

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01 4523

QUALITY REQUIREMENTS

PART I - GENERAL

1.01. SUMMARY OF QUALITY REQUIREMENTS

A. Section Includes:

1. Administrative and procedural requirements for quality assurance and quality control.
2. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Design-Build Team of responsibility for compliance with the Contract Document requirements.
3. Specific quality-assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
4. Specified tests, inspections, and related actions do not limit Design-Build Team's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
5. Requirements for Design-Build Team to provide quality-assurance and control services required by the Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.02. DESCRIPTION

- A. Establish and maintain a Quality Assurance/Quality Control (QA/QC) program as described in this section. The QA/QC program must cover construction operations on-site and off-site and must be keyed to the proposed construction sequence and serve as the foundation on which the Commissioning Plan will be built and executed for the mechanical and electrical systems.
- B. The process of assuring quality and compliance for the Project will take place in two ways. First, QA/QC must implement a program to monitor, verify, and accept the Work during the construction installation including, without limitation, equipment and the system components. The QA/QC program will coordinate with the Project commissioning and dovetail the monitoring and requirements for systems and equipment. Second the Commissioning program will plan, monitor, verify, and accept the operation and the performance of the equipment and systems.

1.03. REQUIREMENTS

- A. QA/QC Program Requirements - The QA/QC program consists of a QA/QC Organization, a Quality Control (QC) Plan, attending a QA/QC Plan meeting with the Owner, attending a Coordination and Mutual Understanding Meeting with the Owner, conducting QA/QC meetings on site, performing three phases of control: performing submittal review, ensuring testing is performed, and preparing QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. In addition this Section consists of the coordination of the QA/QC program with the Commissioning program.

1.04. DEFINITIONS

A. Quality Assurance Services:

1. Activities, actions, and procedures performed at a level above Quality Control to assure the work performed has in effect a quality control procedure and process performed by those doing the Work to guard against defects and deficiencies and assure that proposed construction will comply with requirements. Includes submittals, certifications, and other actions to assure that the proposed products and services will meet the Contract requirements. Services do not include Contract enforcement activities performed by the Owner.

B. Quality Control Services:

1. Tests, inspections, procedures, and related actions at the level where the work is performed, during and after execution of the Work, to evaluate that actual products and completed construction comply with all Contract requirements.

C. Mockups:

1. Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Laboratory Mockups:

1. Full-size, physical assemblies that are constructed at a testing facility to verify performance characteristics.

E. Preconstruction Testing:

1. Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

F. Product Testing:

1. Tests and inspections that are performed by an Nationally Recognized Testing Laboratory (NRTL), an National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Source Quality Control Testing:

1. Tests and inspections that are performed at the source, i.e., Plant, mill, factory, or shop.

- H. Field Quality Control Testing:
1. Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency:
1. An entity engaged by the Owner or Owner's Construction Manager to perform specific tests, inspections, or both. Testing laboratory will mean the same as testing agency. The testing agency will be under the control of the Owner's Construction Manager.
- J. Installer/Applicator/Erector:
1. Design-Build Team or another entity engaged by Design-Build Team as an employee, Subcontractor, or Sub-subcontractor experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for the Project, whose work has resulted in construction with a record of successful in-service performance
 2. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- K. Experienced:
1. When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to the Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- L. Test:
1. All tests to be performed in the presence of the Owner.
- M. Manufacturer Qualifications:
1. A firm experienced in manufacturing products or systems similar to those indicated for the Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- N. Fabricator Qualifications:
1. A firm experienced in producing products similar to those indicated for the Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- O. Professional Architect/Engineer Qualifications:
1. A professional Architect/Engineer who is legally qualified and licensed to practice in California and who is experienced in providing Architecture and Engineering services of the kind indicated. Architect/Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for the Project in material, design, and extent.

P. Specialists:

1. Certain sections of the Specifications require that specific construction activities will be performed by entities that are recognized experts in those operations. Specialists must satisfy qualification requirements indicated and must be engaged for the activities indicated.
2. Requirement for specialists must not supersede building codes and regulations governing the Work.

Q. Testing Agency Qualifications:

1. An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to American Society for Testing of Materials (ASTM) E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
2. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
3. NVLAP: A testing agency accredited according to National Institute of Standards and Technology's (NIST) NVLAP.

R. Factory-Authorized Service Representative Qualifications:

1. An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for the Project.

S. Preconstruction Testing:

1. Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods.

1.05. REGULATORY REQUIREMENTS

A. General:

1. All applicable federal, County and local requirements will govern the construction and completion of the Work; all must be current enforced editions.

B. Copies of Regulations:

1. Copies of the applicable regulations and codes, federal, County and local to be retained at the Project site to be available for reference by parties who have a reasonable need.

C. Enforcement:

1. References in the Contract Documents to "code" or to "building code" not otherwise identified will mean the foregoing specified codes, together with the additions, changes, amendments and interpretations adopted by the enforcing agency, and in effect on the date the Contract is executed.
2. Nothing on the Contract Documents will be interpreted as requiring or permitting work that is contrary to these rules, regulations and codes.

