 12

2.3 Abbreviations 12
2.4 Definitions 12

PART 3 - DESIGN PHASE 14

3.1 Design Phase Overview 14
3.2 Design Phase Commissioning Activities 14
3.3 Design Phase Acceptance Requirements 15
3.4 Design Phase Documentation 15

PART 4 - CONSTRUCTION PHASE 16

4.1 Construction Phase Overview 16
4.2 Construction Phase Commissioning Activities 16
4.3 Construction Phase Acceptance Requirements 20
4.4 Construction Phase Documentation 20

PART 5 - TESTING, TRAINING, ACCEPTANCE PHASE 21

5.1 Testing/Training/Acceptance Phase Overview 21
5.2 Testing/Training/Acceptance Phase Commissioning Activities 21
5.3 Testing/Training Phase Acceptance Requirements 22
5.4 Testing/Training/Acceptance Phase Documentation 22

PART 6 - OCCUPANCY PHASE 23

6.1 Occupancy Phase Overview 23
6.2 Occupancy Phase Commissioning Activities 23
6.3 Occupancy Phase Acceptance Requirements 23
6.4 Occupancy Phase Documentation 24

PART 7 - COMMISSIONING TEAM 25

7.1 Team Structure 25
7.2 Roles and Responsibilities 26

END OF TABLE OF CONTENTS

NOTE: APPENDICES TO BE ADDED AS PROJECTS ARE AWARDED.

REVIEW AND APPROVAL

The Commissioning Plan was developed specifically for this project using approved engineering specifications and drawings as the basis for verification that the owner's project requirements are met.

Function	Organization	Name	Signature	Date
Written By				
Cx Manager	Jacobs	Paul Nelson		
Approved By				
Project Executive	Jacobs	Mike Pampalone		
Project Manager	Jacobs	Paul Nelson		
Project Manager	MCB Camp Lejeune PWD	Sofia Schwartz		

REVISION HISTORY

The Commissioning Plan is considered a "living" document that may be updated throughout the project duration by the Cx Authority as applicable. When updates are completed, copies of the revised Plan will be submitted to the Commissioning Team Members.

Plan updates along with revision dates are documented below:

Rev #	Date	Description
0	7/28/17	Issued for Design Phase – MCB Camp Lejeune Reveiw
1	8/7/17	Issued for Design Phase – Bid Document Reference

PART 1 - OVERVIEW

1.1 Purpose of the Commissioning Plan

The purpose of the Commissioning Plan is to provide guidance for the commissioning process, particularly with respect to participation, reporting, approvals, coordination and communication by the commissioning team, owner, contractors and subcontractors.

The Owner has committed to implement the Commissioning Process for the following Camp Lejeune Infrastructure Reset projects identified in this plan. The Commissioning Plan is a source of information on the key steps that must be completed throughout the design, construction, acceptance, and operation of the new facility to assure the Owner's Project Requirements are met. This Commissioning Plan has been specifically developed for these projects to aid the building design, construction, and operation teams in ensuring the quality of the project.

It is important to understand that the Commissioning Plan provides a framework for the commissioning process. It may be modified and adapted to meet unforeseen quality control issues and opportunities throughout the project.

The Commissioning Plan is to be used as a Guide by all Project Team Members throughout the duration of this Project. This plan is not intended to impose additional contract requirements on Contractors (including the Cx Authority) beyond what is required in their respective Contract Documents. Therefore, when a conflict arises between what is required in this Cx Plan and what is required in the Contract Documents, the Contract Documents take precedence.

The Commissioning process shall augment and be coordinated with the contractors and owners quality control programs to provide an enhanced level of quality assurance.

The Commissioning Process includes all the parties directly involved in the design, construction and initial occupancy phases of the project during the warranty period, as well as owner's representatives and the Commissioning Authority. Commissioning takes place continuously during the project from programming through the first year of operation and touches all parties involved in design, construction, start-up, testing, operation and maintenance.

1.2 Project Specific Information

Project specific information related to commissioning, such as building specific equipment and systems pre-functional checklists, functional performance tests, project team member lists, etc… will be added to this plan as Appendices based on the project scheduling.

1.3 Project Description

The Infrastructure Reset projects consist of architectural and interior renovation coupled with HVAC replacements of various buildings at MCB Camp Lejeune, NC. The following buildings are included in the commissioning plan:

Building	CLJ Project No.	GSF	Building Use	No. Floors	Year Built
FC515	17-0011	45,501	BEQ E1/E4	3	1979
HP475	17-0012	48,435	BEQ E1/E4	3	1990
HP145	17-0015	45,695	BEQ E1/E4	3	1980
523	17-0016	27,532	BN HDQ (Admin)	2	1943
901	17-0017	26,722	WAREHOUSE	2	1948
HP503	17-0022	48,930	BEQ E1/E4	3	1989
HP513	17-0023	57,693	BEQ E1/E4	3	1991
500	17-0025	12,240	Indoor Fitness Center GYMNASIUM	2	1943
1140	17-0026	44,803	BEQ/Admin	3	1977
HP175	17-0034	46,197	BEQ E1/E4	3	1980
527	17-0046	27,547	BN HDQ (Admin)	2	1943
LCH4007	17-0056	31,640	CHILD DEVELOPMENT CENTER	1	2012
1810	17-0063	12,039	WAREHOUSE	1	1952

1.4 Commissioning Scope

The scope of 3rd party commissioning for these projects primarily consists of:

- HVAC systems, equipment and controls
- Domestic Hot Water plants and circulation

Other building systems special to specific projects are identified in Part 2 of this plan

The Commissioning scope includes the following:

1.4.1 Design Phase

1.4.1.1. Commissioning review of the pre-final design drawings and specifications.

1.4.1.2. Development of the commissioning specification and coordination of commissioning requirements with relevant sections of Division 01, 22 and 23.

1.4.1.3. Review the basis of design (BOD), prepared by the A/E, and provide comments and recommendations to ensure that the BOD reflects the energy goals as well as the Government's requirements.

