



Module 3: QUALITY MANAGEMENT PLANNING

Submodule 1: Purpose and Components

Objectives: After completing this submodule, you will be able to:

- Identify the components of a QA Plan.
- Define the Quality Control (QC) Plan.
- Identify the components of the QC Plan.

A. The Quality Assurance Plan:

1. The QA Plan is a Government document used as a management tool. It is required by ER 1180-1-6 and by P-445. It is not a contract requirement. The components of a QA Plan are:
 - Government staffing requirements.
 - Functions of each QA team member.
 - Government training requirements.
 - Government pre-award activities.
 - Definable Features of Work (DFOW) list.
 - Government surveillance and testing activities.
2. The QA Plan ensures that all team members are following the same plan and achieves better coordination of the government's QA activities. Just as important, the contractor will be receiving consistent guidance and will be able to respond to requirements in a more effective manner. For construction quality management to be effective, quality control and quality assurance must be coordinated and compliment one another.

Area/resident engineers and Resident Officer in Charge of Construction (ROICC) require QA personnel to become fully aware of the QA Plan as well as the CQC requirements. The DFOW list in the QA Plan will later align with the QC Plan, the schedule and the submittal register. Based upon this knowledge, the groundwork is established for **Government/contractor partnership**.

B. The Quality Control Plan:

- The Contractor's QC Plan is the foundation upon which quality work is based. It is an outline of the planned quality control procedures, and is vital to the quality control system. The plan must be comprehensive, detailed, and logical if the contractor's quality control system is to be effective. While experience and knowledge of the construction industry are necessary in developing a good QC Plan, the contractor must consider fully the specific contract requirements and special factors peculiar to a project as well. It is pertinent that the QC Manager is the author or co-author of the QC Plan to assure that all quality requirements contained in the contract are included and that the QC Manager is thoroughly familiar with the plan. The detailed requirements for a QC Plan are in specification section 01450N Quality Control and 01451A Contractor Quality Control.
- The QC Plan must be received, reviewed, and formally accepted by the Contracting Officer or their representatives before any construction work can begin. In some cases, this requirement can be met by an interim plan. If an interim plan is provided by the contractor it must include, as a minimum, his general plan for quality control, plus the specifics for the work he is about to begin. A final acceptable plan must be received within the time specified in the contract. The contractual requirements are found in Section 01451A or Section 01450N of the contract.
- Resident Management System (RMS) is a Corps' data management system that provides an easy mechanism for developing a QC Plan based on contractor input. RMS is discussed in detail in optional Module 8.
- See optional Module 9 for NAVFAC's WEB CM capability for submission of the QC Plan.

C. Quality Control Plan Components:

There are differences between USACE and NAVFAC requirements for structuring the QC Plan. For details of the content and format see specification section 01450N Quality Control, paragraph entitled QUALITY

CONTROL (QC) PLAN or 01451A Contractor Quality Control, paragraph entitled Content of the CQC Plan. These specification sections can be accessed at <http://www.ccb.org/docs/ufgshome/UFGSToc.htm>. The QC Plan shall include, as a minimum, the following:

- Table of Contents – A listing of the major sections identified with tabs in the order of the bulletized items following hereafter.
- QC Organization – The QC organization must be identified, including a chart showing the organizational structure and lines of authority. The contractor must provide sufficient quality control personnel to satisfy all contract requirements. The contractor's quality control staff may vary in size, depending on the work being performed at a point in time. The personnel of this staff shall be fully qualified by experience and technical training as required in the specifications to perform their assigned duties. In any case, the contractor must indicate how he intends the staff to meet all requirements. This assures that the contractor has identified needs in advance, is planning to satisfy those needs, and is not overlooking or underestimating requirements.
- Names and Qualifications – The names, qualifications, and classification of each member of the contractor's quality control team must be provided. The QC Manager and the Alternate QC Manager must be employees of the prime contractor. This information may be provided in phases, as work progresses; however, the Government must receive the information before an individual begins work. This includes subcontractors and supplier personnel assigned QC duties. Include the CQM course certification for the QC Manager and the Alternate QC Manager as required by the specifications.
- Duties, Responsibilities and Authorities of QC Personnel – Provide a listing of assigned quality control activities for performance by the prime contractor, subcontractors, offsite fabricators, and suppliers. If the contractor delegates quality control duties, the plan must indicate how he will assure the effectiveness of the quality control efforts. Include a list of duties, responsibilities and authorities of each person in the QC organization.
- Outside Organizations – Provide a listing of outside organizations such as architectural and consulting engineering firms that will be employed by the contractor and a description of their services.
- Appointment Letters – Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for implementing and managing the QC program as

QC Manager and Alternate QC Manager to implement and manage the three phases of control and their authority to stop work which is not in compliance with the contract. The QC Manager shall issue letters of direction to the (Assistant QC Manager – on NAVFAC contracts) and all other QC specialists outlining their duties, authorities, and responsibilities. Copies of the letters shall be included in the QC Plan.

