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ER 1110-1-12

Regulation  
No. 1110-1-12

1 June 1993

Engineering and Design  
QUALITY MANAGEMENT

1. Purpose. This engineer regulation (ER) provides general policy and principles for improving the quality of engineering and design services and products delivered to customers of the U.S. Army Corps of Engineers. Specific quality procedures, practices and tools are also provided in this ER.

2. Amicability. This regulation applies to Headquarters, U.S. Army Corps of Engineers (HQUSACE), major subordinate commands (MSC), districts, laboratories, and field operating activities (FOA) having engineering and design responsibility.

3. References.

- a. AR 5-1, Army Management Philosophy.
- b. ER 5-7-1 (FR), Project Management.
- c. ER 385-1-92, Safety and Occupational Health Document Requirements Hazardous Waste Site Remedial Act.
- d. ER 415-1-11, Biddability, Constructibility, Operability.
- e. ER 415-3-11, Post Completion Inspection and Design Criteria Feedback Inspection.
- f. ER 415-345-38, Transfer and Warranties.
- g. ER 415-345-42, Costs, Cost Estimating, and Reserves for Contingencies.
- h. ER 715-1-8, Architect-Engineer Contract Administration Support System.
- i. ER 715-1-10, Architect-Engineer Responsibility Management Program (AERMP).
- j. ER 715-1-15, Time Standards for the Architect-Engineer Acquisition Process.
- k. ER 1110-1-263, Chemical Quality Management for Hazardous Waste Remedial Activities.
  1. ER 1110-1-1300, Cost Engineering Policy and General Requirements.
- m. ER 1110-2-109, Hydroelectric Design Center.
- n. ER 1110-2-1150, Engineering and Design for Civil Works Projects.
- o. ER 1110-2-1200, Drawings and Specifications.
- p. ER 1110-3-109, Corps-Wide Centers of Expertise.
- q. ER 1110-345-100, Design Policy for Military Construction.
- r. ER 1110-345-700, Design Analyses.
- s. ER 1110-345-710, Drawings.
- t. ER 1110-345-720, Construction Specifications.
- u. ER 1180-1-6 Construction Quality Management.

“Leadership for Total Army Quality” Concept Plan, February 1993, OCSA, HQDA (DACS-DMM).

4. Policy. The policy of the U.S. Army Corps of Engineers (USACE) is to deliver excellent engineering and design services and products to customers on schedule and within budget. Adherence to the following principles will contribute to achieving this policy.

a. Customer focused environment. Agreements shall be developed and documented with customers and project managers on their requirements and expectations. In addition to functional, technical, aesthetic and environmental requirements, these agreements shall reflect schedules and budgets that are reasonable and attainable. These agreements must be incorporated in the project management plan (PMP). Cooperation and open communication shall be established and sustained between customers, and technical and management elements.

b. Continuous process improvement. An organized, systematic approach shall be employed to assure continuous process improvement. This approach will be employed to the extent that implementation costs are reasonable for the results that are potentially achievable.

c. Empowerment of people. People shall be provided maximum authority commensurate with their responsibilities and held accountable for results. In addition to technically-oriented training, training in teamwork and process improvement concepts shall be provided.

## 5. Definitions.

a. Acronyms. A list of acronyms is at Appendix A.

b. Customer. The owner, client, user, project manager (PM), or beneficiary of a USACE service or product.

c. Design. The process of (1) developing the analyses that define the required technical systems (e.g., geotechnical, hydraulic, architectural, structural, electrical, mechanical, fire protection) which will be utilized, (2) producing the technical portions of the construction contract documents (i. e., the drawings and specifications), and (3) preparing the construction cost estimate.

d. Engineering. For the purpose of this regulation, the efforts of technical disciplines involved in producing a technical service or product (e.g., a design, engineering feasibility study, geotechnical report, design analysis, facility master plan, hydraulics/hydrology analysis, construction cost estimate).

e. Menu of Services. A list of planning, engineering and administrative services required for execution of a project (also called a "design element menu"). This list is established by the PM with the customer with the assistance of the Engineering Division's technical manager (TM) prior to initiation of the design process. The menu serves to document the understanding of what services are to be provided and what products are to be furnished. The menu also provides the basis for the design cost estimate and the project specific work breakdown structure (WBS).