1.4.1.4. Development and issuance of a commissioning plan for the Infrastructure Reset projects addressed by this plan.

1.4.1.5. Responding to bidders requests for information/clarification related to commissioning scope of work through the COR.

1.4.2 Construction Phase

1.4.2.1. Hold a scoping meeting and identify commissioning team members and define responsibilities.

1.4.2.2. Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules

1.4.2.3. Coordinate the commissioning work and, with the general contractor (GC) and construction manager (CM), ensure that commissioning activities are being scheduled into the master schedule.

1.4.2.4. Request and review additional information required to perform commissioning tasks, submittals, O&M materials, contractor start-up and checkout procedures.

1.4.2.5. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.

1.4.2.6. Review Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.

1.4.2.7. Write and distribute pre-functional construction checklists and functional performance test procedures

1.4.2.8. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.

1.4.2.9. Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Document this testing and notify owner's project manager of any deficiencies in results or procedures.

1.4.2.10. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and notify owner's project manager of any deficiencies in results or procedures.

1.4.2.11. Approve prefunctional construction checklist completion

1.4.2.12. Review systems startup reports.

1.4.2.13. Review testing, adjusting and balancing (TAB) execution plan.

1.4.2.14. Verify air and water systems balancing by spot testing and by reviewing completed reports and by selected site observation.

1.4.3 Testing, Training and Acceptance Phase

1.4.3.1. Analyze any functional performance trend logs and monitoring data to verify performance. This may include use of Data Loggers deployed by the Commissioning Authority to monitor space temperatures and humidity levels.

1.4.3.2. Witness testing on a portion of the systems for validation of the designed balance of air, water, and power. Review and validate the HVAC system testing and balancing activities (TAB) as performed by the construction contractor. Verify building control systems have adequate points, sequences, and features to provide energy reduction operations and provide comfort/control through the use of Building Automation System (BAS) trend logging, spot measurements, and/or functional performance tests.

1.4.3.3. Continually maintain master deficiency and resolution log and develop a separate testing record. Provide to the Owner and CM written progress reports and test results with recommended actions.

1.4.3.4. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.

1.4.3.5. Review the training of the Owner's operating personnel provided by the GC and witness sufficient training to ensure compliance with contract requirements.

1.4.3.6. Review O&M information submitted by the GC, including eOMSI data.

1.4.3.7. Develop a Final Commissioning Report that includes:

1.4.3.8. Development of a Systems manual for the commissioning systems.

1.4.4 Occupancy Phase

1.4.4.1. Review and close out commissioning issues which were not resolved prior to BOD.

1.4.4.2. Perform seasonal or deferred testing with the assistance of the contractors.

1.4.4.3. Assist in scheduling second season TAB verification and review the results.

1.4.4.4. Perform a Warranty Review with the users, owner and facilities management to assure all warranty issues are resolved prior to the end of the contractor warranty period.

1.4.4.5. Review equipment and systems operational trend data to assure proper continued operation.

1.4.4.6. Amend the final Commissioning Report with a Occupancy Phase report.

PART 2 - SYSTEMS AND DOCUMENTION SUMMARY

2.1 Commissioned Systems

2.1.1 The following table identifies the general equipment and systems to be commissioned for each project. Reference Appendix A for detailed project information.

2.1.2 Table 2.1 - Systems to be Commissioned

PROJECT	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg	Bldg
	FC515	HP475	HP145	523	901	HP503	HP513	500	1140	HP175	527	LCH4007	1810
Mechanical System / Equipment													
Air Cooled Chiller	x	x	x			x	x	x	x	x		TBD	
Chilled Water Pumps	x	x	x			x	x	x	x	x		TBD	
Boilers	E	x	x			x	x		E	x		TBD	
Hot Water Pumps	E	x	x			x	x		E	x		TBD	
Unit Heaters	x	x	x		x	x	x		x	x		TBD	x
Hot water Reheat Coils	x											TBD	
Baseboard/Radiators					x							TBD	
Air Handling Units/DOAS	x	x	x			x	x	x	x	x		TBD	
Energy Recovery Ventilator	x	x	x			x	x					TBD	
Supply / Exhaust Fans	x	x	x	x	x	x	x	x	x	x	x	TBD	x
Fan Coil Units	x											TBD	
Air terminal devices (VAV)	x	x	x			x	x	x	x	x		TBD	
Fan Powered Boxes	x	x	x			x	x	x	x			TBD	
VRF System				x							x	TBD	
Ductless Split System		x	x	x	x	x	x	x	x		x	TBD	x
Heat Pumps				x	x						x	TBD	
Packaged Terminal AC Unit									x	x		TBD	
Gas Furnace w/AC												TBD	x
Dehumidifiers		x	x	x		x	x	x	x	x	x	TBD	
Building Controls	x	x	x	x	x	x	x	x	x	x	x	x	x
Plumbing System / Equipment													
Domestic Water Heater	x	x	x	x	x	x	x			x	x	TBD	x
Pumps	x	x	x	x		x	x		x	x	x	TBD	x
Mixing Valves	x	x	x	x		x	x			x	x	TBD	x
Compressed Air System					x							TBD	
E = Existing Equipment to be recommissioned													

2.2 Commissioning Documents

2.2.1 The following table summarizes the general documentation required to facilitate the commissioning process. Additional supportive documentation maybe required

on a project by project basis, as determined by the commissioning authority and required by the project specific specifications.

2.2.2 In order to facilitate transfer of commissioning related documentation, Jacobs will provide access to a Jacobs SharePoint site to the General Contractor, ROICC and PWD. This site will be used to upload submittals to the Commissioning Authority and for PWD and Contractors to download commissioning documentation.