- Submittal Procedures and Initial Submittal Register – A listing of procedures for scheduling and managing submittals, including those of designers of record, consultants, architect-engineers, subcontractors, offsite fabricators, suppliers, and purchasing agents. Include a listing of procedures for reviewing, approving and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval.
- Testing Laboratory Information – Performance of control testing is to be included in the QC Plan. If a commercial laboratory is to be used, the plan must indicate both the laboratory to be used and the test methods to be employed. Provide testing laboratory information required by the paragraphs entitled “Accreditation Requirements” or “Construction Materials Testing Laboratory Requirements”, as applicable (for NAVFAC contracts). If technicians employed by the contractor will be performing the tests, the plan must indicate who will perform specific tests and their qualifications. Specifics relative to test report submissions are to be addressed, including format, content, and consistency of all documentation.
- Testing Plan and Log – A testing plan and log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test. The specifications require giving advance notice to the Government of the times when tests will be conducted.
- Procedures to Complete Construction Deficiencies/Rework Items – A listing of the procedures to identify, record, and track construction deficiencies/rework items from identification through corrective action. It is noted that this plan must also include design deficiencies/rework items if the contract is a design-build contract
- Documentation Procedures – Documentation procedures including proposed report formats.

- List of Definable Features of Work - A list of the definable features of work (DFOW). A DFOW is a task which is separate and distinct from other tasks and has separate control requirements. As a minimum, each section of the specifications can be considered as a DFOW. However, there may be more than one definable feature under a section of the specifications. Masonry, landscape, plumbing, interior electrical, are examples. Another definition of a DFOW is an activity in the project schedule that results in a physical product. The list shall be cross-referenced to the contractor's construction schedule and the specification sections. For projects requiring a progress schedule, the list of DFOWs shall include, but not be limited to, all items of work on the schedule. For projects requiring a network analysis schedule, the list of DFOWs shall include, but not be limited to, all critical path activities.

- Procedures for Performing the Three Phases of Control - The Three Phases of Control are the core of the Construction Quality Management system. The QC Plan is the means by which the contractor assures himself that his construction, to include his subcontractors and suppliers, complies with the requirements of the contract plans and specifications. If the project is design-build, the plan also assures compliance with the RFP. The controls shall be adequate to cover all construction operations, including both onsite and offsite fabrication, and will be keyed to the construction schedule. The three phases are as follows:
 - Preparatory Phase. This phase shall be performed **prior to beginning** work on each definable feature of work. Use the preparatory phase checklist when conducting this phase meeting. Safety is a consideration.

 - Initial Phase. This phase must be accomplished **at the beginning** of a definable feature of work. Use the initial phase checklist when conducting this phase meeting. Safety is a consideration.

 - Follow-Up Phase. Daily checks shall be performed to assure continuing compliance with contract requirements. Safety is a consideration.

- Personnel Matrix (NAVFAC contracts specific) – 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.

- Procedures for Completion Inspection - Provisions for the QC Manager to conduct completion inspections of the work and develop a "punch list" of items which do not conform to the contract requirements. The QC Manager shall make a second completion inspection to ascertain that all "punch list" items have been corrected and so notify the government. The completion inspections and any "punch list" item corrections will be accomplished within the time stated for completion of the work. The plan must include project completion turnover procedures. These may include:
 - warranty information.
 - O & M manuals
 - system operation and sequence verification
 - final system testing
 - instruction and training procedures
 - punch-out
 - pre-final inspection to include the Government
 - final inspection to include the client/customer "punch list"
 - "punch list" correction and verification
 - turnover of extra materials and spare parts
 - turnover of keys
 - completed as-built drawings

D. **References:** Specific QC requirements are found in the construction contract. Although not part of the construction contract, primary references on the QC Plans are (Engineer Pamphlet) EP 715-1-2, "A Guide to Effective Contractor Quality Control." and Naval Facilities Engineering Command's "Effective Quality Control" pamphlet. These pamphlets are an excellent source of information. They are concise and to the point, indicating the areas to be addressed in developing an effective, well-planned contractor quality control system. They are a valuable aid for both Government and contractor personnel in understanding quality control.



Module 3: QUALITY MANAGEMENT PLANNING

Submodule 2: Review and Acceptance

Objectives: After completing this submodule, you will be able to:

- Describe the process used to review the contractor's Quality Control (QC) Plan by comparing it to the requirements of the contract provisions and determining its feasibility.
 - State the basic concepts which the government uses to accept or return a QC Plan.
- A. **Quality Control Plan Review Participants:** There are three individuals who are normally involved in the review of the QC Plan; they are the area/resident engineer or ROICC/SGE, the project engineer or AROICC/AREICC, and the onsite QA personnel.
- B. **Two Major Steps in the Review Process:**
- Examination of the QC Plan in light of the requirements of the specifications.
 - Determination of the QC Plan's feasibility. This requires the reviewers to have a good working knowledge of contract requirements.
- If problems are discovered, it is necessary to identify those points in the plan that needs change or clarification.
- C. **Assure Minimum Requirements Are Met:**
- Determine that the plan provides adequate control of the DFOWs.
 - Examine the proposed QC staffing and organization to ascertain if it complies with contract specifications. Determine if the contractor has provided the names and qualifications (in resume format) of the

individual(s) responsible for QC of each DFO, tests, submittal controls, and reports.

