**UNIFIED FACILITIES GUIDE SPECIFICATIONS**

**References are in agreement with UMRL dated January 2019**
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SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 45 00.05 20

# DESIGN AND CONSTRUCTION QUALITY CONTROL

**06/15**

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**USACE / NAVFAC / AFCEC / NASA** | **UFGS-01 45 00.05 20 (June 2015) Change 2 - 02/18**

**Preparing Activity: NAVFAC** | **Superseding UFGS-01 45 00.05 20 (May 2014)**

**UNIFIED FACILITIES GUIDE SPECIFICATIONS**

**References are in agreement with UMRL dated January 2019**

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SECTION 01 45 00.05 20

DESIGN AND CONSTRUCTION QUALITY CONTROL
**06/15**

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**NOTE: This guide specification covers the preparation and use of Design-Build (DB) Quality Control. This guide specification will normally be used for Category One and Category Two projects. It may be also used for smaller, complex projects at the discretion of the Government. This section shall be reviewed and approved by the Administering ROICC/FEAD prior to RFP completion.**

**Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specifications sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.**

**Remove information and requirements not required in respective project, whether or not brackets are present.**

**Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).**

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**NOTE: When this specification is used, it will be in conjunction with Section 01 32 17.00 20, COST-LOADED NETWORK ANALYSIS SCHEDULES (NAS).**

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**NOTE: Specify QC Specialists for those areas of work that are of sufficient complexity or size to justify the expense.**

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PART 1 GENERAL

1.1 REFERENCES

**********

**NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.**

**Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.**

**References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.**

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

| | |
|---|---|
| ASHRAE 52.2 | (2012) Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size |

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM D6245 | (2012) Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation |
| ASTM D6345 | (2010) Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air |

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

| | |
|---|---|
| ANSI/SMACNA 008 | (2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition |

U.S. ARMY CORPS OF ENGINEERS (USACE)

| | |
|---|---|
| EM 385-1-1 | (2014) Safety and Health Requirements Manual |

1.2 SUBMITTALS

**********

**NOTE: Review Submittal Description (SD) definitions in Section 01 33 00.05 20 CONSTRUCTION SUBMITTAL PROCEDURES and 01 33 10.05 20 DESIGN SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Keep submittals to the minimum required for quality control.**

**The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.**

**An "S" following a submittal item indicates that the submittal is required for the Sustainability eNotebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING. Coordinate all Part 2 and Part 4 Specification Sections with 01 33 29.05 20 SUSTAINABILITY REPORTING FOR DESIGN-BUILD.**

**********

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29.05 20 SUSTAINABILITY REPORTING FOR DESIGN-BUILD. Submit the following in accordance with Section 01 33 00.05 20 CONSTRUCTION SUBMITTAL PROCEDURES and 01 33 10.05 20 DESIGN SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Design Quality Control (DQC) Plan; G

Submit a DQC Plan prior to the Post Award Kickoff Meeting.

Construction Quality Control (CQC) Plan; G

Submit a Construction QC Plan prior to start of construction.

Indoor Air Quality (IAQ) Management Plan; G

[ Commissioning Plan; G

Submit a Commissioning Plan within 60 days of approval of Cx Authority.

] SD-05 Design Data

Design Quality Control Documentation; G

**********

**NOTE: Coordinate the submittal requirement dates with the submittal dates in Section 01 32 17.00 20 COST-LOADED NETWORK ANALYSIS SCHEDULES (NAS).**

**********

SD-07 Certificates

Preliminary Inspections and Final Acceptance Testing; G

Final Life Safety/Fire Protection Certification; G

**********

**NOTE: The requirement to training of Government personnel on the operation of the facility has been relocated from this section to Section 01 78 24.00 20, FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI). The QC has training oversight responsibilities.**

**********

[ SD-11 Closeout Submittals

Summary Commissioning Report; G

]1.3 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program that is administered by a Design and Construction Quality Control organization, using Quality Control (Design and Construction) Plans, Commissioning Plans and Reports, meetings, a Coordination and Mutual Understanding Meeting, three phases of control, submittal review and approval, testing, completion inspections, and QC certifications,[ independent Special Inspections in accordance with Section 01 45 35.05 20 SPECIAL INSPECTIONS FOR DESIGN-BUILD,] and documentation necessary to provide design, materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program must cover on-site and off-site work. No construction work or testing may be performed unless the QC Manager is on the work site.

1.3.1 QC Plan Meeting

Prior to submission of the QC Plan, the QC Manager may request a meeting with the Contracting Officer to discuss the QC Plan requirements of this Contract.

The purpose of this meeting is to develop a mutual understanding of the QC Plan requirements prior to plan development and submission and to agree on the Contractor's list of Definable Features of Work (DFOWs).

1.3.2 Mutual Understanding Meeting

The purpose of this meeting is to develop a mutual understanding of the QC Plans, including documentation, administration, requirements and procedures, coordination of activities to be performed, and the coordination of the contractor's management, production and QC personnel. At the meeting, the contractor will explain in detail how the three phases of quality control will be implemented for each DFOW.