3. Where other codes or standards are referenced in the Contract Documents, the affected work must meet or exceed the applicable requirements of such codes and standards.
4. The code, specification or standard referred to will have full force and effect as though printed in the Contract Documents, except as modified.
5. Where the Contract Documents call for or describe materials, work quality or construction of a better quality, higher standard or larger size than is required by said laws, codes, rules and regulations, the provisions of the Contract Documents will take precedence over said laws, codes, rules and regulations.

D. Other Applicable Laws and Regulations:

1. Applicable federal, County, and local laws, and the rules and regulations of governing utility districts and the various other authorities having jurisdiction over the construction and completion of the Project, including the latest rules and regulations of the California Labor Code, will apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though printed in the Contract Documents.
2. If laws, ordinances, rules, regulations or orders of public agency having jurisdiction require work to be inspected, tested or approved by some authority other than the Owner or Design-Build Team, the Design-Build Team must give required notices and make arrangements, deliver to the Owner the certificates of inspection, test, or approval of such public agency, and pay costs therefore unless otherwise provided in the Contract Documents.

1.06. CONFLICTING REQUIREMENTS

A. General:

1. If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Owner for a decision before proceeding.

B. Minimum Quantity or Quality Levels:

1. The quantity or quality level shown or specified must be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Owner for a decision before proceeding.

1.07. QUALITY ASSURANCE/QUALITY CONTROL ON INSTALLATION

- A. Monitoring - Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship to produce work of the specified quality.
- B. Compliance - Comply fully with manufacturers' instructions including each step in sequence and comply fully with the Contract documents inclusive of the entirety of the intent of the Design Criteria.

- C. Conflicts - Should manufacturers' instructions conflict with the Contract Documents, request clarification from University's Representative before proceeding.
- D. Standards:
 - 1. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, code, or specified requirements indicate higher standards or more precise workmanship.
 - 2. Perform Work by persons qualified to produce workmanship of specified quality.
- E. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, code, or specified requirements indicate higher standards or more precise workmanship.
- F. Coordination of all above-ceiling work is mandatory prior to any installation.
 - 1. Documentation of such coordination will be required prior to applicable installation taking place in the specific area concerned.

1.08. VERIFICATION OF CONDITIONS

- A. Prior to installing any portion of the Work, Design-Build Team must inspect the work already in place to receive the work to be installed and arrange for correction of defects in the existing workmanship, material or conditions that may adversely affect work to be installed. Such inspections must include test applications of the materials to be installed as required to establish the correct condition of surfaces involved. Where the specifications require a material to be installed under the supervision or inspection of the material manufacturer or its representative, Design-Build Team must ensure that the manufacturer or its representative also inspects the work in place and issues a letter of approval to the Owner.

1.09. REFERENCES

- A. The publications listed below form a minimum part of this specification to the extent referenced. The current editions of the publications are referred to in the text by the basic designation only.
 - 1. ASTM A 880 - Criteria for Use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys
 - 2. ASTM C 1077 Laboratories Testing Concrete and Concrete Aggregates for Use In Construction and Criteria for Laboratory Evaluation
 - 3. ASTM D 3666 (Rev. A) - Evaluating and Qualifying Agencies Testing and Inspecting Bituminous Paving Materials
 - 4. ASTM D 3740 - Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
 - 5. ASTM E 329 - Evaluation of Testing and Inspection Agencies as Used in Construction
 - 6. ASTM E 543 (Rev. A) - Determining the Qualification of Non-Destructive Testing
 - 7. ASHRAE – American Society of Heating, Refrigeration, and Air Conditioning Engineers
 - 8. AWS – American Welding Society
 - 9. SMACNA – Sheet Metal and Air Conditioning Contractors National Association
 - 10. ACI – American Concrete Institute

11. AABC – American Air Balance Council
12. NETA – International Electrical Test and Acceptance Association
13. IEEE – Institute of Electrical and Electronic Engineers
14. All other standards as referenced throughout this set of Specifications

1.10. SUBMITTALS

- A. Quality Assurance/Quality Control (QA/QC) Plan: Submit a QA/QC Plan for the Owner's review within thirty (30) days prior to commencement of construction.
- B. Schedule of Tests and Inspections:
 1. Prepare in tabular form and include the following, as applicable:
 - a. Specification Section number and title.
 - b. Description of test and inspection.
 - c. Identification of applicable standards.
 - d. Identification of test and inspection methods.
 - e. Number of tests and inspections required.
 - f. Time schedule or time span for tests and inspections.
 - g. Entity responsible for performing tests and inspections.
 - h. Requirements for obtaining samples.
 - i. Unique characteristics of each quality control service.
- C. Reports:
 1. QA/QC Reports.
 - a. Daily Inspection Reports.
 - b. Public Utility Acceptance Reports.
 - c. State of California Inspection Reports
 - d. Visitor Observation Reports.
 - e. Product Manufacturers Inspection Reports (roofing, waterproofing, etc.).
 2. Prepare and submit certified written reports that include the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making tests and inspections.
 - f. Description of the Work and test and inspection method.
 - g. Identification of product and Specification Section.
 - h. Complete test or inspection data.
 - i. Test and inspection results and an interpretation of test results.
 - j. Record of temperature and weather conditions at time of sample taken and testing and inspecting.
 - k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - l. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates:

1. For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

E. Testing Agency Responsibilities:

1. Submit a certified written report of each test, inspection, and similar quality-assurance service to the Owner, with copy to Design-Build Team. Interpret tests and inspections in each report whether tested and inspected work complies with or deviates from the Contract Documents.