- Check that the level of authority and responsibility delegated to the contractor's QC Manager is clearly defined.
 - Assure that the QC Plan:
 - clearly assigns individual control and test duties,
 - defines the capacity in which individuals will be working, and
 - indicates what tests will be used.
 - Determine that the plan addresses the procedures for processing submittals.
 - Check that the plan specifies which contractor (prime, subcontractor, offsite fabricator, or supplier) will be performing what portions of QC.
 - Assure that report forms include required features and reporting items.
- D. **Acceptance of the QC Plan:** If the initial review reveals that changes are necessary, the changes must be made by the contractor before the plan can be accepted. Acceptance of the plan is contingent on satisfactory QC performance once construction is underway. The Government always reserves the right to require necessary changes in the QC Plan and in contractor operations so as to obtain the specified quality. After the plan has been accepted, if some part of the plan isn't working, the Government may require changes to be made.
- E. **Commencement of Construction:** Until an interim or final QC Plan is accepted, construction cannot begin.
- F. **Changes to the QC Plan:** If the contractor wants to make changes in the QC Plan during construction, the Government must be notified in writing. The contractor cannot implement any change until the Government has formally accepted the changes in writing. If deficiencies are occurring, the plan needs to be studied to see if the problem is non-adherence or if revisions should be made to correct shortcomings in the QC Plan.
- G. **Distribution:** After the QC Plan has been reviewed, changed as necessary, and accepted, copies are distributed to all personnel involved in QC activities. The Government provides copies to onsite QA personnel.

- H. **Example Quality Control Plan:** An example of a QC plan is provided in the exercise section of this submodule. Included with the plan is a letter of transmittal from the contractor to the Area Engineer or ROICC.



EXERCISE AND EXAMPLE

Submodule 3.2

Following is an **example** of a CorpsQC Plan, but it is not complete. Review this plan and comment on how it could be improved to meet the contract requirements.

NOTE: Navy Students - Example of Navy QC Plan is in the Navy Forms Section of the Reference/Glossary.

**Keyes Construction Co., Inc.
General Contractor
5318 Madison St.
Denver, Co 80200**

May 19, 20xx

Serial No. MC-4

**Area Engineer
U.S. Army Corps of Engineers
563 W. Granger
Colorado Springs, CO 80900**

**RE: One Tactical Equipment Shop
DACA92-97-C-0111
Ft. Carson, CO**

Gentlemen:

**We are submitting, herewith, our Quality Control Plan for the above
referenced project for acceptance.**

Very truly yours,

**Warren J. Cooper
Construction Manager**

**Keyes Construction Company, Inc.
5318 W. Madison
Denver, Colorado 80200**

WC/1d

**cc: Field
File**

**QUALITY CONTROL PLAN
KEYES CONSTRUCTION COMPANY, INC.
FOR CONSTRUCTION OF
ONE TACTICAL EQUIPMENT SHOP
FORT CARSON, COLORADO
CONTRACT NO. DACA92-97-C-0111
MAY 20xx**

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Keyes Construction Co., Inc.
General Contractor
5318 Madison St.
Denver, Co 80200

May 19, 20xx

Serial No. MC-5

Army Engineer
U.S. Army Corps of Engineers
563 W. Granger
Colorado Springs, CO 80900

RE: One Tactical Equipment Shop
DACA92-97-C-O111
Ft. Carson, CO.

Gentlemen:

This is to introduce Morton S. McCray for the position of Contractor's Representative for Quality Control on the above referenced project.

Very truly yours,

Warren P. Crossen
Construction Manager

Keyes Construction Company, Inc.
5318 Madison St.
Denver, Colorado 80200

WC/1d

cc: Field
File

Keyes Construction Co., Inc.
General Contractor
5318 Madison St.
Denver Co. 80200

May 19, 20xx

Morton S. McCray
Quality Control System Manager
3636 Belview Avenue
Colorado Springs, CO 80900

RE: Quality Control
One Tactical Equipment Shop
DACA92-97-C-0111

Dear Mr. McCray:

This is a Letter of Direction to you outlining your duties and responsibility as our Quality Control Representative on the above referenced project.

You will be responsible for preparing and maintaining the Submittal Register Form 4288 for the duration of the project. You are required to check all shop drawings for accurate dimensions and to ensure compliance to applicable specifications and drawings as to the quality of materials being proposed for the project. This also applies to all subcontractors, offsite fabricators, and suppliers.

You will make, on a continuing basis, sufficient daily follow-ups to ensure that all workmanship and materials in the construction of this project are in conformance with the specifications and drawings.

You will be responsible for all testing as required by the specifications, a qualified testing laboratory will be furnished to you, as outlined in The Keyes Construction Quality Control Plan.

You will be present during all testing and coordinate all such tests as required in accordance with the specifications and the Corps of Engineers Representative.

The quality control system will include three phases of control and tests. Primarily, Preparatory Phase, Initial Phase, and Follow-up Phase. You are directed to Section 01451A/01450N, paragraph 3.6 for specific instructions outlining these control phases. All control phases and tests shall be recorded

daily on the Quality Control Report and submitted the following work day covered by the report to the government Representative. All test results shall be submitted in triplicate copies, not later than three calendar days after the tests are performed.

You are directed to review The Keyes Construction Quality Control Plan as well as the Project Specifications, Amendments and Drawings, in their entirety. If there is an item not understood, you are to consult your Quality Control Support Team.