f. Partnering. Partnering may be defined as "the development and sustainment of a relationship that promotes achievement of mutually beneficial goals." The relationship is based on trust, dedication to common goals, and an understanding of each other's individual needs, expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation and the continuous improvement of delivered products and services, Partnering is a

voluntary relationship which builds upon the good relationship which exists among the professional participants involved in any engineering or design activity. Partnering is further described in Appendix B, which includes a sample design quality partnering agreement.

g. Project Management Plan (PMP). The detailed, specific plan, used to manage and control the delivery of a project from its inception to completion. Generally, no distinction is made in this regulation between the PMP and subplans, or other types of plans for accomplishing projects. See ER 5-7-1 (FR) for a full definition of PMP.

h. Project Manager (PM). The PM is the leader of the project team comprised of Technical Managers (TM) and other members as appropriate, and has the responsibility for development and management of the PMP. The PM is the primary contact with the Corps' customer and is responsible for delivery of the project and insuring that all commitments are met, or exceeded. See ER 5-7-1 (FR).

i. Quality. Conformance to properly developed requirements.

j. Quality Control. The process employed by the USACE engineering organization for the performance of a task that meets the agreed-upon requirements of the customer, on schedule and within budget.

k. Quality Control Plan (QCP). A USACE written technical management plan for a specific technical product or service (i.e., a contract requirement or an in-house effort). The QCP becomes part of the project management plan (PMP). For Civil Works projects the QCP may be part of the initial project management plan (IPMP), as well as the PMP.

l. Quality Design. In general, a design that conforms to the customer's requirements (functional, technical, aesthetic, environmental) and expectations, and is consistent with the appropriate technical criteria. An acceptable level of quality does not imply perfection, however, there should be no compromise of functional, health or safety requirements. In addition, design modifications determined necessary during construction should be relatively minor and have minimal cost and schedule impacts.

m. Quality Verification. The process by which an engineering organization determines whether the desired quality of service or product is being realized. Design quality verification includes appropriate design reviews, the biddability, constructibility, operability (BCO) review process, and other reviews as necessary.

n. Technical Manager (TM). Unless specifically stated otherwise, TM in this regulation refers to the Engineering Division TM. The TM is the Engineering Division point of contact with the PM and the coordinator of the technical engineering and design support requirements for the project.

o. Total Army Quality (TAQ). A leadership philosophy and management approach. It is a leadership philosophy which empowers all individuals to build on the aggregate capabilities of our

quality Army. As a management approach, TAQ focuses on continuous process improvement to meet or exceed the expectations of internal and external customers. In this regards, TAQ embodies the fundamental aspects of the Total Quality Management (TQM) approaches being used in today's private sector.

p. USACE Commands. Subordinate entities of the U.S. Army Corps of Engineers.

6. Quality Management Plan (QMP). The Engineering Division in each USACE command shall establish a QMP that complies with the policy and principles presented in this regulation, adapting the procedures and tools herein as appropriate. This plan should be tailored to the specific missions and structure of the local organization and based on the concepts of TAQ. The pamphlet, "Leadership for Total Army Quality Concept Plan," distributed to USACE Commands by HQUSACE in April 1993, should serve as the basis for the QMP.

Note: The requirements of ER 1110-1-263, Chemical Quality Management for Hazardous Waste Remedial Activities, and the roles/responsibilities of technical managers (TM) and project managers (PM), as described in Appendix I-G, ER 5-7-1 (FR), Project Management, take precedence in the event of a conflict with this regulation.

a. Quality control plan (QCP).

(1) The QCP is a management plan for executing a quality engineering product or service, on schedule and within budget. A QCP should be prepared for every engineering product or service, whether obtained using in-house forces or an architect-engineer (A-E). The QCP for small or non-complex projects should be a very simple document, setting forth the schedule and a minimum of coordination information. A more comprehensive document shall be prepared for large or complex projects. While an in-house "design" QCP should be complete, it need not duplicate items of a definitional or procedural nature that are in the QMP. The TM should submit the QCP to the PM for review and incorporation into the PMP prior to initiation of the technical work on the project.

(2) An exception to the QCP requirements in paragraph 6a(1) above may be made on a case by case basis by the engineering functional chief, provided all aspects of the designer's QCP are documented in formal correspondence and/or the contract document, and/or the PMP.

(3) The A-E shall be required to submit a QCP with the fee proposal. A list of items that would normally be included in an A-E "design" QCP is provided at Appendix C. The nature of the QCP for design, or other products or services, shall be determined with the A-E in pre-proposal meetings. For large or complex projects, the A-E may be allowed to submit a generic QCP with his fee proposal, with a fully-detailed QCP furnished early in the first phase of the work.