1.3.3 Design and Construction Quality Control Plans

The contractor must provide a project specific Design Quality Control (DQC) Plan and Construction Quality Control (CQC) Plan, for review and approval by the Contracting Officer. The Contractor must perform no design until the DQC Plan is approved and no construction until the CQC Plan is approved. The Contractor's plans must include the following:

a. The QC organization for this contract, including member resumes.

b. A letter from an officer of the company designating the QC Manager, Alternate QC Manager, DQC Manager, [Commissioning Authority,] and their authority.

c. QC Manager and DQC Manager qualifications in resume format.

d. Names of the individuals, including their respective firm names, who will be serving as the DOR in their respective design discipline.

e. List of DFOW including list of design submittal packaging. DFOW is a task that is separate and distinct from other tasks and has control requirements and work crews unique to the task.

f. For the CQC Plan, a plan to implement the "Three Phases of Control" for each DFOW.

g. For the CQC Plan, a testing Plan, log and list of personnel and accredited laboratories that will perform tests. Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation with the testing plan.[ Coordinate this testing Plan with the Commissioning Plan verification testing requirements to avoid duplication of effort.]

h. Submittal Register including design submittals, listing personnel who will review submittals and noting submittals for Contracting Officer review.

i. Procedures for submitting and reviewing design changes/ variations prior to submission to the Contracting Officer.

j. As part of the Contractor's DQC plan, a statement of Life Safety and Fire Protection Features Inspections and Testing must be prepared by the Fire Protection Designer of Record (DOR). Examples of life safety and fire protection features include, but are not limited to, water distribution systems including fire pumps and fire hydrants, fire resistive assemblies such as fire rated walls/partitions, through -penetration firestop systems, spray-applied fire proofing of structural components, fire alarm and detection systems, fire suppression and standpipe systems, means of egress components, emergency and exit lighting fixtures. The plan must include a listing of the individuals, approved agencies or firms that will be retained for conducting the required inspections and tests accompanied by a description of individual inspector's experience and a copy of all required certifications. Additional copies of this plan must be submitted to the NAVFAC Fire Protection Engineer and the Installation Fire Chief. This plan must include the following:

(1) Comprehensive list of systems, components or features to be

inspected and tested.

(2) Description of performance verification testing activities for each system or component.

(3) Procedures and schedules for functional performance tests of all systems requiring functional testing.

k. For the DQC plan, submit a formal Communication Plan that indicates the frequency of design meetings and what information is covered in those meetings, key design decision points tied to the Network Analysis Schedule and how the DOR plans to include the Government in those decisions, peer review procedures, interdisciplinary coordination, design review procedures, comment resolution, etc.

The Communication Plan must emphasize key decisions and possible problems the Contractor and Government may encounter during the design phase of the project. Provide a plan to discuss design alternatives and design coordination with the stakeholders at the key decision points as they arise on the project. Identify individual stakeholders and suggested communication methods that will be employed to expedite and facilitate each anticipated critical decision. Communication methods may include: Concept Design Workshop, over-the-shoulder review meetings, presentation at client's office, lifecycle cost analysis presentation, technical phone conversation, and formal review meeting. The design portion of the Communication Plan must be written by the DQC Manager and confirmed during the Post Award Kick off Partnering. Update the Communication Plan at every Partnering meeting.

l. For the DQC Plan, procedures for insuring the design documents are submitted in accordance with FC 1-300-09N, Navy and Marine Corps Design Procedures and other procedures to ensure disciplines have been properly coordinated to eliminate conflicts.

m. For the DQC Plan, provide Quality Control Documentation procedures such as QC review sets and QC comments to demonstrate that cross checking of all engineering disciple's design drawings and specifications has taken place. The QC review documentation must exhibit a checking process of the design documents for completeness, accuracy, and constructability.

n. For the DQC Plan, a list of design subcontractors and the scope of the work which each firm will accomplish.

[1.3.4 Commissioning Plan

The Contractor must provide a project specific Commissioning Plan for review and acceptance by the Contracting Officer. The intent of the commissioning plan is to expose all critical issues and resolve them with input from the construction team at early stages of planning. Develop and submit the Commissioning Plan to define the on-site activities and roles and responsibilities for commissioning all building systems required by the Project Program paragraph BUILDING COMMISSIONING. The Commissioning Plan must be updated as information changes during the project. The Plan must include all items required by the Third Party Certifier (TPC) and must include the following:

a. Commissioning Authority qualifications and experience.

b. A description of the Commissioning Team's roles and responsibilities as

well as organizational relationships with the Contractor's QC Manager, DQC Manager, and verification and testing personnel.

c. A listing of all systems required to be commissioned, include a list of required instruments and components for measurements, verifications, and full commissioning of mechanical systems.

d. A description of the testing and acceptance method used for each system. Describe all commissioning process activities. Include the sequence and schedule for starting and balancing air distribution systems to ensure construction materials, such as architectural finishes, are installed under the appropriate environmental conditions. Also address the procedure that will be used to "dry out" the structure.

e. A procedures and schedule for functional performance tests of all systems to be commissioned. The Commissioning Authority must present for all functional performance tests. Coordinate this schedule with the QC Plan testing requirements to avoid duplication of effort.

f. Coordinate with eOMSI Preparer to approve the training plan, content of the facility maintenance and operational training, and training schedule for Government personnel. Provide training sessions on performance of the systems that were commissioned.