2.2.3 Table 2.2 Commissioning Documents Summary

Document	Responsible Party	Description	Deliverable Date	Recipients
OPR/1391	Owner	Summary statement of project design goals and functional performance criteria.	During Design	Cx Team
BOD	A/E	Design concepts and assumptions utilized to translate OPR.	Prior to construction start	Cx Team
Cx Plan	CxA	Approved Cx Plan	Construction Kickoff	Cx Team
Cx Schedule	CxA	List of key Cx milestones to be integrated into construction schedule	Construction Kickoff	Cx Team
Construction Schedule	GC	Master construction schedule to which the commissioning activities will be integrated	Prior to Commissioning Kick-off Meeting	Cx Team
Contractors Submittal Register	GC	Submittal register showing all contractually required submittals	Prior to Commissioning Kick-off Meeting	Cx Team
Equipment Submittals	All Contractors	Detailed data on all commissioned equipment.	During normal submittal process	Cx Team
Pre-Functional Checklists	CxA	Official document developed by Cx for contractor verification of installation integrity.	Prior to equipment deliveries.	Cx Team
Start-up Plans	All Contractors	Plan for start-up of each commissioned piece of equipment or system.	4 weeks after approved submittals	CxA, Owner
Completed PFCs	All Contractors	Executed checklists to communicate readiness for functional testing.	2 weeks after installation complete and vendor start-up.	CxA, Owner
O&M Manuals	All Contractors	Documentation of equipment design features, set-up, adjustment and maintenance requirements, spare parts list, etc.	90 days prior to training.	Cx Team
TAB Report	TAB Contractor	Initial report submitted to engineer for review and approval.	2 weeks after field work complete.	Cx Team
Functional Performance Checklists	CxA	Official document for contractor verification of functional integrity.	Prior to PFC completion	Cx Team
Completed FPTs	CxA	Executed checklists to communicate readiness for turnover to owner.	1 week after testing complete.	Owner, GC
Cx Progress	CxA	Routine updates on Cx schedule and	Monthly as needed.	Owner

Document	Responsible Party	Description	Deliverable Date	Recipients
Reports		technical issues.		
Cx Issues Log	CxA	List of deficiencies and non-conformance issues identified during execution of PFC and FPT work.	As needed.	Owner, GC
Warranty Review	CxA	Review, verify, and document equipment warranties to ensure that the Government's responsibilities to maintain the warranties are clearly defined. Document/verify that installations are in conformance with the manufacturer's requirements to validate the warranties. Provide verification and documentation of system acceptance dates for warranty period determination.	Within 10 months of substantial completion	Owner
Cx Final Report	CxA	Summary statement of equipment/system installation integrity and functionality with respect to design intent and owners project requirements.	4 weeks after final testing.	Owner

2.3 Abbreviations

The following are common abbreviations used throughout the Commissioning Process:

A/E	Architect / Engineer	GC	General Contractor
BAS	Building Automation System	CIR	Corrective Issues Report
CxA	Commissioning Authority	MC	Mechanical Contractor
PFC	Pre-Functional Checklist	O&M	Operations & Maintenance
CM	Construction Manager	PM	Project Manager
Cx	Commissioning	EC	Electrical Contractor
TAB	Test and Balance	FPT	Functional Performance Test
BOD	Basis of Design	OPR	Owner's Project Requirements

2.4 Definitions

- Basis of Design Document: A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- Commissioning Authority: An entity identified by the Owner who plans, schedules, and coordinates the Commissioning Team to implement the Commissioning Process. This is often abbreviated as Cx Authority.
- Commissioning Plan: A document prepared and updated by the Cx Authority that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.
- Commissioning Process: A quality-focused process for enhancing the delivery of a project. The Process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.
- Commissioning Team: The individuals who through coordinated actions are responsible for implementing the Commissioning Process.
- Pre-Functional Checklist: Documents prepared by the Cx Authority and issued to the Contractor early in the Construction Phase. The purpose of the Checklists is to verify that appropriate components are on-site, correctly installed and started, operational and ready for Functional Performance Testing.
- Contractor QA/QC Test Reports: Reports generated by the Contractors in accordance with the Project Specifications and provided to the Cx Authority as a part of the Pre-Functional Checklists. Example tests include but not limited to; Duct pressure tests, piping hydrostatic tests, cable insulation tests.
- Corrective Issue Report: A report generated by the Cx Authority during Functional Performance Testing documenting issues found during the testing procedures that require follow-up corrective action.

- Functional Performance Testing: The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.
- Owners Project Requirements: A written document that details the functional requirements of the project and the expectations of how the facility will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.
- Final Commissioning Report: The Final Commissioning Report includes information from the entire Commissioning Process as defined throughout the Commissioning Plan and will include Training documentation and completed Functional Performance Test documentation and the resolved Corrective Issues Report. This report will be provided to the Owner at the completion of the project.

PART 3 - DESIGN PHASE

3.1 Design Phase Overview

During the Design Phase of the project delivery process, the Owner's Project Requirements are translated into construction documents.

The Cx Authority provides a review of the Contract Documents to ensure the Commissioning Process requirements are incorporated into the Construction Documents, Construction Drawings and Construction Specifications.

The Design Team develops the Basis of Design document and issues it to the Project Team. The intent of the Basis of Design is to clearly convey the assumptions made in developing a design solution that fulfills the intent and criteria in the Owner's Project Requirements. Narrative descriptions of facility systems and assemblies are developed and included.

3.2 Design Phase Commissioning Activities

3.2.1 Facilitate Owner's Project Requirements

The Commissioning Authority will review the 1391 and related documents to assure requirements are included in the Basis of Design and Final Design Documents.

3.2.2 Develop Commissioning Plan

The Commissioning Plan identifies processes and procedures necessary for a successful Commissioning Process. The Commissioning Plan addresses the Owner's Project Requirements and reflects the defined scope and budget for the Commissioning Process. Also included in the Commissioning Plan is the Commissioning Team structure along with a description of each Team Member's roles and responsibilities.

3.2.3 Develop Commissioning Specifications

The Commissioning Authority will develop a project specific Commissioning Specification Section. According to the Master Format, this Specification Section is part of Division 1. This Specification Section outlines the general requirements of the Commissioning Process and the Cx Authority involvement with the Contractor. Division specific commissioning requirements are incorporated by the Architect and Engineer to coordinate with the commissioning specification.