F. Design-Build Team Responsibilities:

1. Include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance specifications.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for the Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. If any offsite or site-cast concrete panel fabrication is performed, a qualified QA/QC representative from the Design-Build Team is required to review and sign off all panels for installation of all embeds, insets, components, and infrastructure, prior to concrete placement. This includes reviewing the panels for completeness, and dimensioning of all cast-in-place components.
 - g. Offsite concrete fabricators over 50 miles from jobsite shall be Precast/Prestressed Institute of America (PIA) certified.
 - h. Offsite steel fabricators over 50 miles from jobsite shall be American Institute of Steel Construction (AISC) certified.
 - i. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on the Project. Location of mock-up to be determined by Sheriff's Staff.
 - j. Provide a full-time QA/QC Manager committed to the Project.

G. Mockups

1. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
2. Build mockups in location and of size indicated or, if not indicated, as directed by the Owner.
3. Notify the Owner seven (7) days in advance of dates and times when mockups will be constructed.

4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain the Owner's approval of mockups before starting work, fabrication, or construction. Allow seven days for initial review and each re-review of each mockup.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. When directed, demolish and remove mockups.

H. Laboratory Mockups

1. Comply with requirements of pre-construction testing and those specified in individual Sections and Divisions.

1.11. QA/QC Organization

A. QA/QC Manager:

1. Duties: The QA/QC Manager's duties on the Project are limited to the responsibility of managing and implementing the QA/QC program on a full-time basis. The QA/QC Manager is required to attend the QA/QC Plan meeting, attend the Coordination and Mutual Understanding Meeting, conduct the QA/QC meetings, perform submittal review, ensure testing is performed and prepare QA/QC certifications and documentation required in this Contract. The QA/QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by the QA/QC specialists. No Work or testing may be performed unless the QA/QC Manager or the Designated Alternate QA/QC Manager is on the Project site. The QA/QC Manager must report directly to an officer of the Design-Build Team's Entity and must not be the same individual as, nor be subordinate to, the Project Superintendent or the Design-Build Team's Project Manager. The QA/QC Manager will coordinate the QA/QC activities with the Owner and the IOR, insuring a consistent and progressive verification of the mechanical and electrical systems from the installation Quality Control program through the operation and performance acceptance of the Project.
2. Commissioning program. The QA/QC Manager must assure that inspections by the Design-Build Team's work force have occurred prior to calling on the Owner's Inspectors for an inspection. This will minimize the failed inspections recorded and documented by the Owner.
3. Qualifications: A graduate of a four-year, accredited college program in one of the following disciplines: Engineering, Architecture, Construction Management, Engineering Technology, Building Construction, or Building Science with a minimum of ten (10) years experience as an inspector, QA/QC Manager, project manager, or construction manager on major and complex projects of similar size and scope. Submit qualifications for review and acceptance by the Owner. Show examples where candidate performed similar duties and responsibilities. Examples should describe QA/QC Programs of similar type Projects, including health facilities.

- B. Alternate QA/QC Manager Duties and Qualifications: Designate an alternate for the QA/QC Manager at the Project site to serve in the event of the designated QA/QC Manager's absence. The educational and experience requirements for the Alternate QA/QC Manager will be similar to those for the QA/QC Manager. This individual must also act as an alternate to the Project QA/QC and will serve in the event of the designated QA/QC's absence.
- C. QA/QC Specialists Duties and Qualifications: Provide a QA/QC specialist at the Project site for each of the areas of responsibilities specified below, who will assist and report to the QA/QC Manager, and who will have no duties other than performing the three phases of control and preparing documentation required in this Contract. Pertinent QA/QC specialists are required to attend the Coordination and Mutual Understanding Meeting, QA/QC meetings, and 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. The mechanical and electrical specialists will also assist in the commissioning activities, specifically the monitoring of the Start Up and Functional Performance Tests (FPT).

TABLE A

QUALIFICATION EXPERIENCE IN AREA OF RESPONSIBILITY	AREA OF RESPONSIBILITY	(FREQUENCY)
Plumbing, fire protection and/or piping installation contractor, mechanic, or superintendent with 10 years experience.	Installation and testing of piping systems; assist in the monitoring of the Start Up and FPT's.	Full-time during roughing plumbing and piping installations
Sheet metal contractor, mechanic, or superintendent with 10 years experience.	Installation & testing all ductwork systems; assist in the monitoring of the Start Up and FPT's.	Full-time during ductwork installation
Building controls manufacturer's representative with 5 years experience.	Operation and performance of the controls system, review controls submittals	Part-time during the submittal and installation stage. Full time during the point-by-point evaluation of the system, refer to Division 1 and Division 15

Electrical contractor/journeyman w/ CA license as electrician and a fire alarm contractor/journeyman or vendor.	Installation & testing normal and essential power systems; assist in the monitoring of the Start Up and FPT's.	Full-time during installation, wiring, connection, etc. & testing; refer to Division 1 and Division 16 Part- time during submittal, raceway rough in
Roofing Manufacturer's representative with 5 years minimum.	Installation and testing of the roofing systems	Full-time during roofing operations
Waterproofing consultant/manufacturer's Technical Representative.	Installation & testing of waterproofing systems	Full-time during waterproofing operations

D. Submittal Review Duties and Qualifications:

1. Submittal Assistant: Provide a full-time Submittal Assistant at the Project site until 95 percent of the submittals have been approved. Sole duty of the Submittal Assistant will be to assist the QA/QC Manager in processing, certifying QC compliance and maintaining files for submittals. Submittal Assistant must have a minimum of (3) years experience as a project engineer, scheduler or construction- related worker.