]1.3.5 Summary Commissioning Report

The Commissioning Authority must provide a Summary Commissioning Report upon completion of the performance verification items. The Summary Commissioning Report must include all items required by the TPC and must include the following:

a. Executive Summary of the commissioning process including results and observations of the commissioning program.

b. A history of deficiencies identified and their resolution. Indicate outstanding issues to be resolved.

c. Commissioned systems performance test results and evaluations. Provide a 72 hour data trend utilizing the building automation system. Verify that the trend data reflects proper operation of the system.

**********

**NOTE: Special Inspections are required for all projects except the following:**

**1) Construction of a minor nature as approved by the Contracting Officer.**
**2) Utility and miscellaneous Group U occupancies that are accessories to a residential occupancy.**
**3) Portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 of IBC or the conventional light-frame construction provisions of Section 2308 of IBC.**

**Include the following paragraph when Special Inspections are required.**

**********

[1.3.6 Special Inspections

Perform all required Special Inspections [and structural observations ]per Section 01 45 35.05 20 SPECIAL INSPECTIONS FOR DESIGN-BUILD, the Statement of Special Inspections and the Schedule of Special Inspections.

]1.4 QC ORGANIZATION

**********
**NOTE: Choose this bracketed paragraph for NAVFAC Atlantic projects and delete the second bracketed paragraph below.**
**********

[ The QC Manager must manage the QC organization and must report to an officer of the firm and must not be subordinate to the Project Superintendent or the Project Manager.
]

**********
**NOTE: Choose the following bracketed paragraph for NAVFAC Pacific projects and delete the above bracketed paragraph.**
**********

[ The QC Manager must manage the QC organization and must report to the Project Superintendent. The QC Manager, Project Superintendent and Project Manager must work together effectively. Although the QC Manager is the primary individual responsible for quality control, all individuals must be held responsible for the quality of work on the job.

]1.4.1 QC and Alternate QC Manager

QC and Alternate QC Manager qualifications:

a. Complete the course entitled "Construction Quality Management (CQM) for Contractors" and maintain a current certificate. The QC Manager that does not have a current certification must obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for class schedule information.

b. Familiar with requirements of USACE EM 385-1-1, and experience in the areas of hazard identification and safety compliance.

c. [Five] [_____] years of combined experience as a Superintendent, QC Manager, Project Manager, or Project Engineer on similar size and type construction contracts, and at least two years' experience as a QC Manager.

**********
**NOTE: Choose the following additional bracketed paragraph for large, complex projects.**
**********

[ d. A graduate of a four year accredited college or university program in one of the following disciplines: Engineering, Architecture, Construction Management, Engineering Technology, Building Construction,

or Building Science. The QC must have experience on similar size projects and the type of construction contracts which include the major trades that are part of this Contract.

] QC and Alternate QC Manager responsibilities:

a. Participate in the Post Award Kick-off, Partnering, Preconstruction, Design Development, and Coordination and Mutual Understanding Meetings.

b. Implement the "Three Phase of Control" plan for each DFOW and notify the Contracting Officer at least 3 business days in advance of each Preparatory and Initial Phase meeting. Submit respective checklists to the Contracting Officer the next business day.

c. Ensure that no construction begins before the DOR has finalized the design for that segment of work, and construction submittals are approved as required.

d. Inspect all work and rework, using International Conference of Building Officials certified QC specialists as applicable, to ensure its compliance with contract requirements. Maintain a rework log.

e. Immediately stop any segment of work, which does not comply with the contract requirements and direct the removal and replacement of any defective work.

f. Remove any individual from the site who fails to perform their work in a skillful, safe and workmanlike manner or whose work does not comply with the contract plans and specifications.

g. Prepare daily QC Reports.

**********

**NOTE: Choose the bracketed option below for photographic documentation to support the Daily Reports above, unless photography is prohibited at the job site. Coordinate this requirement with Section 01 14 00, WORK RESTRICTIONS.**

**********

[ h. Provide daily photographic documentation to support the work reported in the Daily Reports. Maintain a file of CD/ DVD disks at the job site that assemble the photographs supporting the daily reports. Organize the supporting photographs into searchable files organized by date and under each date organize the photographs in folders for each definable features of work. Indicate on the disk label and disk holder the date range of pictures contained on each disk. Provide a date stamp on each picture and title each picture with a description of location and viewed components. Provide .jpeg color photograph files that are 300 DPI - printable at 20 cm by 25 cm 8 inch by 10 inch size.

Photograph construction related to existing work to be covered by contract modifications and required rework as follows;

(1) View of as-is conditions prior to modification / rework.

(2) View of as-is conditions with existing exterior enclosure and interior finishes removed before modification / new work begins.

(3) View of new / modified construction prior to being covered by exterior enclosure and interior finishes.

(4) View of completed new / modified construction.