The Commissioning Process integrates with many other administrative procedures. The Cx Authority will review the complete set of Specifications to insure proper cross references are made to all related Sections. These review comments will be issued to the Owner for consideration and for inclusion into the Contract Documents. The CxA issues the comments to the owner. The owner will forward to the Design Team. The Design Team is responsible to incorporate these comments in to the Specifications.

3.2.4 Review Basis of Design

The Basis of Design is developed by the A/E and reviewed by the CxA. This document details all assumptions made during the design phase. These assumptions (codes, standards, occupant load, noise criteria, etc.) are typically recorded in the designer's files, but never transmitted to the Owner. By documenting the Basis of Design in a

consistent format, the information is captured and stays with the facility for its life. This simplifies future troubleshooting and modification of the facility and its systems.

3.2.5 Perform Focused Review of Contract Documents

The CxA will perform a review of the prefinal design specifications and drawings. The CxA will ensure compliance with the Owner's Project Requirements and that commissioning requirements are incorporated for all systems being commissioned.

3.3 Design Phase Acceptance Requirements

Not applicable to this project

3.4 Design Phase Documentation

Documentation delivered at the conclusion of the Design Phase includes:

3.4.1 Owner's Project Requirements (Government)

3.4.2 Commissioning Plan (CxA)

3.4.3 Basis of Design (A/E)

3.4.4 Commissioning Specifications (CxA)

3.4.5 Design Review Comments (CxA, Team)

PART 4 - CONSTRUCTION PHASE

4.1 Construction Phase Overview

The Construction Phase begins with the Notice to Proceed and concludes on the date of Substantial Completion. During the Construction Phase of the project delivery process, systems and assemblies are installed, inspected, tested, and placed into service to meet the Owner's Project Requirements.

4.2 Construction Phase Commissioning Activities

4.2.1 Commissioning Scoping/Kick-Off Meeting

After the Notice to Proceed to the contractors for the Construction Phase, the Commissioning Authority will conduct a Commissioning Kick-off Meeting to introduce the Contractor and Subcontractors to the Commissioning Process requirements for the project. In addition, the specific roles and responsibilities of each Contractor relative to the Commissioning Process are reviewed, as described in Para 8.2.3.

4.2.2 Progress Meetings

The Commissioning Authority will periodically attend the Project Construction Progress Meetings. The Contractor will be given advance notice prior to a meeting date if the Cx Authority wishes to have an agenda item for that particular meeting.

In coordination with the regularly scheduled progress meetings, the Cx Authority will conduct Commissioning Progress Meetings with an agenda focused solely on Commissioning-related issues. The frequency of these meetings is dependent on the progress of the project and the quality of documentation being provided by the Commissioning Team Members. If the project is progressing on schedule and the documentation is current and complete to the state of the project, there will be fewer Commissioning Progress Meetings required. The Cx Authority will notify all expected attendees well in advance of scheduling a Commissioning Progress Meeting. These meetings will usually be held in conjunction with regularly-scheduled construction meetings.

4.2.3 Pre-DALT/Pre-TAB meeting

In coordination with the construction schedule, the Cx Authority will assist in coordinating Pre-DALT/Pre-TAB meeting(s) with the contractor and owner focused solely on requirements and coordination of DALT and TAB testing. The TAB contractor, Controls contractor and owner representatives will be required to attend.

4.2.4 Controls Integration Meeting

After the submission of the building controls submittal and prior to the installation/programming of the control system, the Cx Authority will request a Controls Integration Meeting to review the control sequences, assist in coordinating any interfaces between the building controls and the fire alarm system, access control system, and factory packaged controls required to be interfaced or monitored by the BAS. The relevant contractors, owner representatives and equipment vendors will be required to attend.

4.2.5 Project Schedules

The Contractor is required to incorporate Commissioning activities into the Master Project Schedule. The commissioning Authority will review the master construction schedule and provide review comments in addition to identifying required commissioning activities with durations to be included in the schedule. The Cx Authority will be available to assist the Contractor's scheduling person in this effort. As the schedule is updated throughout the Construction Phase, the Cx Authority will provide input information for Commissioning activities and review the overall project progress. The contractor should update the Cx Authority of any schedule changes on a monthly basis.

Several vital activities in the Commissioning Process can require significant time and must be performed in a sequential manner. It is imperative that adequate time be allotted for the following activities.

- Equipment Start up
- DALT
- TAB
- Controls Contractor Pre-PVT testing
- Functional Performance Testing
- Trend Data Collection
- PVT/Acceptance Testing by the Owner
- Owner Training

4.2.6 Submittal / Shop Drawing Reviews

At the beginning of the construction phase, the Contractor is required to provide the project submittal register to the Cx Authority. The CxA will identify submittals which will require review by the CxA for the commissioning process. The commissioning review of the submittals will primarily be for information. However, if the CxA identifies deficiencies that will impact the design intent or the commissioning process, the CxA will notify the COR and provide those comments to the owner. It will be the owner's responsibility to review and forward the comments to the contractor or DOR. Ideally, the CxA review will take place concurrently with the EOR and owner reviews.

For Submittals relating to systems to be commissioned, with the approval of the COR, the Contractor will forward one complete copy of the submittal package directly to the Cx Authority at the same time as forwarding to NAVFAC. NAVFAC provide an approved copy of the final submittal to the CxA for record.

Equipment submittals for equipment and systems will be submitted to the DOR and Cx. CxA will provide comments to the DOR for inclusion prior to the DOR submitting to the ROICC for return to the contractor. However the controls submittal will required review by PWD prior to returning to the contractor by the ROICC

Documentation submittals, such as the DALT plan, TAB plan, TAB report, Training Plans, Prefunctional Construction Checklists, etc… shall be submitted to the ROICC and CxA.

Upon receipt of approved equipment and systems submittals, the contractor shall forward draft O/M documentation to the owner and CxA.

