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	A GUIDE TO EFFECTIVE CONTRACTOR QUALITY CONTROL (CQC)	
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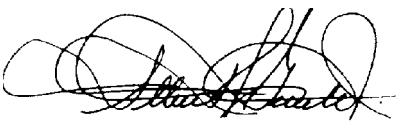
A Guide to Effective

Contractor Quality Control (CQC)

This Pamphlet supsersedes EP 715-1-2, dated November 1980.

A Guide to Effective
Contractor Quality Control
(CQC)

Effective control of construction operations instills pride in work, gains favorable recognition, and saves the contractor money. This booklet explains the Corps' concept of CQC and can assist the contractor to bring about effective control. It does not attempt to tell the contractor how to manage its organization or construction efforts but passes along some reminders of lessons learned and some suggestions as to just what the Corps of Engineers is looking for from the contractor regarding Quality Control.



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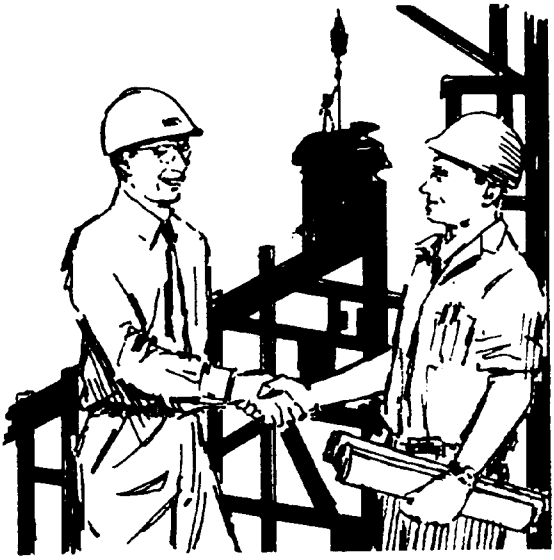


The contractor and the Government are both interested in quality construction simply because it means to the Government — getting our money's worth, and to the contractor — satisfactory performance and profit.

CQC is a management system for producing construction complying with the terms of the contract. It encompasses all phases of the work, such as approval of submittals, procurement, storage of materials and equipment, coordination of subcontractor's activities, and the inspections and tests required to be sure that the specified materials are used and installation is acceptable to produce the required end product.

The contractor and the Government both have a role in obtaining quality construction consistent with the contract requirements. The responsibilities of both parties must complement each other and work in harmony.

The contractor is responsible for: (1) producing the quality product on time and in compliance with the terms of the contract; (2) establishing and utilizing a construction quality control program of the scope and character necessary to achieve the quality of construction outlined in the contract; and (3) producing and maintaining acceptable records of its quality control activities.

The Government is responsible for:
(1) establishing construction standards and quality control requirements; (2) construction management activities including, among others, checking adequacy of contractor's control (quality assurance for acceptance), performing specified tests and inspections as designated in the contract, determining that reported construction deficiencies have been corrected; (3) determining payments due to the contractor; and (4) assuring timely completion.

For a **quality control program** to be effective, there must be a planned program of actions and lines of authority and responsibilities must be established.

It is necessary to analyze, develop, and document how the designated QC representatives will manage and control all construction operations. The plan should be geared to fit the contractor's needs. A meeting is required, before start of construction, between contractor and Government personnel to discuss the required plan and the interrelationship of the contractor and Government. Also, the Government representative is available at all times **to** discuss the planned control operations with the contractor. The quality control plan should include at least the following key considerations:

- The plan must include the contractor's system for tracking construction deficiencies to ensure corrective action is taken in a timely manner.

- A CQC staff of adequate size and technical capabilities **to** timely accomplish all quality control functions.

- Supervisory staff should have adequate time for CQC activities, as well as the many management responsibilities.

- Organizational lines of authority and responsibility must be clear and logical.

- The plan must explain the control, inspection, and test procedures, both on site and off site, and assign these responsibilities to individuals on the CQC staff.

- Qualifications of the staff should match the control requirements of the plan and an individual's qualifications must be adequate for the duties assigned.

- The plan must show the procedures for processing submittals and who will be responsible for approving each submittal.

- The plan must strongly emphasize that quality will be obtained through a preventive type of control of each definable feature of work. This requires an understanding of a definable feature, as discussed later on in this guide. The plan will include a listing of proposed definable features of work.

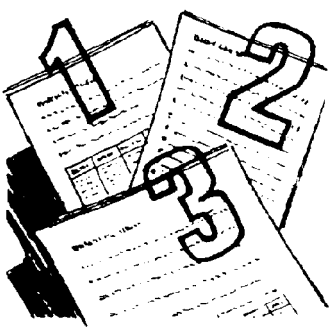
- The coverage of testing must be adequate. The plan must list the tests **to** be performed, and state who will be responsible for the results, and who will prepare and sign reports.

- Inspection and test report forms must be comprehensive.

- Frequency of reporting and time for submitting reports must be indicated.