The Quality Control Support Team will consist of the Project Superintendent and Keyes Construction Project Management.

Sincerely,

Warren P. Crossen
Construction Manager

WC/1d

cc: Field
Corps of Engineers

**QUALITY CONTROL PLAN
ONE TACTICAL EQUIPMENT SHOP
FORT CARSON, COLORADO
CONTRACT NO. DACA92-97-C-0111
MAY 20xx**

1.0 PURPOSE

This document establishes the Quality Control System of Keyes Construction Company, Inc. to provide the necessary supervision, control phases and tests of all items of work, including that of suppliers and subcontractors, that will ensure the compliance of all work with the applicable specifications and drawings in respect with the contractor-furnished equipment, materials, workmanship, construction, finish, functional performance, and identification.

2.0 POLICY

Keyes Construction Company, Inc. through the utilization of a Quality Control System, strives to obtain a uniform, high quality level of workmanship throughout all phases of procurement, fabrication, construction and installation of equipment and facilities, to assure this end, the following principles will be observed:

- A. Assure the highest quality by maintaining supervised controls and written instructions governing quality control procedures and practices, establish clearly defined responsibility and authority for compliance.
- B. Conform to all contractual requirements, specifications, applicable military standards and the Keyes Construction Company, Inc. Quality Control Plan. Compile accurate records of test certifications and other required documentation.
- C. Notify Project Management, and the government of quality discrepancies for immediate corrective action. Assure that corrective action is implemented properly.
- D. The Quality Control System Manager will be housed in a space separate from the Project Management staff and shall be under the supervision of Keyes Construction Company, Inc. home office.

3.0 ORGANIZATION

3.1 Quality Control System Manager - Reports to and receives his authority directly from Keyes Construction Company, Inc. management. The Quality Control System Manager shall formulate and implement as required the written procedures and instructions contained in this plan. Actual practices are not limited to this plan and where a discrepancy exists between this plan and the contract requirements, the contract requirements shall prevail. Consults with project supervisory personnel to assure compliance with the quality control requirements of the contract. Coordinates the quality control efforts of subcontractors and suppliers to correspond with the overall Quality Control Plan. He shall provide direct feedback and advise the government representative regarding the effectiveness and capability of the quality control organization, including but not limited to coordination, field engineering, office engineering, accounting for government- furnished property, etc. He will be physically on the project site for the duration of the contract work. He will review and coordinate submittals and approvals for contractor furnished materials and equipment, conduct tests, and follow-ups of subcontractor's work as required to ensure compliance with contract plans and specifications.

3.2 Contractor's Other Personnel - Quality control functions will be carried out by other contractor's personnel to include the Project Superintendent who will be physically on the job-site for the duration of the contract work.

He will assist the Quality Control System Manager in other areas as required to fully implement the Quality Control Plan. The QC system manager may delegate such duties to other contractor's personnel who may be assigned to the project on a temporary basis such as Field Engineers and Superintendents.

3.3 Commercial Testing Firms

Commercial testing firms to be utilized are:

Testing Laboratory, Inc.
2003 E. Willard St.
Denver, Colorado 80900

4.0 **PROCEDURES**

- 4.1 Control of Onsite Construction - The Quality Control System Manager will perform sufficient control phases and tests of all work, including that of subcontractors to ensure conformance to applicable specifications and drawings with respect to the materials, workmanship, construction, finish, functional performance, and identification.

The Quality Control organization will perform at least three phases of control for all definable features of work, as follows:

- a. Preparatory Phase - Performed prior to beginning each definable feature of work. Notify the Government and other appropriate persons at least 24 hours in advance of the meeting.
- (1) Review contract requirements.
 - (2) Check to assure that all materials and/or equipment are on hand and have been tested, submitted, and approved as required.
 - (3) Check to assure that provisions have been made to provide required control testing.
 - (4) Examine work area to assure that all preliminary work has been accomplished.
 - (5) Review hazard analysis.
- b. Initial Phase - Performed at the beginning of a definable feature of work. Notify the Government and other appropriate persons at least 24 hours in advance of the meeting.
- (1) Check preliminary work.
 - (2) Check new work for compliance with contract documents.
 - (3) Review of control testing.
 - (4) Establish level of workmanship.
 - (5) Check for use of defective or damaged materials.

- (6) Check for omissions and resolve any differences of interpretation with the Government representative.
 - (7) General check of dimensional requirements.
 - (8) Check safety compliance.
 - c. Follow-Up Phases - Perform daily checks to assure continued compliance with workmanship established at the initial phase.
 - (1) Assurance of continuous compliance with contract drawings and specifications .
 - (2) Daily control testing.
- 4.2 Receiving and Warehousing - Inspection of permanent construction materials received will be performed by the Quality Control System Manager, or other contractor personnel. Visual inspection will be made for:

Identification

Damage

Completeness

Evidence of compliance with approvals

Proper documentation

Results of receiving inspection will be recorded on an appropriate report form and will be made available to the Government.