1.12. QA/QC PLAN

- A. Requirements: Provide for review by the Owner, a QA/QC Plan that covers both on-site and off-site Work, and includes the following:
1. A chart showing the QA/QC organizational structure and its relationship to the production side of the organization.
 2. Names and qualifications, in resume format, for each person in the QA/QC organization.
 3. Duties, responsibilities and authorities of each person in the QA/QC organization.
 4. Documentation procedures, including proposed report formats for all reports required herein.
 5. A letter signed by an officer of the firm appointing the QA/QC Manager and stating that he/she is responsible for managing and implementing the QA/QC program as described herein, and that the QA/QC Manager reports to an officer of the firm, someone other than Design-Build Team's Project Manager. Include in this letter the QA/QC Manager's authority to direct the stopping, removal and replacement of non- conforming Work.

6. Procedures for reviewing, approving and managing submittals. Provide the name(s) of the person(s) in the QA/QC organization authorized to review and certify submittals prior to approval.
 7. A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, test procedures, the frequency, schedule activity number and the person responsible for each test.
 8. Procedures to identify, record, track and complete rework items, including schedule activity numbers.
 9. A listing of outside organizations such as, architectural and consulting engineering firms that will be employed by Design-Build Team and a description of the services and resumes of personnel these firms will provide.
 10. A list of the definable features of work. A definable feature of work is a task that is separate and distinct from other tasks and requires separate control requirements. As a minimum, unless otherwise accepted by the Owner, consider each section of the specifications as a definable feature of work. However, there may be more than one definable feature of work in each section of the specifications.
 11. A personnel matrix showing, for each section of the specification, who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document the testing.
 12. Provide procedures describing mandatory above ceiling coordination prior to the execution of any above ceiling work.
- B. Preliminary Work Authorized Prior to Review and Acceptance: The only work that is authorized to proceed prior to the acceptance of the QA/QC Plan is mobilization of storage and office trailers and surveying, the preparation of excavation shoring systems, and removal of hazardous materials. Design-Build Team must not proceed on other activities without written authorization from the Owner.
- C. Acceptance of conformance with Bridging Documents: Acceptance of the QA/QC Plan for conformance to the Bridging Documents is required before the start of construction. Owner reserves the right to require changes in the QA/QC Plan and operations as necessary to ensure the specified quality of Work. Owner reserves the right to interview any member of the QA/QC organization at any time in order to verify his/her submitted qualifications.
- D. Notification of Changes: Submit written notification to Owner of any proposed change, including changes in the QA/QC organization personnel, a minimum of seven (7) days prior to a proposed change. Design-Build Team must receive Owner approval prior to implementing such proposed changes.

1.13. QUALITY ASSURANCE

- A. General:
1. Qualifications paragraphs in this Article establish the minimum qualification levels required; see this Section, Part 3 – Execution. Individual Specification Sections specify additional requirements.

B. Design-Build Team's Records

1. Maintain accurate, current records on an appropriate form for all inspections and tests performed, instructions received from the Owner, firm or individual performing test, and actions taken as a result of those instructions.
2. These records must include evidence that the required inspections or tests have been performed (including type and number of inspections or tests, nature of defects, causes for rejection, etc.), proposed or directed remedial action, and corrective action taken.
3. Document inspections and tests as required by each Specification Section

C. Design Quality Program

1. The Design-Build Team's Quality Control Program must include, but not limited to, Design-Build Team's procedures for thoroughly reviewing the Design Documents for:
 - a. Functionality
 - b. Design Excellence
 - c. Sustainability
 - d. Maintainability
 - e. Coordination among disciplines
 - f. Constructability
 - g. Value Engineering
 - h. Quality Engineering
 - i. Life Cycle
 - j. Energy Efficiency
 - k. Fire Life Safety
 - l. Code Compliance

D. Construction Quality Control Plan

1. The Design-Build Team's Quality Control Program must include, but not limited to, Design-Build Team's procedures to review construction through completion of the Project with emphasis on the following:
 - a. Installation of construction site security and monitoring.
 - b. Maintenance of fire & life safety program.
 - c. Coordination.
 - d. Mitigation for noise, dust, runoff during construction and all California Environmental Quality Act (CEQA) Mitigation issues.
 - e. Payment of all fees permits and licenses.
 - f. Monitoring for construction and employee, parking, deliveries and storage.
 - g. Protection of the Public and their use of the right of way surrounding the construction site.
 - h. Protection of archaeological resources (if applicable).
 - i. Protection of the plants and trees.
 - j. Protection, reinstatement of existing utilities and services.
 - k. Staging and shoring of all excavations.
 - l. Excavation of sub-grade and placement of compacted fill.