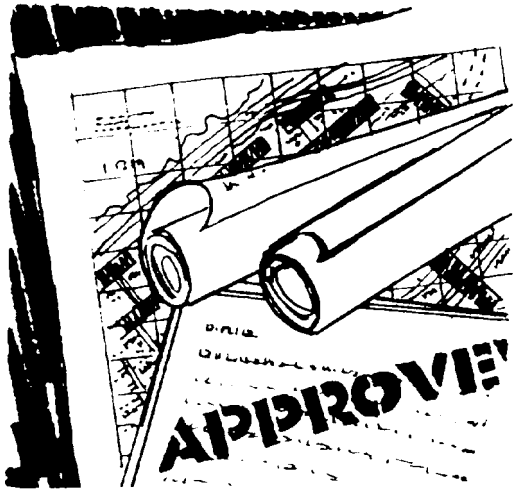
It may be advantageous for a contractor to make **incremental submittals** of the plan or to supplement or revise the plan. If the plan is determined to be inadequate by the Government, the contractor should make the changes necessary to assure the specified or needed control is provided

From years of experience, it has been found that certain procedures work better than others and, therefore, these are usually included in the contract documents. One of these is the **three phase control concept**. The contractor's control

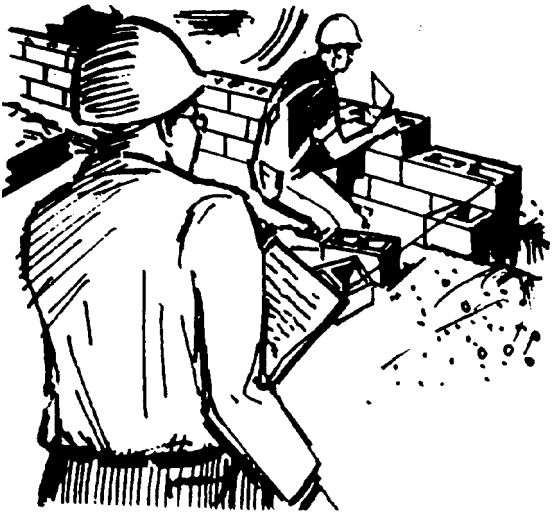


of quality should be divided into at least three phases for all definable features of work. A definable feature is a task which is separate and distinct from other tasks and has separate control requirements. Each control phase provides the opportunity to prevent problems and deficiencies. Generally, construction knowledge and experience alone, although necessary, will not get the job done. The contractor's quality control representative (CQCR) must know in detail the requirements of the specific contract. The CQCR can then put the general construction knowledge and experience to work in control and accomplishment of specific contract requirements. The complete performance of the phase controls is the contractor's responsibility. The role of the Government is to see that the control phases are thoroughly and timely performed and conducted by the contractor designated CQCR and the CQCR is knowledgeable and adequately performs the necessary control. The three control phases are:

Preparatory phase. The preparatory phase, as it applies to a feature of work, commences with actions in advance of construction. A few examples of preparatory actions are approval of shop drawings, lift sheets, test reports, and mix designs; a physical check of material on site against approvals



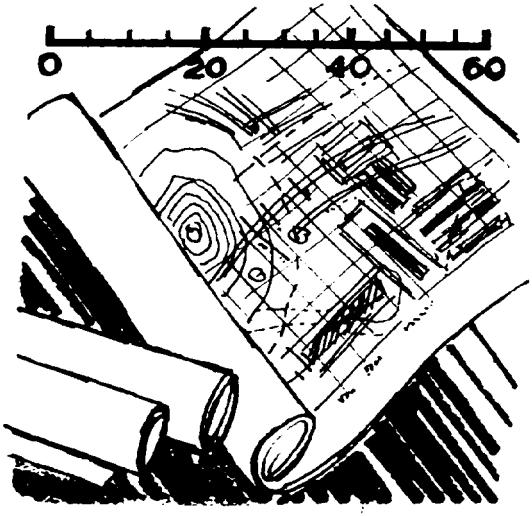
and contract requirements, safety checks of equipment, and other preparatory steps dependent upon the particular operation. Certain types of complex construction will require lift sheets or detailed sketches to insure proper location and installation of embedded items by all crafts. This is a preparatory action which will pay dividends later by locating conflicts between trade items sufficiently in advance to permit timely correction. Advance planning must be performed to determine that all preparatory actions required prior to construction have been accomplished.



Initial phase. The initial control of each separate feature or segment of work is made at the outset of the operation. Here is the best opportunity to get the work off to a proper start in full compliance with contract requirements. This is the time for the contractor to establish standards of workmanship. If there are differences of opinion in the interpretation of contract requirements, the issue can be discussed and settled at the outset of work much easier than after the work is in place. The initial inspection phase is a practical method of performing preventive inspection and reaching agreements in advance.

Follow-up phase. Follow-up inspection and testing is geared toward a level of effort to determine continuation of compliance and workmanship established during preparatory and initial phases. Follow-up inspections and testing may be on a daily, routine, or predetermined basis as required to assure strict contract compliance. Follow-up inspections become more productive when they are preceded by thorough preparatory and initial phases. With advance determination that material and equipment are in compliance with the contract and with workmanship standards established, follow-up inspection becomes more effective.