(4) Design of large, technically-complex construction projects may involve specialized processes, such as chemical/incineration processes or automation, that require expertise not found within the executing commands' purview. In these instances, the QCP shall cover how the specialized technical

expertise required for reviews of the design and shop drawings will be resourced from within the USACE or from the commercial sector.

b. Appointment of TMs. Appointment of qualified persons to act as TMs is critical to achieving the objectives of an effective quality management plan. Management must ensure that the persons appointed to these positions have the requisite knowledge and experience. For in-house design, the TM should be the design team leader in addition to other duties (see paragraph 7b below). This individual should be chosen according to the nature of the project. For example, a civil engineer would normally serve as the TM on a levee project, while an architect would be the TM for design of most buildings. For projects where the design will be done by an A-E, the TM should have expertise in the technical aspects of procurement of A-E services and daily administration of these contracts.

c. Engineering and design criteria management.

(1) Engineering Divisions shall develop a system for documenting the criteria applicable to each engineering or design service or product. This document shall list the criteria obtained from the customer (by reference, if documented in a satisfactory manner), and as developed in prenegotiation and/or predesign conferences with the PM, customer and designer. This document shall be updated to reflect all changes in the criteria after initial development.

(2) Engineering Divisions should develop a criteria management process to ensure design criteria and standard design details appropriate for each customer's requirements are developed, updated as required, and made readily available to the designers and reviewers.

(3) Engineering Divisions doing an appreciable amount of contracting for A-E services should develop an A-E services manual. The manual should include general instructions for the A-E on preparation of construction contract documents, design standards, technical guidance, guide specifications, drawing organization, etc. Responsibility for maintaining the Manual in a current condition should be specifically assigned.

d. Design quality tools. The development and promulgation of design tools is a continuing, dynamic process. Engineering Divisions are encouraged to investigate design tools as they come into the marketplace. A list of design tools related to design quality are listed in Appendix D. A short description of each and the USACE proponent office, where it exists, are provided.

e. Designer selection process. The availability and level of expertise required in all disciplines shall be fully considered prior to making any decision to design a project in-house. Designer selection decisions (i. e., whether the design is to be done by in-house forces or by an A-E) are made by the technical organization responsible for engineering and design execution.

f. Project coordination.

(1) General. The PM is responsible for managing the project scope, schedule changes, funding needs, cost estimate changes and authorization matters with the customer and higher authority. The

TM is responsible for coordinating all project activities within the Engineering Division including the A-E, when utilized, and is the day-today interface between Engineering Division and the PM.

(2) Design basis. The TM is responsible for ensuring that the basis for design is adequate prior to starting the actual design effort. This is a fundamental requirement in meeting the customer's requirements and expectations. i.e., successful delivery of a quality project. Further, many projects involve investigation into alternatives in the early design stages. Therefore, it may be necessary to hold meetings in addition to those mentioned herein to ensure that there is a complete understanding between the designer, the PM, and the customer on what is to be done.

(3) Design coordination.

(a) The TM should hold project meetings with the PM, the Engineering Division personnel that will be associated with the project, and any other key personnel selected by the PM. There should be an initial meeting prior to start of any substantive work to review the project and start building the team identity and partnering spirit that will contribute to project success. These meetings should be held at intervals determined by the TM, or PM, to keep the team members informal on status of the project and foster the partnering spirit.

(b) The PM, TM, and the designer should attend a predesign conference with the customer to discuss the project scope and requirements prior to initiating the engineering services, studies or design work. Technical disciplines should be represented as deemed appropriate by the designer and the TM. For medical projects, representatives of the HQUSACE Medical Facilities Design Office shall be included. The conference should include a visit to the construction site whenever possible. The designer should have a statement of design and functional requirements for the project, and technical criteria in hand, prior to this conference. The use of a design element menu is strongly recommended as a means of initially defining the work to be done. The design element menu (a sample is enclosed at Appendix D) should be reviewed at this conference to ensure that there is a complete understanding of the customer's requirements and expectations. Deviations, exceptions, deletions, and additions to the project definition documents shall be reduced to writing. Appendix E contains information on specific design documents that the designer may be required to prepare.