- m. Excavation, placement, backfill and compaction of utilities and services.
- n. Testing, inspections, certifications and placement of concrete foundations and structures.
- o. Testing, inspections, certifications, erection and assembly of structural components.
- p. Testing, inspection, certifications of all electrical services, transformers, switchgear and equipment
- q. Testing, inspection, certifications of all pipelines, valves and equipment, including but not limited to:
 - 1) Diesel and gas
 - 2) Steam and condensate
 - 3) Cooling water, supply and return
 - 4) Water reticulation, including domestic and well systems
 - 5) Filtration and conditioning systems
 - 6) Sewer and storm drainage systems
 - 7) Testing, inspection, and certification of all machinery, mechanisms and equipment.
- r. Testing, inspection, certification of upgrade and integration of controls systems.
- s. Not Used
- t. Testing, inspection of all architectural features and finishes.
- u. Commissioning, occupancy, post occupancy and handover including but not limited to:
 - 1) Landscape and gardens
 - 2) Buildings and structures
 - 3) Plant machinery, mechanisms, and equipment
 - 4) Utilities and services
 - 5) Controls and security systems

1.14. TESTING LABORATORY SERVICES

A. Testing Responsibility:

- 1. The Owner's Construction Manager will employ and pay for services of an independent testing laboratory to perform specified testing per CCR Title 24, and any other testing specifically indicated in the Contract Documents to be the Owner's responsibility.
 - a. The Owner will furnish Design-Build Team with names, addresses, and telephone numbers of the independent testing laboratory and the Owner Representative responsible for monitoring the testing.
 - b. Design-Build Team must cooperate with laboratory to facilitate execution of its required services.
- 2. Design-Build Team will employ and pay for services related to testing, adjusting, and balancing of systems as specified under individual sections.

B. Required Tests and Inspection

- 1. Testing and inspection services are required to verify compliance with the Contract Documents. These services will, in no way, relieve the Design-Build Team from its obligations to perform the work of the Contract.

- a. Required testing and inspection services for specific construction and/or material production activities are referenced in individual Sections, as applicable.
- b. Specified tests, inspections, and related activities do not preclude Design-Build Team's quality control procedures that facilitate compliance with the Contract Document requirements.

C. Design-Build Team's Responsibilities

- 1. Cooperate with laboratory personnel and Owner representative; provide access to work and to manufacturer's operations.
- 2. Provide laboratory with adequate quantities of representational samples of materials proposed to be used which require testing.
- 3. Provide to laboratory preliminary design mix proposed to be used for concrete, and other material mixes which require control by testing laboratory.
- 4. Furnish copies of products tests reports as required.
- 5. Furnish incidental labor and facilities:
 - a. To provide access to work to be tested.
 - b. To obtain and handle samples at the Project site or at source of product to be tested.
 - c. To facilitate inspections and tests.
 - d. For storage and curing of test samples.
- 6. Notify Owner representative 48 hours in advance of operations to allow for laboratory assignment of personnel and scheduling of tests and/or inspections. When tests or inspections cannot be performed after such notice due to any factors for which Design-Build Team is responsible, Design-Build Team must reimburse the Owner for all laboratory personnel labor and travel expenses incurred.
 - a. Notifications must include:
 - 1) Specification section number and title.
 - 2) Description of test and/or inspection.
 - 3) Identification of all applicable standards.
 - 4) Identification of test and inspection methods.
 - 5) Number of tests and inspections required.
 - 6) Time schedule or time span for tests and inspections.
 - 7) Requirements for obtaining samples.
 - 8) Any unique characteristics or required test or inspection.
- 7. Retesting or additional inspection required due to nonconformance with the Contract Documents must be performed by the Owner's Construction Managers independent testing laboratory at the Design-Build Team's expense.
- 8. Testing and inspection requested by Design-Build Team and not required by the Contract Documents are Design-Build Team's responsibility.

9. When additional testing services are needed for Design-Build Team's convenience, Design-Build Team will employ and pay for the services of a separate, equally qualified independent testing laboratory or make arrangements with Owner's laboratory and pay for such additional samples and tests.
10. The Owner Representative will have the right to reject materials and workmanship which are defective or to require correction. Rejected workmanship must be satisfactorily corrected and rejected materials must be removed from the premises without charge to the Owner. If Design-Build Team does not correct such rejected work within a reasonable time, fixed by written notice, the Owner may correct same and charge the expense to Design-Build Team.
11. Should it be considered necessary or advisable by the Owner at any time before Acceptance of the Work to make examination of work already completed by removing or tearing out same, Design-Build Team must, on request, promptly furnish necessary facilities, labor and materials. If such work is found to be defective in any respect due to fault of Design-Build Team or subcontractor, will defray all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet requirements of the Contract Documents, additional cost of labor and material necessary involved in the examination and replacement will be allowed the Design-Build Team.