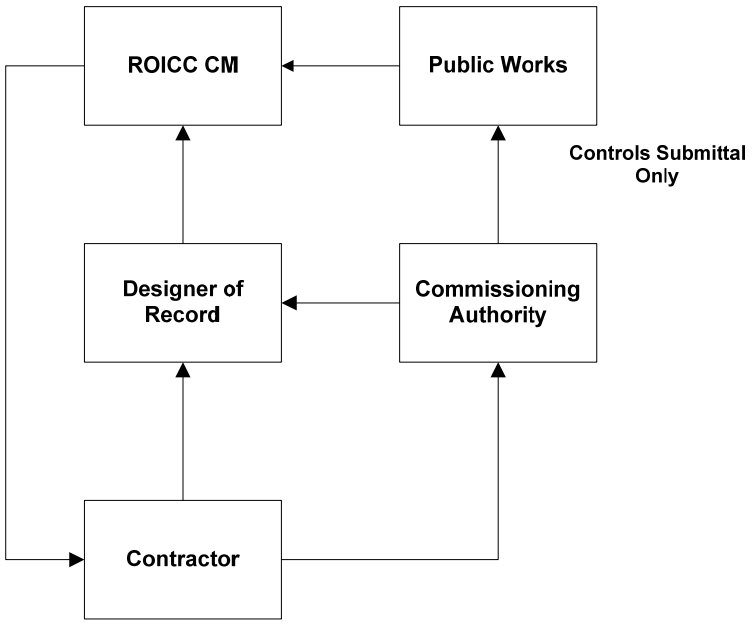


Figure 5-2-6-1: Commissioning Related Equipment Submittal Process Flowchart

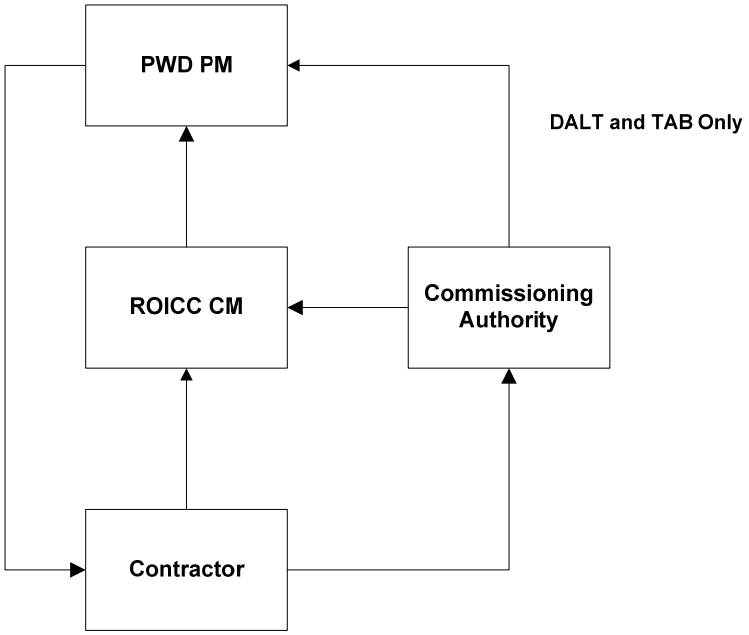


Figure 5-2-6-2: Commissioning Related Document Submittal Process Flowchart

4.2.7 Pre-Functional Checklists:

Pre-Functional Checklists are important to ensure that the equipment and systems are installed and operational in accordance with the Contract Documents and Design Intent. Pre-Functional construction checklists are a prerequisite for Functional Performance Testing to proceed. The Cx Authority will develop a Pre-Functional Checklist for each system or major piece of equipment included in the systems being commissioned as identified in Section 2 of this Plan. The Checklists are to be completed by the Contractor and returned to the Cx Authority for inclusion in the Final Commissioning Report.

Pre-Functional Checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g. oil levels, fan belt tension, labels affixed, gauges in place, sensor calibration, etc.). Some Checklist items entail simple testing of the function of a component, piece of equipment or system (e.g. measuring voltages and current values, checking rotations, etc.). Pre-Functional Checklists augment and are combined with the manufacturer's start-up procedures and contractor quality control process. The Cx Authority does not witness the Checklist activities, except for QA/QC testing of larger or more critical pieces of equipment, as appropriate.

Pre-Functional Checklists should be maintained in a binder at the Construction Manager's project site office and are subject to review for comparison between the completion level of the Checklists and the status of the work during site observation visits by the Cx Authority.

The Checklist is to be completed by the Contractor in five steps as follows:

4.2.7.1. When the equipment is delivered to the site, Section 1 of the Checklist is to be completed. The intent of this Section is to make physical checks for shipping damage and also to verify the model & serial information, capacities, and options included as specified.

Numerous problems and delays can be avoided at this time through identification of possible wrong shipments, incorrect capacities and missing components.

4.2.7.2. When the equipment is actually installed, Section 2 of the Checklist is to be completed by the Contractor. The intent of this Section is to assure the equipment is installed per the Contract Documents and the Owner's Project Requirements.

4.2.7.3. At the time of equipment start-up, Section 3 will be completed by the Contractor. For larger or critical equipment the Cx Authority will witness the start-up procedures. The Contractor is to forward copies of all manufacturer's start-up forms and reports to the Cx Authority along with the Pre-Functional Checklist upon completion of the Checklist. The start-up documentation shall be included with the Checklists in the binder in the Construction Manager's project site office.

4.2.7.4. During the BAS configuration and integration process for the system, Section 4 shall be completed by the Contractor. The purpose of this section is to document the full control and monitoring capabilities of the BAS system including alarms, trends and full range of the sequence of operations.

4.2.7.5. When Sections 1-4 have been completed, the Contractor will sign Section 5 and forward the completed Checklist and supporting documentation as applicable to notify the Cx Authority that the equipment or system has been properly installed and started and is ready for Functional Performance Testing.

4.2.8 Site Observations

Periodically, during the Construction Phase, the Cx Authority will perform site observation visits. The purpose of these visits is to review the installation progress of the systems being commissioned and to compare the actual job progress with the progress indicated on the Pre-Functional Checklists located in the binder in the Construction Manager's project site office. The Cx Authority will submit a detailed report of each visit to the members of the Commissioning Team. These site visits will typically correspond with project meeting dates and project progress milestones.