- 4.3 Offsite Control - Facilities of offsite fabricators and suppliers will be surveyed as required to assure that all requirements of the contract drawings and specifications are met and maintained and to assure delivery of quality products. The results of each survey will be recorded on an appropriate form and will be made available to the Government. The fabricator or supplier will be notified of any deficiencies and will be required to submit a report of corrective actions taken. The contractor will inform the Government of offsite surveys.

- 4.4 Documentation - The Quality Control System Manager will maintain current records of all control activities and tests. These will include factual evidence that the required control phases and tests have been performed, including the number and results; nature of defects, causes for rejection, etc.; proposed remedial action; corrective actions taken; contractor's records will cover both conforming and defective features and will include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records on an appropriate form will be furnished to the Government daily.
- 4.5 Drawing and Document Control - Contract drawing, work orders and change orders issued for construction will also be issued to the Quality Control System Manager. It is the responsibility of the Office Engineer to issue all technical information to the Quality Control System Manager. It is the responsibility of the Quality Control System Manager to maintain this technical information and keep it current and recorded as it is revised. No technical information will be replaced or revised without receipt of properly authorized change notice, revision, or equal.
- 4.6 Materials Certification - Copies of all purchase orders or subcontracts requiring receiving inspection will be given to the Quality Control Department for receiving and record purposes. When the purchase order requires vendor certification of materials, equipment, or supplies, such certification shall be verified as to accuracy and conformance and may be used in lieu of a test for those properties covered by the certification. Copies of all certifications received will be maintained in the Quality Control folder and will be available to the Government upon request or submitted to him as provided in the contract specifications.
- 4.7 Workmanship Inspection - Items which will be embedded in the concrete placements or areas which will be covered up by a following operation will be inspected by the Quality Control System Manager. The Quality Control System Manager shall verify by signature that all items installed are in accordance with the contract drawings and specifications prior to the placement of concrete or covering. Any corrective action required will be recorded.
- 4.8 Calibration of Equipment - All contractor furnished measuring and test equipment shall be calibrated and maintained to traceable government standards. Records of these calibration certifications

will be maintained by the Quality Control Department and made available to the Government upon request.

- a. Each instrument will be plainly and permanently numbered, the equipment will be operated only by those persons directly responsible for the equipment or personnel under their cognizance.
- b. Each piece of equipment will be checked for accuracy as recommended by manufacturer for frequency of calibration. Required calibration of measuring and test equipment will be conducted by a certified laboratory.
- c. Measuring and test equipment dropped, damaged, or believed to be inaccurate will be removed from services and recalibrated.

4.9 Final Inspection and Test - Prior to final inspection or start of tests, all systems being inspected or tested shall be completed and accepted by the Quality Control System Manager, after this acceptance, the final inspection and test may proceed in accordance with the following steps:

- a. Verify the test personnel have a working knowledge of the special characteristics of the instruments being used.
- b. Note the particular inspection or test requirements and criteria for successful completion of the required inspection or test.
- c. Upon satisfactory verification of these requirements the test may proceed. Each reading will be verified and documented by the Quality Control System Manager. All functional validations or tests will be performed by the Quality Control Department unless otherwise noted. No functional test will be performed by the Quality Control Department unless otherwise noted. No functional test will be accepted without properly authorized and approved test procedures.
- d. The general requirement of final acceptance will include, but not be limited to, the following:
 - (1) General appearance
 - (2) Workmanship

- (3) Cleanliness of areas and equipment
- (4) Identification of equipment
- (5) Painting
- (6) Removal of unused material and temporary facilities
- (7) Condition of job files and completion of paperwork

4.10 Revision Policy - Activities, programs, and procedures not covered in this Quality Control Plan or proposals or additions to these standards, shall be discussed at meetings held for that purpose at such times and places the Quality Control System Manager may select, and shall take such action to request acceptance from the government to incorporate such revisions as deemed necessary. A record shall be kept of such meetings and interested parties present, together with the subject matter reviewed. Such meetings shall be held as required by changes in the contract specifications for the purpose of reviewing the QC plan, to entertain revisions, additions or deletions. Accepted revisions shall be incorporated in the plan as first revision, second revision, etc., a revised index page shall be included.

5.1 TESTING METHODS

All testing will be in accordance with the applicable section of the specifications.

6.0 RECORDING FORMS

The contractor quality control personnel will perform all tests as indicated in the contract specifications using the appropriate Corps of Engineers ASTM, or other approved test methods. The following list itemizes some of the forms which the contractor quality control personnel intend to use. This list is not all inclusive and may be revised and updated as conditions require. The contractor's records will be available for review by the Government.

- a. Subcontractor Daily QC Report - To be filled out daily by the subcontractors quality control personnel covering the day's quality control activities, approved by the Prime Contractor's Quality Control System Manager, and placed in the Prime Contractor's file.

- b. Construction Quality Control Daily Report - To be used by the Quality Control System Manager to report the day's quality control activities of the Prime Contractor and all subcontractors, submitted to the government daily.
- c. Trip Report - Used to report activities covering offsite trips. Will be submitted with the contractor's Quality Control Daily Report.

Daily QC reports and all attachments will be submitted in duplicate on the first working day following the day covered by this report.