] i. Ensure that Contractor Production Reports are prepared daily.

j. Hold [weekly] [bi-weekly] QC meetings with the DQC Manager, [Commissioning Authority, ]DOR (or representative), Superintendent and the Contracting Officer; participation must be suitable for the phase of work. Distribute minutes of these meetings.

k. Ensure that design and construction submittals are reviewed and approved, as required by the contract, prior to allowing material on site and work to proceed with these items. Maintain a submittal register.

l. Update As-built drawings daily, maintaining up-to-date set on site.

m. Maintain a testing plan and log. Ensure that all testing is performed in accordance with the contract. Review all test reports and notify the Contracting Officer of all deficiencies, along with a proposal for corrective action.

n. Maintain rework log on site, noting dates deficiency identified, and date corrected.

o. Certify and sign statement on each invoice that all work to be paid under the invoice has been completed in accordance with contract requirements.

p. Perform Punch-out and participate in Pre-final and Final acceptance Inspections. Submit list of deficiencies to the Contracting Officer for each inspection. Correct all deficiencies prior to the Final inspection. Notify Contracting Officer prior to final inspection to establish a schedule date acceptable by the Contracting Officer.

q. Ensure that all required keys, operation and maintenance manuals, warranty certificates, and the As-built drawings are correct and complete, in accordance with the contract, and submitted to the Contracting Officer.

r. Assure that all applicable tests, and observations required by the contract are performed.

s. Coordinate all factory and on-site testing, Testing Laboratory personnel, QC Specialists, and any other inspection and testing personnel required by this Contract.

t. Notify the Contracting Officer of any proposed changes to the QC plan.

u. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

v. Update the Performance Assessment Plan as described in Section 01 31 19.05 20 POST AWARD MEETINGS and discuss monthly at a QC meeting.

**********

**NOTE: Choose the following bracketed paragraph for**

**projects not with the scope of the TPC or if a Commissioning Authority is not required. If a Commissioning Authority is required delete the following bracketed paragraph.**

**********

[ w. Coordinate training of Government maintenance personnel with the eOMSI Preparer to assure training materials and training classes are accurate and provide instruction and documentation on critical elements of the products, materials, and systems in the constructed facility. Verify that the Government's operating personnel were trained.

]

**********

**NOTE: Include the following paragraph with Special Inspections are required.**

**********

[ x. Coordinate scheduled work with Special Inspections required by Section 01 45 35.05 20 SPECIAL INSPECTIONS FOR DESIGN-BUILD, the Statement of Special Inspections and the Schedule of Special Inspections.

]

**********

**NOTE: Include the following paragraph when Special Inspections are required and there will not be an SIOR.**

**********

[ y. Supervise all Special Inspectors required by the contract documents and the IBC.

z. Verify the qualifications of all of the Special Inspectors.

aa. Verify the qualifications of fabricators.

bb. Maintain a 3- ring binder for the Special Inspector's daily and biweekly reports. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the DOR.

]1.4.2 DQC Manager

**********

**NOTE: For NAVFAC Pacific projects, delete the first bracketed option below allowing the DQC to be subordinate to the Project Superintendent or the Project Manager. For NAVFAC Atlantic projects, choose the first bracketed option not allowing the DQC to be subordinate to the Project Superintendent or the Project Manager.**

**Choose the second bracketed option below for projects that require a Commissioning Authority.**

**The designer should review specification 01 33 10.05 20 DESIGN SUBMITTAL PROCEDURES to ensure proper coordination with SI submittals.**

**********

The DQC Manager must be a member of the QC organization, must coordinate

actions with the QC Manager [, and must not be subordinate to the Project Superintendent or the Project Manager].[ The DQC Manager may also act as the Commissioning Authority if all Commissioning Authority qualifications are met.]

DQC Manager qualifications:

a. A minimum of [5][_____] years' experience as a design Architect or Engineer on similar size and type designs / or design-build contracts. Provide education, experience, and management capabilities on similar size and type contracts.

b. Be a registered professional engineer or architect with an active registration. Provide proof of registration as part of the resume submittal package.

c. Complete the US Army Corps of Engineers (USACE) course entitled "Construction Quality Management (CQM) for Contractors."

DQC Manager responsibilities:

a. Be responsible for the design integrity, professional design standards, and all design services required.

b. Be a member of the Designer of Record's (DOR) firm, but may not be the DOR or the person stamping and approving final construction drawings or approving submittals.

c. Be responsible for development of the design portion of the QC Plan, incorporation and maintenance of the approved Design Schedule, and the preparation of DQC Reports and minutes of all design meetings.

d. Participate in the Post Award Kick-Off, all design planning meetings, design presentations, partnering, and QC meetings.

e. Implement the DQC plan and must remain on staff involved with the project until completion of the project.

f. Be cognizant of and assure that all design documents on the project have been developed in accordance with the Contract.

g. Provide Design Quality Control Documentation (DQCD) which indicates design coordination of the engineering disciplines. Submit DQCD with the pre-final and final design submittals as required in Section 01 33 10.05 20, DESIGN SUBMITTAL PROCEDURES.

h. Develop the submittal register. Coordinate with each DOR to determine what items need to be submitted, and who needs to approve.

i. Provide QC certification for design compliance.

j. Certify and sign statement on each invoice that all work to be paid to the DOR under the invoice has been completed in accordance with the contract requirements.

k. Prepare weekly DQC Reports that document the work the design team accomplished that week.

l. Coordinate all training requirements with the QC and in accordance with

01 78 23 OPERATION AND MAINTENANCE DATA.