(4) Design coordination - A-E designs. Every effort shall be made to ensure that the A-E understands the scope of the project, the requirements of the Government, and the services and/or products to be delivered. It may be necessary to hold an additional meeting after the predesign conference for this purpose. At this followup meeting the predesign conference minutes, scope of work, requirement for the QCP, and all phases of the required effort affecting the designer's fee will be discussed. A "lessons-learned list" of common design deficiencies is a valuable source of information and would appropriately be discussed at this meeting, if it has not been covered in an earlier conference. An example lessons-learned list is at Appendix F. If applicable, the requirements for a health and/or safety plan should also be discussed.

g. Designer site visits. Designers shall visit the project site prior to the start of design to observe and evaluate existing field conditions, adjacent structures and other features that could have an impact

on the design. The first visit of this nature would normally be included in the predesign conference mentioned in paragraph 6f(3). Visits shall be made as necessary during design at appropriate times to ascertain compatibility of proposed design with the site, including utility connections, and survey data. A visit after completion of design may be advisable to ensure that all features of the design are compatible with existing conditions and that the customer's requirements will be met by the design.

h. Desire verification process. Engineering Division's QCP shall clearly define quality verification activities for specific organizational elements. The design verification process is intended to ensure that an acceptable design is produced by the designer. It does not eliminate the necessity for the designer to perform the checks described in paragraph 7c(3), or relieve him of the responsibility for design quality.

(1) General. The design verification process must be planned carefully to obtain the desired results and stay within budget and schedule. To ensure an adequate review the reviewer must be instructed as to the purpose of the review, the criteria which the design is to be reviewed against, how the review is to be performed, and the level of effort planned for the review. On some projects it may be advisable for reviewers to visit the project site in order to verify critical aspects of the design. The reviewer should be cautioned not to give unauthorized direction to the designer and to avoid comments which reflect personal preferences.

(2) Design criteria. It may be advisable to have technical reviewers conduct a review of the appropriate design memoranda, design directives, and the scope of work prior to the initiation of design to ensure that the appropriate design parameters necessary to define the project are presented and that mandatory design criteria (such as safety codes and standards) will be considered. This effort may include selective attendance at the predesign conference (or conferences during design period) to discuss the design approach with the designer.

(3) Design review.

(a) An independent review of the designer's work shall be performed to verify that an acceptable design has been provided for a particular design phase of a project. This independent design review is not intended to be a detailed check of the designer's work. The detailed check of the design is to be performed by the designer's organization in accordance with the designer's QCP. For A-E designed projects, and in-house designed military projects, the design verification review will be done by the local USACE command. Civil Works projects designed in-house will be reviewed by the USACE command's "one-level" higher organization. See ER 1110-2-1150 and ER 1110-2-1200 for special requirements for Civil Works projects. Review of military projects is covered by ER 1110-345-100.

(b) Management of review comments. The Automated Review Management System (ARMS) shall be used to manage design review comments for all military projects where the parties involved provide written comments to the designer. The use of this system is strongly encouraged on Civil Works projects as well. ARMS provides an effective and economical means of compiling and assembling comments from all reviewing elements, coordinating comments by deleting inappropriate

or duplicate comments, and back checking to ensure proper resolution by the designer. All comments should be screened by the TM for consistency with project requirements, criteria, and freedom from inappropriate directives or "personal preferences." ARMS is the only approved system for automated management of review comments for Corps projects. See Appendix D for additional information on this important design quality tool.

(c) Checklists can be a powerful tool for reviewers. To be most effective, each individual reviewer should develop his "own" checklist from standard checklists that may be available. The checklist should be used at the end of the review rather than used as a list of the only areas that will be considered during review. A standard checklist can also be used as a training aid for new reviewers. Sample checklists are at Appendices G, H, I and J of this regulation.

(d) Value engineering (VE). A value engineering study is required for all projects with an estimated construction cost of \$2,000,000, or over. Exceptions must be approved by a general officer or a member of the senior executive service. Rejections of VE proposals exceeding one million dollars require division engineer approval. See the discussion of VE in Appendix D.

(4) Centers of expertise. Where applicable, designs must be reviewed by the appropriate mandatory center of expertise (MCX). Also, the voluntary use of technical centers of expertise (TCX) is encouraged. See Appendix D, paragraph 12. The HQUSACE Medical Facilities Design Office is a MCX for medical projects on which they have Contracting Officer's Representative authority. Use of the technical medical expertise of that office is mandatory in these instances.