- a. Copies of all inspection and test reports including data and calculation sheets will be submitted with the daily QC report.
- b. Quality Control System Managers' reports will contain notations specifically defining the phase of control on each day's activities and note compliance or non-compliance with previous phases when applicable.
- c. The Government will be notified 24 hours in advance of all tests to be performed in the field.
- d. Concrete Placement Card - To be filled out prior to, during and after concrete placement to document that preparatory, initial and follow-up phases have been made for concrete placement. A copy of this report is to be included with the daily QC report.
- e. Concrete Summary - Provides a running summary of concrete test results. To be kept in contractor's files and made available to the Government upon request.
- f. Density Test Summary - Provides a running summary of soil testing results. To be kept in contractor's files and made available to the Government upon request.

7.0 **QUALITY CONTROL PROCEDURES**

- 7.1 Surveillance of Subcontractors' Operations - Surveillance of the subcontractors' operations is the responsibility of the Quality Control System Manager. Major discrepancies that come to his attention will be recorded and transmitted to the related subcontractor. The contractor's Quality Control System Manager has authority to act directly with subcontractor representatives on routine quality control activities. If the discrepancy is related to a concrete placement or will be covered by preceding operation, a

resolution will be made prior to the item being covered. Major discrepancies will be followed up on a daily basis, upon correction of the major discrepancy, the date corrected will be noted and by whom.

There is one Quality Control System Manager for the Keyes Construction Company, Inc. with support of the Project Superintendent and Keyes Construction Company, Inc. Project Management. Surveillance of the subcontractors operations is the responsibility of the Quality Control System Manager. The Contractor's Quality Control System Manager has authority to act directly with subcontractor representatives on routine quality control activities.

In addition to the Contractor's Quality Control System Manager, the Mechanical and Electrical Contractor's Superintendent will act as their quality control engineer and will be directly responsible to the Contractor's Quality Control System Manager, and the Keyes Construction Company, Inc. Quality Control Support Team.

- 7.2 Inspection Acceptance Procedures - All construction work shall be in accordance with the contract drawings and specifications. All rework or changes which change existing engineering drawings or specifications must be authorized. All construction work will be recorded on the Quality Control System Manager's report. Work found in compliance with the drawings and specifications will be so noted. If discrepancies are found, they will be handled in accordance with inspection discrepancy procedures.
- 7.3 Inspection Discrepancy Procedure - Intended as an inspection system whereby all discrepancies in quality, workmanship, materials, equipment, supplies, and/or unauthorized deviations from engineering requirements on specifications can be called to the attention of responsible supervision personnel.
- a. Discrepancies will be recorded on the Quality Control Daily report form. Each discrepancy will be assigned a number by the recording Quality Control System Manager. A concise statement locating the discrepancy and description of the discrepancy will be filled in by the Quality Control System Manager.
 - b. When material, equipment, supplies, or workmanship, that does not conform to the contract drawings or specifications are rejected, the rejecting Quality Control System Manager

will initiate a discrepancy report and immediately furnish copies to the contractor's Project Manager and Superintendent or Subcontractor's Job Representative.

- c. Upon reviewing the discrepancy report, the Project Manager or his representative and the Quality Control System Manager will examine the rejected items. If in their opinion, any of the rejected items can be reworked to a usable condition, the discrepancy report will be so noted. However, if, in their opinion, the item cannot be reworked either from a practical and economical standpoint, the item shall be scrapped and an entry made on the discrepancy report concluded to that effect.
- d. Upon completion of rework on items specified for rework, the Quality Control System Manager will be notified and he will re-inspect the item(s) to the original requirement plus the rework information on the discrepancy report. If it is found acceptable, the discrepancy report will be so noted. From this point on, the item(s) will be handled in the normal manner. If, however, the item(s) is still not acceptable to the Quality Control System Manager due to poor workmanship, etc., arising from the rework, we will treat this item as a first time rejection and this will be resubmitted for inspection only after further rework.
- e. The discrepancy report log will be periodically reviewed by the Project Manager with the Quality Control System Manager to formulate a disposition of each listed uncorrected discrepancy. They will establish timetables for final resolution of all discrepancies.

7.4 Concrete Testing Procedures - Field testing of concrete and preparation, handling, curing, and testing of cylinders will be in accordance with ATSM and CRD Standards as set forth in paragraph 5.1.

In addition, the following ASTM Standards will be followed:

- C 173-73 Air content of freshly mixed concrete by the volumetric method.
- C 470-73T Molds for forming concrete tests cylinders vertically.
- C 617-73 Capping cylindrical concrete specimens.

C 683-71T Compressive and flexural strength of concrete under field conditions.

- a. Test cylinders will remain in the area where they are prepared for the first 24 hours properly protected as set forth in ASTM 31-69. They will then be transported to the laboratory, removed from the mold and immersed in a tank of saturated lime water until time of testing. Transportation from work area to laboratory area on the job-site will be in boxes containing wet sand or sawdust and will be protected from freezing.
- b. Field test specimens for concrete paving shall be in accordance with paragraph 13 of the contract specifications.

8.0 **DEFINABLE FEATURES OF CONSTRUCTION WORK**

General Requirements

- a. Special project procedures to include coordination of work, project meetings, submittals, and quality control.
- b. Administrative Requirements.
- c. Environmental Protection.
- d. Job Conditions.