1.4.3 Designer of Record (DOR) Qualifications

The DOR must be a registered design professional, retained by the prime contractor, responsible for the overall design and review of submittal documents prepared by others. The DOR is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in the state in which the design professional works. The DOR cannot serve as the DQC.

[1.4.4 Commissioning Authority (CA)

Commissioning Authority qualifications:

The Commissioning Authority (CA) must be a member of the QC organization, must coordinate actions with the QC Manager, must not be subordinate to the Project Superintendent or the Project Manager, and must report findings directly to the Contracting Officer. The Commissioning Authority may also act as the DQC Manager if all DQC Manager qualifications are met. The Commissioning Authority selected must meet the requirements of the Third Party Certifier (TPC) with the following additional qualifications:

a. Be a certified Building System Commissioning (Cx) Contractor recognized by a Building Commissioning Organization. Acceptable minimum certifications are "Certified Cx Agent" from the Associated Air Balance Council (AABC); "NEBB Building Systems Cx Certified Professional" from National Environmental Balancing Bureau (NEBB); "Certified Building Cx Professional" from the Association of Energy Engineers (AEE); "Certified Cx Professional (CxP)" from the Building Commissioning Association (BCA); or "Commissioning Process Authority Professional" or "Commissioning Process Manager" from the University of Wisconsin College of Engineering.

b. Have documented Commissioning Authority experience in at least two building projects. Provide proof of commissioning experience as part of the Commissioning Plan.

Commissioning Authority Responsibilities:

a. Be responsible for development of the Commissioning Plan, the Summary Commissioning Report, and minutes of all commissioning meetings.

b. Participate in the Post Award Kick-Off, all design planning meetings, design presentations, partnering, and QC meetings.

c. Review the Request for Proposal (RFP) for energy and sustainability goals, system expectations, O&M requirements, training expectations, and construction quality expectations.

d. Review the Basis of Design and ensure the RFP requirements are met.

e. Ensure commissioning requirements are incorporated into the construction documents.

f. Assure the electrical requirements of the actual equipment supplied by the mechanical contractor are verified, reviewed and coordinated with the electrical and other trades.

g. Be responsible for implementation and updating of the Commissioning Plan.

h. Be responsible for development of systems functional testing procedures.

i. Ensure pre-functional installation inspections are performed on all systems indicated to be commissioned in accordance with the Commissioning Plan and Contract documents.

j. Verify systems performance of all systems indicated to be commissioned in accordance with the Commissioning Plan and Contract documents.

k. Report any deficiencies in installation, general performance, operation, and functional performance of all systems indicated to be commissioned.

l. Participate in the eOMSI Field Validation to assure the accuracy of the eOMSI Data and eOMSI Document information prior to the submission of the Final eOMSI submittal.

m. Coordinate training of Government maintenance personnel with the eOMSI Preparer to assure training materials and training classes are accurate and provide instruction and documentation on critical elements of the products, materials, and systems in the constructed facility. Verify that the Government's operating personnel were trained on the information necessary to operate the facility.

]1.4.5 QC Specialists

QC Specialists must assist and report to the QC Manager and may perform production related duties but must be allowed sufficient time to perform their assigned quality control duties. QC Specialists are required to attend the Coordination and Mutual Understanding Meeting, QC meetings and be physically present at the construction site to perform the three phases of control and prepare documentation for each definable feature of work in their area of responsibility at the frequency specified below.

**********

**NOTE: Other than the Fire Protection QC Specialist, only specify QC Specialists for those areas of work of sufficient complexity or size where a specialist is required to supplement the QC Manager. The use of Registered Professional Engineers or Architects for QC Specialists may be allowed in special cases, but only after consultation with and approval by Administering ROICC/FEAD Office. Indicate the specific time and frequency when the QC Specialist must be on site. DO NOT omit the Fire Protection QC Specialist requirements without consent of NAVFAC FPE.**

**********

1.4.5.1 Fire Protection QC Specialist

The Fire Protection QC Specialist (FPQC) must be a U.S. registered Professional Engineer and must be an integral part of the Prime Contractor's Quality Control Organization. This FPQC must have no business relationships (owner, partner, operating officer, distributor, salesman, or technical representative) with any fire protection equipment device

manufacturers, suppliers or installers for any such equipment provided as part of this project. The Fire Protection Designer of Record may serve as the lead Fire Protection QC Specialist, provided the following qualifications are met.

a. Qualifications/Experience: The FPQC must have obtained their professional registration by successfully completing the Fire Protection Engineering discipline examination. This FPQC must have a minimum of 5 years full time and exclusive experience in every aspect of facility design and construction as it relates to fire protection, which includes, but is not limited to, building code analysis, life safety code analysis, design of automatic detection and suppression systems, passive fire protection design, water supply analysis, and a multi-discipline coordination reviews, and construction surveillance.