1.15. TEST AND INSPECTION LOG A.

A. General:

1. Prepare a record of tests and inspections. Include the following:
 - a. Date test or inspection was conducted.
 - b. Description of the Work tested or inspected.
 - c. Date test or inspection results were transmitted to Owner.
 - d. Identification of testing agency or special inspector conducting test or inspection.
2. Maintain log at the Project site. Post changes and modifications as they occur. Provide access to test and inspection log for the Owner's reference during normal working hours.
3. As a minimum, Design-Build Team must obtain the following tests and/or inspections:
 - a. Soils:
 - 1) Test and analyze fill and backfill materials.
 - 2) Test compaction of fill and backfill materials.
 - 3) Inspect bearing surfaces of foundation excavation.
 - 4) Test compaction trench backfill.
 - 5) Test compaction aggregate under asphalt concrete paving.
 - 6) Test compaction aggregate under site concrete.
 - b. Asphalt concrete:
 - 1) Test asphalt.
 - 2) Test compaction of asphalt.
 - c. Concrete:
 - 1) Test identified reinforcing steel.
 - 2) Test cement.

- 3) Test aggregate for suitability.
- 4) Review concrete mix design.
- 5) Perform continuous batch Plant inspection.
- 6) Test concrete for air content.
- 7) Inspect concrete placement.
- 8) Perform shrinkage tests.
- 9) Make slump tests.
- 10) Cast compression test cylinders. Test cylinders at 7 and 28 days.
- d. Post-tensioning:
 - 1) Continual post-tension inspections.
 - 2) Test identified strands.
- e. Structural steel:
 - 1) Review mill certificates for shapes and plates.
 - 2) Visually inspect shop and field welding.
 - 3) Test full penetration welds.
- f. Metal fabrications:
 - 1) Visually inspect shop and field welding.
 - 2) Test full penetration welds.
- g. Exterior and interior stone veneer:
 - 1) Modulus of rupture, flexure, and other tests.
 - 2) Accelerated aging tests.
 - 3) Production testing.
- h. Fireproofing:
 - 1) Test fireproofing.
 - 2) Test thickness and density.

1.16. QA/QC PLAN MEETING

- A. Prior to submission of the QA/QC Plan, meet with Owner and IOR to discuss the QA/QC Plan requirements of this Contract. The purpose of this meeting is to develop a mutual understanding of the QA/QC Plan requirements prior to plan development and submission.

1.17. COORDINATION AND MUTUAL UNDERSTANDING MEETING

- A. After submission of the QA/QC Plan, but prior to the start of construction, meet with Owner to discuss the QA/QC program required by this Contract. The purpose of this meeting is to develop a mutual understanding of the QA/QC details, including forms to be used for documentation, administration for on-site and off-site Work, and the coordination of Design-Build Team's management, production and QA/QC personnel with the Owner. As a minimum, Design-Build Team's personnel required to attend must include the project manager, project superintendent, QA/QC Manager, and QA/QC specialists. Minutes of the meeting must be prepared by the QA/QC Manager and signed by both Design-Build Team and Owner.

1.18. QA/QC MEETINGS ON SITE

- A. After the start of construction, the QA/QC Manager must conduct weekly QA/QC meetings at the Project site with the project superintendent (not "superintendent staff") and QA/QC specialists. The QA/QC Manager must prepare the minutes of the meeting and provide a copy to Owner within two working days after the meeting. Owner may attend these meetings. The QA/QC Manager must notify Owner at least (2) working days in advance of each meeting. As a minimum, the following must be accomplished at each meeting:

1. Review the minutes of the previous meeting;
2. Review the schedule and the status of Work:
 - a. Work or testing accomplished since last meeting
 - b. Rework items identified since last meeting
 - c. Rework items completed since last meeting
 - d. Review the mandatory coordination of all above-ceiling work
3. Review the status of submittals:
 - a. Submittals reviewed and approved since last meeting b. Submittals required in the near future
4. Review the Work to be accomplished in the next fourteen (14) days and documentation required. Schedule the three phases of control and testing:
 - a. Establish completion dates for rework items
 - b. Preparatory Phases required
 - c. Initial phases required
 - d. Follow-up phases required
 - e. Testing required
 - f. Status of off-site Work or testing
 - g. Documentation required
5. Resolve QA/QC and production problems
6. Address items that may require revising the QA/QC Plan:
 - a. Changes in QA/QC organization personnel
 - b. Changes in procedures.

1.19. THREE PHASES OF CONTROL

- A. The QA/QC Manager must perform three phases of control to ensure that Work complies with requirements of the Performance Criteria, and the Specifications. The three phases of control must adequately cover both on-site and off-site Work and must include the following for each definable feature of Work: a definable feature of Work is a task which is separate and distinct from other tasks and requires separate control requirements as defined in Paragraph 1.12.A.11 herein.
 1. Preparatory Phase: This phase is defined as: The QA/QC control phase, which occurs before the specific Work. During this phase the QA/QC team gathers information, prepares preliminary documentation and meets to discuss the work condition and process. Notify Owner at least (2) working days in advance of each Preparatory Phase meeting. Conduct a Preparatory Phase meeting with the QA/QC specialists, the Superintendent, subcontractor and the foreman responsible for the definable feature. The Preparatory Phase meeting must be conducted a minimum of five (5) working days and a maximum of ten (10) working days prior to the scheduled start of work for the definable feature. Owner may attend these meetings. The Commissioning Authority (CA) will attend these meetings. The QA/QC Manager must prepare minutes of the Preparatory Phase meetings and provide a copy to Owner within two (2) working days after each meeting. Document the results of Preparatory Phase actions in the daily Design-Build Team Quality Control Report. Perform the following tasks and submit a completed Preparatory Phase check off report to Owner within two (2) working days prior to beginning work on each definable feature of work:
 - a. Review each paragraph of the applicable specification sections;