(5) Biddability, constructibility, operability (BCO) review. These reviews are conducted in accordance with ER 415-1-11. BCO is the term normally applied to the reviews made by construction and operations personnel, however, the items listed in ER 415-1-11 should be addressed by all personnel reviewing construction designs. Construction and Operations personnel are usually in the best position to comment on the designer's depiction of existing conditions, design of interfaces, and potential construction problems. This is especially true on retrofit, rehabilitation and remodel projects, and for utility tie-ins. Engineering and Construction Divisions are required to provide a formal, written certification that all appropriate comments have been incorporated in the construction documents prior to opening of construction bids. When the Operations Division is involved, they should be required to provide this certification also.

(6) Plan-In-Hand review. As the name implies, the objective of this type of review is to compare the drawings to existing conditions to discover inconsistencies. Ideally, the review team should be composed of the Project Manager, Technical Manager, Construction Division representative(s), Engineering Division reviewers, the customer and the designer. This review takes place at the project site and is particularly important for retrofit, rehabilitation, or remodel projects where accurate depiction of existing conditions is critical. This particular review is most effective near the end of the design process when the drawings and the specifications are complete, or nearly so.

i. Design guidance improvement. Design deficiencies, improvements, and field changes necessitated by missing or incomplete design guidance/criteria data shall be documented and, along



with recommendations, recorded on a ENG Form 3078. The form is forwarded to the appropriate office in HQUSACE in accordance with procedures in ER 1110-345-100. HQUSACE will review and incorporate the recommendations into the criteria, policy and guidance documents as appropriate.

j. Designer involvement during construction.

(1) The designer should support the project by being involved in the construction. On complex projects the designer should visit the construction site at critical points of construction and as requested by the USACE construction office for consultation. In the case of A-E design, the design contract should include these services as options, The TM shall request the PM to budget funds for this purpose.

(2) Engineering Division shall review construction changes that have a significant impact on design, and all value engineering proposals, waivers, and system changes. The purpose is to ensure that changes will not impair design quality; cause safety, health, environmental problems; or otherwise create unsatisfactory conditions. Also, this review permits the designer to check for recurring deficiencies, which could indicate that changes are needed in guide specifications or design criteria. Procedures should be set up with the Construction and Planning Divisions, and Project Management for this review. It should be possible to define categories of changes for correction of design deficiencies where the coordination with Engineering can be effected by means of information copies of the change documents, to avoid construction delays.

(3) All shop drawings identified as extension of design (i.e., requiring Engineering Division review) shall be reviewed by the designer. All A-E contracts for design of work that may require such submittals from the construction contractor shall include a provision notifying the A-E that he may be required to perform these reviews.

(4) It is desirable that the designers also visit the site after completion of construction to obtain feedback from users that can be used to improve quality and customer service for future projects. Such visits would be particularly beneficial on those projects where newly developed criteria were applied, or where construction changes were made as the result of inadequate design criteria. Organizations that would most directly benefit from this interaction with customers should be represented on the team making these visits. The scheduling of these visits should be coordinated with the Construction Division. These visits should be coordinated with those made under ER 415-3-11, Post Completion Inspection and Design Criteria Feedback Inspection, to avoid duplication of effort.

k. Designer Performance evaluation.

(1) Current HQUSACE guidance on A-E performance evaluation reports shall be fully implemented. An important aspect of this guidance is the timely preparation of interim poor/unsatisfactory evaluations when warranted, and the submittal of these evaluations to the Architect-Engineer Contract Administration Support System (ACASS), maintained by CENPD-CT. This action will make this information available to other Department of Defense contracting offices

who may be considering award of work to A-Es who are performing poorly for the Corps of Engineers.

(2) The performance of USACE in-house designers shall be evaluated using the evaluation factors/attributes on the A-E performance evaluation form. This evaluation shall be made by the organization that reviews the design. These evaluations should be reviewed by the Branch Chiefs of the design organization, and used as a source of information for improving individual and organization performance.

l. Lessons-learned feedback system. A formalized "lessons learned" feedback system should be implemented by each USACE command. Lessons-learned data should be systematically gathered, fully integrated with the design criteria management process, and made readily available to designers and reviewers. Each construction change order of the "design deficiency" category should be evaluated to determine if it is one-of-a-kind or a potentially recurring deficiency. If the item is recurring, a criteria document such as a guide specification or a technical manual may be in error or unclear and should be revised by submitting a ENG Form 3078 in accordance with Engineering Improvement Recommendation System (EIRS) procedures. A "Lessons Learned List - Typical Examples," is at Appendix F. Information on the "Lessons-Learned System; Hazardous, Toxic and Radioactive Waste Program (HTRW)" is in Appendix D, paragraph 8.

m. Training. A training program should be developed for training all personnel in the engineering organization in the concepts of TQM, TAQ, and the policy, principles, procedures, practices and tools in this regulation.