4.2.9 Contractor QA / QC Testing

The Contractor is responsible to provide all Quality Assurance and Quality Control testing and administrative procedures as indicated in the Contract Documents. Although the CxA may not be required to witness the testing, the Contractor shall include the CxA in notifications of scheduled testing.

4.3 Construction Phase Acceptance Requirements

Acceptance of the Construction Phase of the Commissioning Process requires the Owner's acceptance of all applicable contractor submittals and commissioning documents.

4.4 Construction Phase Documentation

The Commissioning Authority Deliverables during the Construction Phase include:

4.4.1 Updated Commissioning Plan

4.4.2 Commissioning Schedule review and activity schedules

4.4.3 Commissioning related meeting minutes/notes

4.4.4 Submittal Reviews and Comments

4.4.5 Pre-Functional Checklists

4.4.6 Site Observation Reports

4.4.7 Functional Performance Test Protocols

PART 5 - TESTING, TRAINING, ACCEPTANCE PHASE

5.1 Testing/Training/Acceptance Phase Overview

The Phase begins with the completion of the construction phase activities and acceptance of the Pre-Functional Checklists. When the equipment and systems to be commissioned are ready for Functional Performance Testing, the contractor shall notify the owner and commissioning authority. During this Phase of the commissioning process; the equipment, systems and assemblies are inspected, tested, accepted and readied for turn-over to the owner at BOD.

Prior to functional testing the following activities must be successfully completed:

- Re-establishment of Permanent Power
- Equipment Start ups
- Contractor Performed PVTs
- TAB

After Successful functional performance testing, the following activities occur leading up to BOD:

- Applicable Phase I Control Training
- Government performed PVT
- Phase 2 Training; training on remainder of equipment and systems.

5.2 Testing/Training/Acceptance Phase Commissioning Activities

5.2.1 Functional Performance Test Procedures:

Functional Performance Testing is the dynamic testing of systems under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied operations, varying outdoor environmental conditions, fire alarm interactions, power failure, etc. The systems are tested through all modes of operation and components are verified to be responding as the sequences and Contract Documents state.

The Contractor is responsible for performing all actions required to carry out the Functional Performance Test Procedures, including providing all required meters, test equipment, laptops, software, radio communication, etc. The requirement of the Contractor to perform the Tests is due to the fact that these Tests are completed before the equipment or systems are accepted by the Owner which means the equipment and systems remain the responsibility of the Contractor.

The Cx Authority will develop the Test Procedures and issue to the Commissioning Team for review and comment. Once the Test Procedures are finalized, a meeting will be held to plan the sequencing and scheduling of the Functional Performance Testing.

The Cx Authority will be in attendance to oversee ALL testing and be responsible for documenting the actions, results and issues encountered.

5.2.2 Corrective Issue Report

The Corrective Issue Report will be generated by the Cx Authority when issues or problems arise during the Functional Performance Testing Procedures. The report will describe the problem condition along with any related reference information and will be

issued to the Contractor for corrective action. When the necessary corrections have been completed, the Contractor will document the actions taken and return the Corrective Issue Report to the Cx Authority. Depending on the nature of the issue or problem, the Cx Authority, along with the Architect, will determine if re-testing of the equipment or system is necessary.

5.3 Testing/Training Phase Acceptance Requirements

Acceptance of the Testing/Training Phase of the Commissioning Process requires the Owner's acceptance of the results of the completed Functional Performance Tests and completed Corrective Issues Report with limited or no open issues remaining consistent with recommendations of the Design Team and other appropriate Commissioning Team Members such as the Acceptance Engineering group for Camp Lejeune.

5.4 Testing/Training/Acceptance Phase Documentation

Documentation delivered at the conclusion of the Testing/Training/Acceptance Phase includes:

5.4.1 Completed Functional Test Procedures

5.4.2 Completed Corrective Issue Report

5.4.3 Functional Testing Report

5.4.4 Training verification Documents

5.4.5 All required Acceptance Phase Deliverables.

PART 6 - OCCUPANCY PHASE

6.1 Occupancy Phase Overview

Commissioning Process activities continue through the end of deferred testing. During the Occupancy Phase functional tests that were deferred during the Testing/Training phase due to seasonal requirements are performed. The final version of the Commissioning Report will be submitted during this phase

6.2 Occupancy Phase Commissioning Activities

6.2.1 Warranty Review

Following the Testing, Training and Acceptance phase, the CxA will review, verify, and document equipment warranties to ensure that the Government's responsibilities to maintain the warranties are clearly defined, verify that that the installations are in conformance with the manufacturer's requirements to validate the warranties and validate system acceptance dates for warranty period determination.

Approximately 10 months after acceptance, the CxA will meet with the Facilities Manager, User, and Public Works to review the overall systems operation, identify any outstanding warranty issues or unresolved commissioning issues and review the control trend data of the commissioned systems.

The Commissioning Authority will provide an Occupancy Phase Summary Report documenting the findings of the Warranty Review Meeeting.

6.2.2 Seasonal/Deferred Testing

Any required seasonally deferred testing will be performed by the contractor and witnessed by the CxA. Deferred functional performance tests follow the same functional performance testing process performed during the Testing/Training phase.

The commissioning authority will also review second season TAB verification. Second season TAB verification shall occur prior to the Warranty Review Meeting.

6.2.3 Final Commissioning Summary Report

The Final Commissioning Summary Report compiled by the Cx Authority will be issued to the Owner for record of the Commissioning Process. This Report is a compilation of all the Commissioning-related documents, forms, logs, and miscellaneous correspondences that was generated during the project, provides the tools and documented benchmarks for evaluation of ongoing performance.

6.3 Occupancy Phase Acceptance Requirements

This phase of the Commissioning Process includes the formal acceptance of the Final Commissioning Report after completion of deferred testing.