- b. Review the Contract Document documents including the Design Criteria;
 - 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 testing schedule and ensure that provisions have been made to provide the required QA/QC testing. The testing plan must list the parts of the testing process, application, phasing, pass/fail and remedy.
 - e. Examine the work area to ensure that the required preliminary work has been completed;
 - f. 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;
 - g. Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted;
 - h. Discuss construction methods and construction methods form.
 - i. Confirm above ceiling coordination is reconciled and that the intended systems' installations will be accessible for servicing. Provide written documentation that this coordination has, in fact, been completed prior to any installation taking place in the specific area concerned.
2. Initial Phase: This phase is defined as: The QA/QC control phase, which occurs as the specific Work begins. Notify Owner at least two (2) working days in advance of each Initial Phase. When construction crews are ready to start work on a definable feature of work, conduct the Initial Phase with the QA/QC Specialists, the Superintendent, and the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of Work to ensure that the Work complies with Contract requirements. Document the results of the Initial Phase in the daily Design-Build Team Quality Control Report. Repeat the Initial Phase for each new crew to work on-site, or when quality falls below specified acceptable levels. Perform the following for each definable feature of Work:
- a. Each system being tested at one time
 - b. The test procedure reference
 - c. The pass/fail criteria
 - d. The schedule for tests
 - e. Confirm the quality of Workmanship required
 - f. Resolve potential conflicts
 - g. Review the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met
 - h. Ensure that testing is performed by the approved laboratory
3. Follow-Up Phase: This phase is defined as: The QA/QC control phase which occurs as the specific Work continues to progress until its completion. Perform the following for on-going work daily, or more frequently, as necessary, until the completion of each definable feature of Work. Document in the daily Design-Build Team Quality Control Report:
- a. Ensure the work is in compliance with Contract requirements, including final sign off by the Inspector of Record (IOR)
 - b. Verify the quality of workmanship required
 - c. Ensure that testing is performed by the approved laboratory
 - d. Ensure that rework items are being corrected

4. Notification of Three Phases of Control for Off-Site Work: Notify Owner at least fourteen (14) days prior to the start of the Preparatory and Initial phases.

1.20. QA/QC CERTIFICATIONS

- A. Design-Build Team Quality Control Report Certification: Each Design-Build Team Quality Control Report must contain the following Statement: "On behalf of Design-Build Team, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the Contract Documents to the best of my knowledge, except as noted in this report."
- B. Invoice Certification: Furnish a certificate to Owner with each Application for Payment, signed by the QA/QC Manager, attesting that Record Drawings are current and attesting that the work for which payment is requested, including stored material, is in compliance with Contract requirements.
- C. Completion Certification: Upon completion of all or a designated portion of the Work, furnish a certificate to Owner, signed by the QA/QC Manager, attesting that "the work has been completed, inspected, tested and is in compliance with the Contract requirements".

1.21. DOCUMENTATION

- A. Maintain current and complete records of on-site and off-site QA/QC program operations and activities, as well as Owner testing.
 1. Design-Build Team Daily Report: Reports are required for each day that Work is performed and must be attached to Design-Build Team Quality Control Report prepared for the same day. Account for each day throughout the life of the Contract. The reporting of Work must be identified by terminology (activity number and description) consistent with the Construction Schedule. Design-Build Team Daily Reports must be prepared, signed and dated by Design-Build Team's Project Superintendent and must include the following information:
 - a. Date of report, name of Design-Build Team, title and location of Contract and Superintendent present.
 - b. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.
 - c. A list of Design-Build Team and subcontractor personnel on the Project site, their trades, employer, work location, description of work performed (keyed to schedule activity numbers) and hours worked.
 - d. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:
 - 1) Was a job safety meeting held? (If YES, attach a copy of the meeting minutes.)
 - 2) Were there any lost time accidents? (If YES, attach a copy of the completed OSHA report.)
 - 3) Was trenching/scaffold/high voltage electrical/high work done? (If YES, attach a statement or checklist showing inspection performed.)
 - 4) Was hazardous material/waste released into the environment? (If YES, attach report of actions taken.)
 - 5) Meetings held.