b. Area of Responsibility: The FPQC is responsible for assuring the proper construction and installation of life safety and fire protection features across all disciplines and trades. The FPQC must be responsible for assuring that life safety and fire protection features are provided in accordance with the design documents, approved construction submittals, and manufacturer's requirements. Examples include, but are not limited to, water distribution systems including fire pumps and fire hydrants, fire resistive assemblies such as spray-applied fire proofing of structural components and fire rated walls/partitions, fire alarm and detection systems, fire suppression and standpipe systems, emergency and exit lighting fixtures, etc.

c. Construction Surveillance: The FPQC is responsible for reviewing and implementing the QC Plan developed by the Fire Protection DOR. The FPQC must visit the construction site as necessary to ensure life safety and fire protection systems are being constructed, applied, and installed in accordance with the approved design documents, approved construction submittals, and manufacturer's requirements. Frequency and duration of the field visits are dependent upon particular system components, system complexity, and phase of construction. At a minimum, field visits must occur just prior to installation of suspended ceiling systems to inspect the integrity of passive fire protection features and fire suppression system piping, and required performance verification testing of all life safety and fire protection systems identified below and in Part 4.

    (1) Preliminary Inspections and Final Acceptance Testing: FPQC must personally witness all preliminary inspections of fire alarm/detection and suppression systems. Once preliminary inspections have been successfully completed, the FPQC must submit a signed certificate to the QC Manager that systems are ready for final inspection and testing. The Naval Facilities Engineering Command Fire Protection Engineer will witness formal tests and approve all systems before they are accepted. The QC Manager must submit the request for formal inspection at least [15][_____] days prior to the date the inspection is to take place. The QC Manager must provide 10 days advance notice to the Contracting Officer and the activity Fire Inspection Office of scheduled final inspections.

d. QC Documentation and Certifications: The following documentation and certification must be prepared by the FPQC. Additional copies must be submitted to the NAVFAC Fire Protection Engineer and the Installation Fire Chief.

(1) Field visit reports. Submit reports documenting all field visits and summarizing all findings.

(2) Inspection and Test reports and certificates. Submit in accordance with the applicable codes, standards, and this RFP.

(3) Final Life Safety/Fire Protection Certification. Provide FPQC certification that all life safety and fire protection systems have been inspected and in the FPQC's professional judgment, have been installed in accordance with the contract documents, approved submittals, and manufacturer's requirements. This certification must summarize all life safety and fire protection features, and must bear the professional seal of the fire protection engineer.

[1.4.5.2 Mechanical QC Specialist

**********

**NOTE: The lists of QC specialists below are templates for other QC specialists. Specialists' scope of work, area of responsibility and frequency of presence at project site are specified in the equipment specifications. The requirements of this list need to be coordinated with the respective equipment sections for consistency.**

**********

| Qualification/Experience in Area of Responsibility | Area of Responsibility | Frequency |
|---|---|---|
| Mechanical Inspector, International Conference of Building Officials (ICBO) Certified / 5 years minimum | Installation and Testing of Boilers | Minimum 3 times a week during installation and full-time during testing |
| Certified Elevator Inspector, certified by an organization accredited by ASME / 5 years minimum | Pretesting to ensure safety code, specification, and building code compliance; provide testing verification report prior to beginning final acceptance test | Once every two weeks during installation, full time during Pretesting |
| Registered Mechanical Engineer (PE)/ QC Specialist | Testing of Installed mechanical systems | Full time during testing |

][1.4.5.3 Building Envelope QC Specialists

| Qualification / Experience in Area of Responsibility | Area of Responsibility | Frequency |
|---|---|---|
| Roofing Manufacturer's Technical Representative / 5 years minimum with roofing system used. | Installation and testing of roofing. | Once a week during installation, two times a Once a week during flashing installation and full time during roof testing. |

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**NOTE: The Special Inspector of Record is required for the following project conditions:**

**1) Seismic Design Category D, E or F; and assigned to Risk Cat III, IV or V.**
**2) Seismic Design Category D, E or F; and with a height greater than 22860 mm 75 ft.**
**3) Seismic Design Category E, assigned to Risk Category I or II and the building is greater than two stories above grade plane.**
**4) Nominal design wind speed in excess of 49 m/sec 110 mph; and assigned to Risk Cat II, IV or V.**
**5) Nominal design wind speed in excess of 49 m/sec 110 mph; and with a height greater than 22860 mm 75 ft..**

**Include the following paragraph when Special Inspections are required.**

**********

[1.4.5.4 Special Inspector [Special Inspector of Record]

The Special Inspector (SI) [Special Inspector of Record (SIOR)] must be an independent third party hired directly by the Prime Contractor. The SI [SIOR] must have not be a company employee of the Contractor or any Sub-Contractor performing the work to be inspected. The qualifications of the SI [SIOR] are defined in Section 01 45 35.05 20 SPECIAL INSPECTIONS FOR DESIGN-BUILD.