6.4 Occupancy Phase Documentation

Documentation delivered during the Occupancy Phase includes:

6.4.1 Warranty Review Report

6.4.2 Final Commissioning Report

PART 7 - COMMISSIONING TEAM

7.1 Team Structure

The Commissioning Team shall consist of representatives from each of the following parties involved in the design, construction and operation of this facility: 1) Owner, Facilities Operations & Users; 2) Architect & Design Professionals; 3) Contractor, Subcontractors & Equipment Suppliers; and 4) the Commissioning Authority. The time at which individual members join the team and the level of their participation during the different phases of the project will vary from member to member.

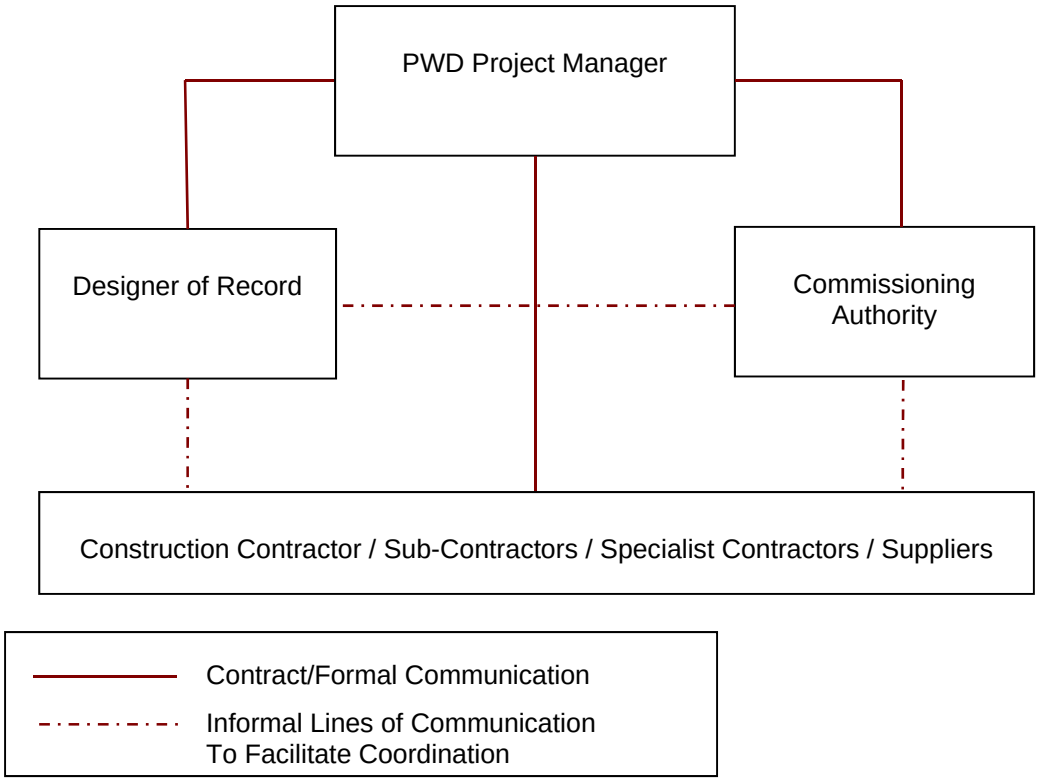


Figure 8-1: Commissioning Team Organization Chart

Note: Reference Project Appendices for specific project Cx Team member listings.

7.2 Roles and Responsibilities

7.2.1 Commissioning Authority

The Commissioning Authority will organize and lead the Commissioning Team including the following tasks:

7.2.1.1. Design Phase

- Develop the Commissioning Plan.
- Develop the Commissioning Specifications.
- Develop the initial format to be used for the Cx Issues Log throughout and for each phase of the Commissioning Process.
- Review the plans and specifications with respect to their completeness in all areas relating to the Commissioning Process and the ability of the design documents to achieve the Owner's Project Requirements including training requirements. Verify there are adequate devices included in the design to properly test the systems and assemblies and to document the performance of each piece of equipment, system, or assembly.

7.2.1.2. Construction Phase

- Conduct a Commissioning Team kick-off meeting. The intent of the meeting will be to review the Commissioning specification requirements, test procedures, and schedule.
- Conduct and document Commissioning progress meetings.
- Assist the Construction Manager, subcontractors, and Owner's Project Manager in incorporating Commissioning activities into the master project schedule.
- Review equipment shop drawings and coordination drawings applicable to systems to be commissioned for compliance with the Contract Documents, the Owner's Project Requirements, and the Basis of Design. Submit review comments to the Design Team for inclusion with their review comments.
- Review additional Construction Phase documentation, ASIs, RFIs, Change Orders, Meeting Minutes, and other correspondence required to perform commissioning tasks.
- Perform site visits, in conjunction with Commissioning meetings, to observe component and system installations. Attend selected planning and job site meetings to obtain information on construction progress.
- Verify and document that the applicable equipment and systems are installed properly and receive adequate preoperational checkout. Develop the Pre-Functional Checklists forms with the assistance of the Construction Manager, the General Contractor, and the Sub-Contractors. Use the completed Pre-Functional Checklists to verify that the applicable equipment and systems are installed properly and have received adequate preoperational checkout.
- Evaluate and document systems start-up, including systems safety requirements and considerations, by reviewing start-up reports and by selected site observation. Before initial startup, review all the control sequences and interlocks, and the detailed testing procedures for proper operation.

- Witness select HVAC piping pressure test, flushing activities and the ductwork leakage testing sufficiently to be confident that proper procedures are followed. Document results in the "Summary Commissioning Report". Coordinate effort with appropriate Government representatives.
- Prepare final Functional Performance Test Procedures. These will be distributed to the Owner, Design Team, and General Contractor for distribution to all affected contractors for their review.

7.2.1.3. Testing/Training Phase

- Witness system and assembly Functional Performance Testing. List any deficiencies on systems in the Corrective Issues Report and provide to the Owner, Design Team, and contractors for review and corrections. Include completed Functional Performance Test Procedures within the Final Commissioning Report.
- Work with the contractor in resolving any issues identified during Functional Performance Testing.