## 7. Responsibilities.

### a. Accountability.

(1) In-house designers are responsible for producing quality services and/or products, on schedule and within budget. All project documents produced by in-house designers shall be clearly identified with the project description and designer's name, and dated.

(2) For contracted design work, the A-E shall be held accountable for the professional quality, technical accuracy, and coordination of all designs, drawings, specifications, cost estimates, and other services provided. A-Es are also to be held accountable for meeting contract schedules and construction project cost limitations. (See ER 715-1-10, Architect-Engineer Responsibility Management Program, for further information.) All items produced by A-E firms shall be clearly identified with the name of the firm, project description and contract number, and dated.

(3) All formal design reviews shall be documented, with the project description, name of reviewer(s), and date shown. This requirement applies to reviews of both A-E and in-house designs.

### b. Technical manager (TM). The TM is responsible for:

(1) Ensuring that customer requirements are fully understood, that clear and accurate criteria are established, and that guidance and direction for the designer is fully documented.

(2) Coordination of Engineering Division's work on assigned products, including administration of the A-E contract if the design is contracted. The TM is the point of contact between Engineering Division and the project manager (PM) on all matters concerning project execution during design. The TM shall closely monitor progress of the work and costs for technical products against the PMP. The TM shall advise the PM of the status periodically, and of all significant developments as they arise.

c. Designer responsibility. The following tasks are basic responsibilities of the designer:

(1) The designer should execute the work diligently and aggressively, and promptly advise the TM of all significant developments adversely impacting the quality, schedule, or cost of the project. Project aesthetics, including interior design and landscaping efforts, must be fully addressed, as these features substantially affect the customer's perception of quality.

(2) Environmental considerations. The designer must give utmost attention to environmental factors in the design of facilities to eliminate or minimize environmental degradation in accordance with Federal, State, and local environmental quality laws and standards. Existing on-site hazardous, toxic, and radioactive waste problems in particular must be addressed. Appropriate coordination should be conducted with Project Management and Planning Division to ensure that authorized, or otherwise required, environmental features have been incorporated into the project design.

(3) Design check:

(a) The designer must have his work checked before each design submittal. This checking procedure is essential to the production of a quality product and must be incorporated into every QCP. Checkers should be highly experienced technical persons in the designer's organization who provide reviews of the design documents to verify that they are technically adequate and complete. Checkers shall initial all design calculations and all drawings. While the project design engineer or architect may review work by others in their administration of the design effort, they should not act as the checkers in the formal procedure called for in this paragraph on projects where they have lead responsibility.

(b) Quality control checklists. These checklists are helpful to designers and their checkers (and reviewers) to ensure that all considerations are systematically addressed. Checklists should be continually revised as dictated by knowledge and experience but must never become a substitute for professional design effort. Checklists are not intended to be comprehensive, and should be modified to fit specific requirements of the designer's office.

(4) Interdisciplinary checks. Interdisciplinary coordination is a key element of the QCP. It begins at the start of design and continues throughout the entire design process. The requirement for an formal interdisciplinary check should be addressed during the predesign conference so that sufficient

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time for this activity can be included in the project delivery schedule. The check should be a scheduled activity. It is usually conducted by the design team members who check each other's work for the purpose of assuring compatibility between drawings and between drawings and specifications produced by the various disciplines (e.g., civil, architectural, mechanical, structural, geotechnical, electrical, hydraulic).

d. Engineer of record (EOR). For in-house design, the EOR is the chief of the engineering office performing the design. Design responsibility of all structural steel connections will remain with the Corps designer, transfer of this responsibility to the contractor will not be permitted.

8. Quality management review. To assure that the requirements of this regulation are met; HQUSACE, in coordination and cooperation with MSC, will conduct quality management reviews. These reviews will be made to assess the effectiveness and implementation of individual USACE command's quality management plans. The reviews will be accomplished in a stand-alone mode or in conjunction with other command inspections/reviews (i.e., command inspections, Engineer Inspector General inspections). Regardless of how conducted, higher authority review of quality management plans at all operating USACE commands shall be accomplished on a three-year frequency, as a minimum.

FOR THE COMMANDER:



WILLIAM D. BROWN  
Colonel, Corps of Engineers  
Chief of Staff

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