]1.4.5.5 Underwater QC Team

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**NOTE: This paragraph to be used only when the inspection of underwater work is required.**

**********

Provide Underwater QC (UWQC) Team at the work site to perform underwater surveillance and inspection for the Contractor. The UWQC Team divers must have current a commercial diver's license, with a minimum of five years experience with underwater inspection. The personnel makeup of the UWQC team must comply with EM 385-1-1, OSHA and local requirements for Contract diving operations. Comply with all the applicable safety requirements of

EM 385-1-1, OSHA and local requirements for Contract diving operations. The UWQC lead diver must be thoroughly familiar with the design plans and specifications to sufficiently understand the engineering aspects of the underwater construction and to be able to recognize and document potential problem areas such as improperly constructed or defective areas. Provide all necessary equipment to conduct surveillance and inspection services, including diver's equipment, dive boat, communication equipment, and photographic/video equipment. Diver(s) must be equipped to maintain two-way communication with QC personnel during diving operations. Prepare and submit a report including photographs and/or videos with the QC report after each dive. Frequency of underwater surveillance and inspection will be [_____] during installation and including final inspection. The UWQC Team must be an independent third party hired directly by the Prime Contractor, and must have no involvement with the design, preparation of Contract, or installation of work.

## 1.5 TESTING

### 1.5.1 Accreditation Requirements

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing must meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the Corporate Office.

### 1.5.2 Laboratory Accreditation Authorities

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**NOTE: Request for listing additional laboratory accreditation programs must be submitted to NAVFACENGCOM EOC/OCR.**

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Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology at http://ts.nist.gov/ts/htdocs/210/214/214.htm , the American Association of State Highway and Transportation Officials (AASHTO) program at http://www.amrl.net/amrlsitefinity/default/aap.aspx , International Accreditation Services, Inc. (IAS) at http://www.iasonline.org, U. S. Army Corps of Engineers Materials Testing Center (MTC) at http://gsl.erdc.usace.army.mil/SL/MTC/, the American Association for Laboratory Accreditation (A2LA) program at http://www.a2la.org/, the Washington Association of Building Officials (WABO) at http://www.wabo.org/ (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) at http://wacel.org/fmi/xsl/wacel/index.xsl (Approval authority by WACEL is limited to projects within Facilities Engineering Command (FEC) Washington geographical area).

### 1.5.3 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures,

techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

1.5.4 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results must be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month, in accordance with paragraph INFORMATION FOR THE CONTRACTING OFFICER.

1.5.5 Test Reports and Monthly Summary Report of Tests

Furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Contracting Officer. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month. Provide a copy of the signed test reports and certifications to the OMSI preparer for inclusion into the OMSI documentation.

1.6 THREE PHASES OF CONTROL

The Three Phases of Control must adequately cover both on-site and off-site work and must include the following for each DFOW.

1.6.1 Preparatory Phase

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**NOTE: Edit as appropriate.**
**********

Notify the Contracting Officer at least two work days in advance of each preparatory phase meeting. The meeting must be conducted by the QC Manager and attended by the Project Superintendent, QC Specialists, and the foreman responsible for the DFOW. [The Special Inspector [Special Inspector of Record] must also attend if required by Special Inspections, as outlined in the Statement of Special Inspections and Schedule of Special Inspections.] When the DFOW will be accomplished by a subcontractor, that subcontractor's foreman must attend the preparatory phase meeting. Document the results of the preparatory phase actions in the [daily Contractor Quality Control Report and in the] Preparatory Phase Checklist. Perform the following prior to beginning work on each DFOW:

a. Review each paragraph of the applicable specification sections;

b. Review the Contract drawings;

c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;

d. Review the testing plan and ensure that provisions have been made to

provide the required QC testing;

[ e. Review Special Inspections required by Section 01 45 35.05 20 SPECIAL INSPECTIONS FOR DESIGN-BUILD, the Statement of Special Inspections and the Schedule of Special Inspections.

] f. Examine the work area to ensure that the required preliminary work has been completed;

g. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;

h. Discuss the specific controls used in construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW; and

i. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Safety Data Sheets (SDS) are submitted.

1.6.2 Initial Phase

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**NOTE: Edit as appropriate.**
**********

Notify the Contracting Officer at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the initial phase with the Project Superintendent, QC Specialists, and the foreman responsible for that DFOW. [The Special Inspector [Special Inspector of Record] must also attend if required by Special Inspections, as outlined in the Statement of Special Inspections and Schedule of Special Inspections.] Observe the initial segment of the DFOW to ensure that the work complies with Contract requirements. Document the results of the initial phase in the [daily CQC Report and in] Initial Phase Checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each DFOW:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

c. Ensure that testing is performed by the approved laboratory, and

d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

e. Ensure manufacturer's representative has performed necessary inspections, if required.

**********
**NOTE: Include the following paragraph if Special Inspections are required.**
**********

[ f. Coordinate scheduled work with Special Inspections required by the

Section 01 45 35.05 20 SPECIAL INSPECTIONS FOR DESIGN-BUILD, the Statement of Special Inspections and the Schedule of Special Inspections.