7.2.1.4. Occupancy Phase

- Assemble the final Commissioning documentation, including the Commissioning Report. Submit this documentation to the Owner for review and acceptance.
- Any seasonally deferred testing will be performed during this Occupancy Phase.
- Perform a warranty review and document equipment warranties.

7.2.2 Owner

The Owner Representatives of the project play important roles in the Commissioning Process and throughout the duration of this project. The Owner facilitates and supports the Cx Authority and is the party who provides final acceptance of the Commissioning Process. Owner representatives are encouraged to attend meetings in each phase relating to the Commissioning Process as available. Following is an outlined summary of responsibilities for the Owner Representatives:

7.2.2.1. Design Phase

- Develop Owners Project Requirements
- Verify alignment between the Owners Project requirements and tenant needs, and incorporate into the Basis of Design.
- Facilitate Contract Document development by the DOR including the integration of the Commissioning Process requirements, specification sections integration, and activities provided by the Commissioning Authority.
- Review and incorporate, as appropriate, the Commissioning Authority's comments from submittal reviews.
- Verify that the operation and maintenance of the systems and assemblies is adequately detailed in the Construction Documents.
- Review and approve the Commissioning Plan and specifications.

7.2.2.2. Construction Phase

- Facilitate the coordination of the commissioning work by the CxA.

- With the GC and CxA, ensure that commissioning activities are being included into the Contractor's master schedule with appropriate durations and linking of predecessor and successor activities.
- Provide the Commissioning Authority with copies of all answered RFIs, Change Orders, ASIs/ECNs and Meeting Minutes.
- Collaborate with the Commissioning Authority to develop the final detailed Functional Performance Test Procedures for control/building automation systems, based on the system shop drawings and submittals.
- Review and approve Construction Phase Commissioning documentation including the completed Pre-Functional checklists.

7.2.2.3. Testing/Training Phase

- Arrange for facility operating and maintenance personnel to participate in various commissioning team activities (e.g., commissioning testing and training sessions).
- Review and approve the O&M manuals concurrent with review by the DOR and CxA.
- Review and approve testing phase Cx documents including Functional Performance Testing.
- Review and comment on resolutions of Corrective Issues Report.

7.2.2.4. Occupancy Phase

- Schedule Occupancy Phase meetings (2nd season TAB, Warranty Review)
- Facilitate collection of occupancy phase documentation from facilities manager and contractors
- Review and accept on the Final Commissioning Report.

7.2.3 Designer of Record

7.2.3.1. Design Phase

- Verify alignment between the Owners Project requirements and the Basis of Design.
- Prepare Contract Documents including the integration of the Commissioning Process requirements, specification sections integration, and activities provided by the Commissioning Authority.
- Review and comment the Commissioning Plan.

7.2.3.2. Construction Phase

- Provide the Commissioning Authority with copies of all answered RFIs, Change Orders, ASIs/ECNs and Meeting Minutes.
- Collaborate with the Commissioning Authority and owner to resolve issues noted during the commissioning process.

7.2.3.3. Testing/Training Phase

- Review and approve the O&M manuals concurrent with review by the CxA.

7.2.3.4. Occupancy Phase

- (None)

7.2.4 CM or General Contractor (GC)

All Contractors are responsible for integrating the Commissioning Process into their operations. Primarily, this includes educating their workers on the commissioning process, this Project's Basis of Design, and the responsibility of each worker for a quality job. The Pre-functional Checklists provided by the Cx Authority shall be completed by the individual workers as appropriate and the Functional Performance Tests shall be completed Cx Authority oversight. Following is an outlined summary of the Contractor's responsibilities.

7.2.4.1. Design Phase

- (None)

7.2.4.2. Construction Phase

- Review Construction Phase Commissioning documentation including but not limited to site observation reports, Pre-Functional Checklists, and submittal reviews.
- Participate in Commissioning meetings.
- Notify the Commissioning Authority when systems and assemblies are ready for functional performance testing through the completion of the Pre-Functional Checklists.
- Copy all meeting minutes to the Commissioning Authority for informational purposes.
- Provide the Commissioning Authority with a copy of all shop drawings and submittals associated with the systems being commissioned. These shall be distributed concurrently with the distribution to the Design Team.
- Incorporate Commissioning activities into the master project schedule. This scheduling shall involve the Commissioning Authority and installation contractors. Provide the Commissioning Authority with schedule updates at least monthly.
- Consolidate and manage the system/equipment O&M manual preparation process by the installation contractors.
- Submit QA/QC testing and start-up report documentation for review by the Owner, Design Team and Commissioning Authority.
- Verify completion of the Pre-Functional Checklists by the appropriate subcontractor as the work is accomplished. Submit completed Pre-Functional Checklists to the Commissioning Authority prior to certifying systems are ready for Functional Performance Testing.
- Keep the Commissioning Authority updated of any construction changes to the systems being commissioned including copies of all relevant Requests for Information and Change Orders.

7.2.4.3. Testing/Training Phase

- Coordinate all subcontractor participation and provide any required equipment necessary for Functional Performance Testing. Equipment required for testing shall have valid calibration certificates.
- Remedy deficiencies identified by the Commissioning Authority during Functional Performance Testing and noted within the Corrective Issues Report.

7.2.4.4. Occupancy Phase

- Remedy deficiencies and warranty issues identified by the Commissioning Authority and owner during prior to the end of the warranty period.

7.2.5 Subcontractors

7.2.5.1. Construction Phase

- Include costs for Commissioning Process activities in the contract price.
- Include Commissioning Process requirements and activities in each purchase order or subcontract written.
- Participate in Commissioning meetings.
- Complete the Pre-Functional Checklists as the work is accomplished and submit to the General Contractor prior to the start of the Functional Performance Testing.

7.2.5.2. Testing/Training Phase

- Demonstrate the performance of assemblies and/or operation of systems to the Commissioning Authority as required in order to achieve the requirements of the Functional Performance Test Procedures.
- Correct all deficiencies identified by the Commissioning Team and noted within the Corrective Issues Report.

7.2.5.3. Occpancy Phase

- Remedy deficiencies and warranty issues identified by the Commissioning Authority and owner during prior to the end of the warranty period.