Site Work

- a. Excavation, Trenching and Backfilling for utilities Systems to include sewer, gravity, drainage, and water lines.
- b. Clearing and grubbing, backfilling for buildings.
- c. Grading.
- d. Fence, chain-link.
- e. Concrete for sidewalks and curbs.
- f. Bituminous Paving.

Concrete

- a. Concrete materials, concrete procedures, concrete formwork, forms, form ties and accessories, concrete reinforcement, concrete finishing, concrete curing and grouting.
- b. Testing.

Masonry

- a. Masonry procedures, mortar, mortar accessories, unit masonry, cavity wall construction to include bringing inner and outer wythes up simultaneously, reinforcement, wall ties, flashing, and cleaning.
- b. Acceptance of Sample Panel.
- c. Testing.

Metals

- a. Structural steel, framing to include metal materials and methods, metal fastening, metal joints, welding, expansion control, and miscellaneous metals
- b. Steel Roof Decking.
- c. High Strength Bolts.

Thermal and Moisture Protection

- a. Damproofing
- b. Fireproofing
- c. Sealants

Doors and Windows

Metal doors and frames, special doors, metal windows, glazing and miscellaneous hardware, caulking.

Finishes

- a. Ceramic tile.
- b. Gypsum wallboard.

- c. Acoustical treatment to include metal suspension system for acoustical tile and lay-in panel ceiling.
- d. Resilient flooring.
- e. Painting.
- f. Furring (metal).

Specialties

- a. Metal toilet partitions
- b. Fire extinguisher cabinets
- c. Toilet accessories

Equipment

Fueling system for motor vehicles

Furnishings

Lockers

Special Construction

- a. Pre-engineered structures
- b. Liquid storage tanks

Mechanical

- a. Insulation to include:
 - (1) Pipes
 - (2) Ducts
 - (3) Equipment
 - (4) High density inserts, insulation protective shields, clips or U bolt support for multiple pipe hanger supports.

- b. Plumbing systems
 - (1) Waste/vent piping to include; underground soil piping, above ground soil piping.
 - (2) Interior piping rough-in to include; galvanized, black iron and copper, including drains, fittings, valves, and piping supports.
 - (3) Plumbing fixtures to include flush valves, faucets, and accessories.
 - (4) Cleaning and operational testing.
- c. Heating systems
 - (1) Equipment and system accessories
 - (2) Fuel oil/gas piping and supports
 - (3) System testing and balancing
- d. Air distribution systems
 - (1) Equipment and accessories.
 - (2) Duct work to include galvanized supports, dampers, louvers, diffusers, duct line support and fire dampers.
- e. Automatic temperature control systems
 - (1) Equipment and materials
 - (2) Installation of materials and equipment
 - (3) System testing
- f. Sprinkler Systems
 - (1) Equipment
 - (2) Piping and supports
 - (3) Accessories

Electrical

- a. Exterior Electric Distribution, Aerial
 - (1) Pole setting.
 - (2) Placement of crossarms, pins, insulators, pole line hardware and conductors.
 - (3) Placement of fuse cutouts, surge arresters, reclosers, potheads, pole mounted transformers to include grounding conductors, grounding conductor testing and cable terminations.

- b. Exterior electrical distribution, underground
 - (1) Duct line excavation, placement of ducts and miscellaneous materials.
 - (2) Placement of in ground junction or pull boxes and manholes.
 - (3) Placement of duct bank concrete encasement.
 - (4) Transformer pad placement.
 - (5) Mounting of pad mounted transformers.
 - (6) Cable placement to include splicing, fire-proofing, and cable terminations.
 - (7) Grounding conductors and testing.

- c. Electrical distribution, interior
 - (1) Wiring methods to include conduit rough-in, raceway boxes, outlet boxes, panelboard cabinets, placement of conductors and conduit placement below the slab for slab-on-grade construction.
 - (2) Wiring devices, panelboards, switch-boards, and lighting fixtures.
 - (3) Motors and transformers.
 - (4) Testing.

- d. Fire Detection and Alarm System
 - (1) Wiring methods to include conduit, ground rods, detectors, control panels, power supply, door holders, audible fire alarm and annunciator panel.
 - (2) Testing.

7. Submittals Reviewed:

| (a) Submittal No. | (b) Spec/Plan Reference | (c) By Whom | (d) Action |
|-------------------|-------------------------|-------------|------------|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

8. Offsite surveillance activities, including action taken:

9. Job Safety: (Report violations; corrective instructions given; corrective actions taken).

10. Remarks: (Instructions received or given. Conflict(s) in Plans and/or specifications).

Contractor's Verification: On behalf of the Contractor, I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as noted above.

Authorized QA Mgr at Site

Date

SAMPLE

Preparatory Phase Checklist

Contract No.: _____ Date: _____

Definable Feature: _____ Spec Section: _____

Government Rep Notified _____ Hours in Advance Yes _____ No _____

I. Personnel Present:

| <u>Name</u> | <u>Position</u> | <u>Company/Government</u> |
|-------------|-----------------|---------------------------|
| 1. _____ | _____ | _____ |
| 2. _____ | _____ | _____ |
| 3. _____ | _____ | _____ |
| 4. _____ | _____ | _____ |
| 5. _____ | _____ | _____ |
| 6. _____ | _____ | _____ |
| 7. _____ | _____ | _____ |

(List additional personnel on reverse side)

II. Submittals

1. Review submittals and/or submittal log 4288. Have all submittals been approved?
Yes _____ No _____

If No, what items have not been submitted?