- e. Include a "remarks" section in this report which must contain pertinent information including directions received, problems encountered during construction and delays, conflicts or errors in the drawings, specifications or coordinated drawings, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the Project site.
2. Design-Build Team Quality Control Report: Reports are required for each day that Work is performed and for every seven (7) consecutive days of no-work and on the last day of a no-work period. Account for each day throughout the life of the Contract. The reporting of Work must be identified by terminology and activity codes consistent with the construction schedule. Design-Build Team Quality Control Reports must be prepared, signed and dated by the QA/QC Manager and must contain the following information:
- a. Identify the control phase (Preparatory, Initial, and Follow-up) and the definable feature of work.
 - b. Results of the Preparatory Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedule have been discussed.
 - c. Results of the Initial Phase meetings held including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, test results are acceptable, work is in compliance with the Contract requirements, and the required testing has been performed and include a list of who performed the tests.
 - d. Results of the Follow-up Phase inspections held including the location of the definable feature of work. Indicate if the report for this definable feature of Work that the work complies with the Contract requirements as approved in the Initial Phase, and that required testing has been performed and include a list of who performed the tests.
 - e. Results of the three Phases of Control for off-site work, if applicable, including actions taken.
 - f. List the rework items identified, but not corrected by close of business.
 - g. List the rework items corrected from the rework items list along with the corrective action taken.
 - h. Include a "remarks" section in this report which must contain pertinent information including directions received, quality control problem areas, deviations from the QA/QC Plan, construction deficiencies encountered, QA/QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by the QC Organization and corrective action taken by Design-Build Team.
 - i. Design-Build Team Quality Control Report certification.
3. Reports from the QC Specialist(s): Reports are required for each day that Work is performed in their area of responsibility. QC specialist reports must include the same documentation requirements as Design-Build Team Quality Control Report for their area of responsibility, QC specialist reports must be prepared, signed

and dated by the QC specialists and must be attached to Design-Build Team Quality Control Report prepared for the same day.

4. Testing Plan and Log: As tests are performed, the QA/QC Manager must record on the "Testing Plan and Log" the date the test was conducted, the date the test results were forwarded to IOR, remarks and acknowledgement that an accredited or approved testing laboratory was used. Attach a current updated copy of the "Testing Plan and Log" to the last daily Design-Build Team Quality Control Report of each month.
5. Rework Items List: The QA/QC Manager must maintain a list of work that does not comply with the Contract requirements, identifying what items need to be reworked, the date the item was originally discovered, and the date the item was corrected. Attach the current copy of the "Design-Build Team Rework Items List" to the last daily Design-Build Team Quality Control Report of each month. Design-Build Team will be responsible for including on this list items needing rework including those identified by Owner.
6. Record Drawings: The QA/QC Manager is required to review the Record Drawings to ensure that the drawings are kept current on a daily basis and marked to show precise locations of items, or any deviations, which have been made from the Construction Drawings. The QA/QC Manager, or QC Specialist assigned to an area of responsibility, must initial each deviation and each revision. Upon completion of Work, the QA/QC Manager must furnish a certificate attesting to the accuracy of the Record Drawings and verification by the IOR prior to submission to Owner.
7. Report Forms:
 - a. The reporting format must contain the following information:
 - 1) Design-Build Team Daily Report
 - 2) Design-Build Team Quality Control Report and Separate Continuation Sheets
 - 3) Testing Plan and Log
 - 4) Rework Items List
 - 5) Construction Methods Form
 - 6) QA/QC Manager's Preparatory Phase Check-off Report
 - b. Report forms must be transmitted via a method acceptable to Owner. All original documents, reports, completed forms, etc. must be forwarded to the Owner.

1.22. REPAIR AND PROTECTION

A. General:

1. Repair and protection are Design-Build Team's responsibility, regardless of the assignment of responsibility for quality control services. Comply with Section 01 73 29, Cutting and Patching.
2. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes. Protect construction exposed by or for quality control service activities.

3. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

PART II - PRODUCTS NOT USED

PART III - EXECUTION

3.01. Quality Control Team and Qualifications

- A. The Design-Build Team must employ the services of an American Society for Quality (ASQ) - certified engineer, or equivalent or better. He will comply with Paragraph 1.11, have a four-year degree, at least three (3) years' experience in QA/QC (10 years' experience overall), and a complete understanding of the following fundamentals:
 1. Liaison with construction management staff, trades and subcontractors, Plant operational staff, fire and life safety officers, security officers to ensure continued seamless execution of site development from mobilization thru to post occupancy.
 2. Quality philosophies, principles, systems, methods, tools, standards, organizational and team dynamics, customer expectations and satisfaction, supplier relations and performance, leadership, training, interpersonal relationships, improvement systems and professional ethics.
 3. Quality system and its development, documentation and implementation to domestic and international standards or requirements.
 4. Audit process including types of audits, planning, preparation, execution, reporting results and follow-up.
 5. Implementation of quality programs, including tracking, analyzing, reporting and problem solving.
 6. Be able to plan, control and assure product and process quality in accordance with quality principles, which include planning processes, material control, acceptance- sampling and measurement systems.
 7. Have basic knowledge of reliability, maintainability, and risk management, including key terms and definitions, modeling, systems design, assessment tools and reporting.
 8. Have a thorough understanding of problem-solving and quality improvement tools and techniques. This includes knowledge of management and planning tools, quality tools, preventive and corrective actions, and how to overcome barriers to quality improvements.
 9. Be able to acquire and analyze data using appropriate standard quantitative methods across a spectrum of business environments to facilitate process analysis and improvements.

END OF SECTION