Control of construction materials, fabricated items and installed equipment. The contractor is responsible for management and control of submittals and the timely arrival of approved materials and equipment. The contract will include a listing of the required submittals. The contractor's



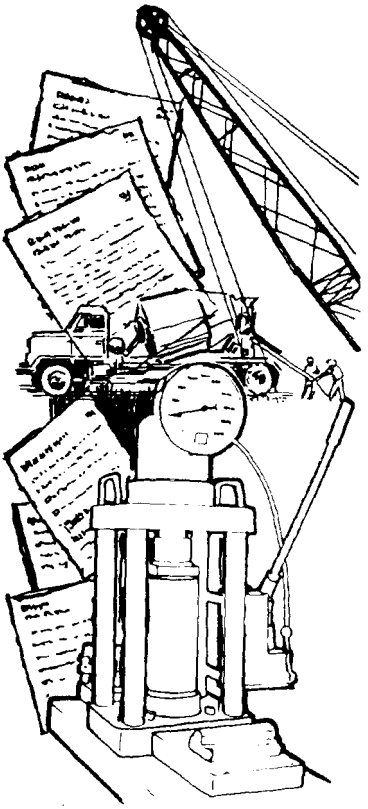
management operation includes reviewing this list to determine that all submittals are included. A submittal register will be prepared using this listing and, if applicable, included in the network schedule. This can be performed in conjunction with the planning of the procurement operation. It has been found that at least 60 days lead time is necessary to maintain adequate control; therefore, the contract usually requires monthly updating of the register or network actually projecting submittal need date 60 days in advance. This procedure should eliminate construction being delayed by missing or unapproved materials and equipment. The schedule must allow adequate time for Government approval when this approval is required.

The contractor is required **to** thoroughly review each submittal **to** assure complete compliance with all contract requirements, and certify compliance on all submittals required in the technical provisions of the contract.

The contract should be reviewed to determine the control that will be necessary for **off site fabrication** items to be procured and **to** arrange for this control. The control procedures will be included in the quality control plan.

Testing is a very important part of controlling quality. Except for verification tests, the testing is usually the responsibility of the contractor. This responsibility includes:

- Checking the contract to determine tests to be performed.
- Selecting qualified personnel or laboratories.
- Making arrangements for timely conducting of test.
- Selecting test facilities, equipment, and procedures that comply with required standards.
- Compiling and submitting the required test documentation in a timely manner.

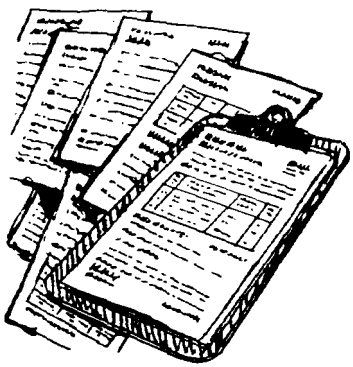


- Seeing that all necessary follow-up tests are made.

The Government may check laboratories, equipment, and procedures for compliance with requirements. The Government may also reserve the right to use contractor's laboratory equipment to verify contractor test results.

A necessary phase of control not always spelled out in the contract, but very important is **the completion phase** or last follow-up. When a segment of work is complete, the contractor should carefully examine this work and prepare a list of anything not completed or not conforming to contract requirements. Work yet to be accomplished could include paperwork, such as submittal of test documents, certificates, diagrams, etc. An effective control system closes out as many segments as rapidly as possible. This also allows full payment to be made. Therefore, effort should be spent scheduling and following-up to assure early completion of the items on the list and a sign-off from the Government.

Documentation is the proof of quality control accomplished. The necessary reports must be designed to prove adequacy of control, completed in a way to show accurately all actions taken and, last but not least, they must be timely.



Reports should list for each phase of control the factual results of control actions taken, observations made and any remedial and corrective actions. In addition, they should include complete information on tests, rejected work, instructions received from the Government and all prime and subcontractors' activities during the reporting period.

The Government will be continually reviewing work and studying reports to **determine the adequacy and effectiveness of the contractor's control system.** The Government's interest is in maintaining the necessary control to prevent deficiencies and tear out and it will therefore emphasize inadequacies in the control system instead of individual construction deficiencies. Also, by noting inadequacies in the contractor's control system as well as assuring that defective work is corrected, the Government obtains a true double check on quality.

When deficiencies are found in the control system, there are many actions that the Government may take, depending on the circumstances. Some of these are: improving the quality control plan, correcting deficient management, removing incompetent quality control personnel, correcting defective work, refusing to allow work to continue on defective work, requiring personal superintendence by the contractor, disallowing payment for the defective work, and issuing an interim unsatisfactory performance appraisal (may result in future low bid rejection). Aggressive and effective application of contractor's quality control program minimize or eliminate the need for the Government **to take these** actions.

Through effective quality control, **the contractor can instill employee pride** in their work, gain a reputation and recognition for quality work and, at the same time, **increase the profit margin.**

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