- a. _____
- b. _____
- c. _____

2. Are all materials on hand? Yes _____ No _____

If No, what items are missing?

- a. _____
- b. _____
- c. _____

3. Check approved submittals against delivered material. (This should be done as material arrives.)

Comments _____

III. Material storage

Are materials stored properly? Yes _____ No _____

If No, what action is taken? _____

IV. Specifications

1. Review each paragraph of specifications.

2. Discuss procedure for accomplishing the work.

3. Clarify any differences.

V. Preliminary Work and Permits

Ensure preliminary work is correct and permits are on file.

If not, what action is taken? _____

VI. Testing

1. Identify test to be performed, frequency, and by whom.

2. When required? _____

3. Where required? _____

4. Review Testing Plan. _____

5. Has test facilities been approved? _____

VII. Safety

1. Review applicable portion of EM 385-1-1. _____

2. Activity Hazard Analysis approved? Yes _____ No _____

VIII. Corps of Engineers comments during meeting.

CQC REP

SAMPLE

Initial Phase Checklist

Contract No.: _____

Date: _____

Definable Feature: _____

Government Rep Notified _____ Hours in Advance Yes _____ No _____

I. Personnel Present:

| <u>Name</u> | <u>Position</u> | <u>Company/Government</u> |
|-------------|-----------------|---------------------------|
| 1. _____ | _____ | _____ |
| 2. _____ | _____ | _____ |
| 3. _____ | _____ | _____ |
| 4. _____ | _____ | _____ |
| 5. _____ | _____ | _____ |
| 6. _____ | _____ | _____ |

(List additional personnel on reverse side)

II. Identify full compliance with procedures identified at preparatory. Coordinate plans, specifications, and submittals.

Comments: _____

III. Preliminary Work. Ensure preliminary work is complete and correct. If not, what action is taken?

IV. Establish Level of Workmanship.

- 1. Where is work located? _____
- 2. Is a sample panel required? Yes _____ No _____
- 3. Will the initial work be considered as a sample? Yes _____ No _____
(If yes, maintain in present condition as long as possible).

V. Resolve any differences.

Comments: _____

VI. Check Safety.

Review job conditions using EM 385-1-1 and job hazard analysis.

Comments: _____

CQC REP

SAMPLE

CONTRACT NO. DACA 92-97-C-O111

Report No. _____

Date _____

CONCRETE PLACEMENT CARD

LOCATION _____

TIME: START _____ FINISH _____ CUBIC YARDS _____

| STATUS | | STATUS | |
|-----------------------|--|-----------------------------|--|
| A-LINE & GRADE | | G-GROUND BUSSES &/OR WIRES | |
| B-SURFACE PREPARATION | | Size | |
| C-FORMS | | Location | |
| Alignment | | Adequately Support | |
| Stability | | Welding | |
| Form Surface | | H-ELECTRICAL BOXES & PANELS | |
| Special Blockouts | | Size | |
| Safety of Work Area | | Location | |
| (runways, scaffold | | Adequately Supported | |
| & ladders) | | Sealed Against Conc. | |
| Form Treatment | | I-PIPING | |
| Chamfer Strips | | Size & Material | |
| Cleanness | | Location | |
| D-REINFORCEMENT | | Support | |
| Size | | Sleeves | |
| Location | | Leak Test | |
| Spacing | | J-WATERSTOP | |
| Splices | | Size-Type | |
| Tie Wires | | Location | |
| Chairs & Spacers | | K-EXPANSION JOINT MAT. | |
| E-EMBEDMENTS | | Size-Type | |
| Anchor Bolts | | Location | |
| Embedded Steel | | L-OTHER FEATURES (List) | |
| F-CONDUITS | | | |
| Size | | | |
| Location | | | |
| Adequately Supported | | | |
| Flush Coupling or | | | |
| Stud-out Req't | | | |
| Clear of Obstruction | | | |
| Concrete Tight | | | |

REMARKS _____

.C. System Manager

SAMPLE

KEYES CONSTRUCTION CO., INC.
ONE TACTICAL EQUIPMENT SHOP
CONTRACT NO. DACA 92-97-C-O111

Report No. _____

Date _____

TRIP REPORT

COMPONENT _____

VENDOR _____

SPEC REF. _____

PURPOSE OF TRIP _____

CONTACT _____

PERSONNEL PRESENT _____

SUMMARY _____

Q.C. System Manager

SAMPLE

PERMANENT MATERIALS REPORT

Project: _____

Location: _____

Materials: _____

Supplier: _____

Subcontractor: _____

Freight Line: _____

Damage Report: _____

Inspected By: _____

Quality Control System Manager

SAMPLE

DEFICIENCY REPORT NO.

Contractor: _____

Date: _____ Contract No.: _____

Location: _____

Reference Specifications Paragraph: _____

Reference Contract Drawing Sheet No.: _____

Deficiency: _____

Corrective Action: _____

Acknowledged: _____

Area Representative & Date

Corps of Engineers Field Rep.