]1.6.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report:

a. Ensure the work is in compliance with Contract requirements;

b. Maintain the quality of workmanship required;

c. Ensure that testing is performed by the approved laboratory; and

d. Ensure that rework items are being corrected.

**********
**NOTE: Include the following paragraph if Special Inspections are required.**
**********

[ e. Coordinate scheduled work with Special Inspections required by the Section 01 45 35.05 20 SPECIAL INSPECTIONS FOR DESIGN-BUILD, the Statement of Special Inspections and the Schedule of Special Inspections.

]1.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases must be conducted on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

1.6.5 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.7 COMPLETION INSPECTIONS

The Contractor must perform the necessary punch-out, pre-final, and final inspections, compile punch lists, and correct deficiencies.

1.7.1 Punch-Out Inspection

Near the completion of all work or any increment thereof, established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC Manager and the CA must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings, specifications and Contract. Include in the punch list any remaining items on the "Rework Items List", which were not corrected prior to the Punch-Out Inspection. Include within the punch list the estimated date by which the deficiencies will be corrected. Provide a copy of the punch list to the Contracting Officer. The QC Manager, or staff, must make follow-on inspections to ascertain that all deficiencies have

been corrected. Once this is accomplished, notify the Contracting Officer that the facility is ready for the Government "Pre-Final Inspection".

1.7.2 Pre-Final Inspection

The Government and QC Manager will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" will be documented by the QC Manager as a result of this inspection. The QC Manager will ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the Client can be scheduled. Any items noted on the "Pre-Final" inspection must be corrected in a timely manner and be accomplished before the contract completion date for the work or any particular increment thereof, if the project is divided into increments by separate completion dates.

1.7.3 Final Acceptance Inspection

Notify the Contracting Officer at least 14 calendar days prior to the date a final acceptance inspection can be held. State within the notice that all items previously identified on the pre-final punch list will be corrected and acceptable, along with any other unfinished Contract work, by the date of the final acceptance inspection. The Contractor must be represented by the QC Manager, the Project Superintendent, the CA, and others deemed necessary. Attendees for the Government will include the Contracting Officer, other FEAD/ROICC personnel, and personnel representing the Client. Failure of the Contractor to have all contract work acceptably complete for this inspection will because for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract Clause entitled "Inspection of Construction."

1.8 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

1.9 CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

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**NOTE: Preventing indoor air quality problems resulting from the construction process sustains the comfort and health of construction workers and building occupants.**

**********

Submit an IAQ Management Plan within 15 days after [Contract award][notice to proceed] and not less than 10 days before the preconstruction meeting. Revise and resubmit Plan as required by the Contracting Officer. Make copies of the final plan available to all workers on site. Include provisions in the Plan to meet the requirements specified below and to ensure safe, healthy air for construction workers and building occupants.

1.9.1 Requirements During Construction

Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of volatile organic compounds (VOCs) in indoor air in accordance with ASTM D6345. Use filters with a Minimum Efficiency Reporting Value (MERV) of 8 in permanently installed air handlers during construction.

1.9.1.1 Control Measures

Meet or exceed the requirements of ANSI/SMACNA 008, Chapter 3, to help minimize contamination of the building from construction activities. The five requirements of this manual which must be adhered to are described below:

a. HVAC protection: Isolate return side of HVAC system from surrounding environment to prevent construction dust and debris from entering the duct work and spaces.

b. Source control: Use low emitting paints and other finishes, sealants, adhesives, and other materials as specified. When available, cleaning products must have a low VOC content and be non-toxic to minimize building contamination. Utilize cleaning techniques that minimize dust generation. Cycle equipment off when not needed. Prohibit idling motor vehicles where emissions could be drawn into building. Designate receiving/storage areas for incoming material that minimize IAQ impacts.

c. Pathway interruption: When pollutants are generated use strategies such as 100 percent outside air ventilation or erection of physical barriers between work and non-work areas to prevent contamination.

d. Housekeeping: Clean frequently to remove construction dust and debris. Promptly clean up spills. Remove accumulated water and keep work areas dry to discourage the growth of mold and bacteria. Take extra measures when hazardous materials are involved.

e. Scheduling: Control the sequence of construction to minimize the absorption of VOCs by other building materials.

1.9.1.2 Moisture Contamination

a. Remove accumulated water and keep work dry.

b. Use dehumidification to remove moist, humid air from a work area.

c. Do not use combustion heaters or generators inside the building.

d. Protect porous materials from exposure to moisture.

e. Remove and replace items which remain damp for more than a few hours.

1.9.2 Requirements after Construction

After construction ends and prior to occupancy, conduct a building flush-out or test the indoor air contaminant levels. Flush-out must be a minimum two-weeks with MERV-13 filtration media as determined by ASHRAE 52.2 at 100 percent outside air. Air contamination testing must be consistent with EPA's current Compendium of Methods for the Determination of Air Pollutants in Indoor Air. After building flush-out or testing and prior to occupancy, replace filtration media. Filtration media must have a MERV of 13 as determined by ASHRAE 52.2.

PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

Not used.

-- End of Section --