

Engineering Division Quality Manual

Scope

This Engineering Division Quality Manual and associated Engineering Quality System (EQS) documents are applicable to all work performed by the Sacramento District Engineering Division (ED). The U.S. Army Corps of Engineers, Sacramento District, is responsible for executing Civil Works, Military, Hazardous, Toxic and Radioactive Waste (HTRW) and Support for Others/Work for Others (SFO/WFO) programs. ED provides a full range of professional engineering, architectural, and environmental services for the planning, design, remediation, construction support, and operational guidance for government, commercial, industrial, military and water resources projects, and for readiness/disaster response missions.

This ED Quality Manual and associated EQS documents do not cover the following requirements within clause 7 of the ISO 9001:2000 standard:

- Validation of Processes for Production and Service Provision
- Customer Property.

Applicability

This ED Quality Manual and associated EQS documents apply to all ED employees and shall be observed and implemented by all personnel as applicable to their activities. No deviation is permitted without the expressed permission of the Management Representative.

Responsibility

The ED Management Representative is responsible for the proper and timely management of the EQS, together with the appropriate level of authority for ensuring its continuing effectiveness. This manual, as well as the entire EQS, will be reviewed annually as a minimum.

Distribution

Assistant Chief of Engineering Division

Chief of Engineering Support Branch

Chief of Design Branch

Chief of Engineering Division

Chief of Geotechnical & Environmental Engineering Branch

EQS Management Representative

EQS Document Controller

Ownership

The Chief of Engineering Division [[Thomas.E.Trainer@usace.army.mil?subject=REFQ06L0-Engineering Division Quality Manual](mailto:Thomas.E.Trainer@usace.army.mil?subject=REFQ06L0-Engineering%20Division%20Quality%20Manual)] is responsible for ensuring that this document is necessary and that it reflects actual practice.

Definitions

Refer to *Glossary of Engineering Quality System Terms and Acronyms* [[REFQ10L0](#)].

General Products, Services, and Types of Projects

ED creates design service solutions to meet customer needs of cost, form, fit, and function by analyzing requirements, investigating technology and options, and developing designs, plans and specifications that meet customer expectations. Products and services include engineering analyses, technical reports, technical consultation, cost estimates, value engineering, plans, specifications, peer reviews, contracts, and construction support. Both In-house and Architect-Engineer (A-E) resources are available for Value Engineering, and Independent Technical Review (ITR) services.

Civil Works

Civil Works engineering services include investigating and solving flood control and water-related needs, including resource management, technical services, landscape architecture, civil design, structural engineering, geotechnical engineering, hydraulics and hydrologic engineering, flood forecasting, water management (incl. reservoir control), dam safety, and disaster response capability. Projects for states, local agencies, SFO (incl. hydropower retrofit) and WFO typically include flood control structures such as levees, channels, dams, as well as dredging projects, harbors, and wetlands restoration. Environmental mitigation requirements are incorporated into all civil works projects.

HTRW

HTRW engineering services include environmental restoration, compliance and pollution prevention including planning, investigation, assessment, design, remediation, monitoring and operation to protect human health and the environment for the following programs and projects:

- Defense Environmental Restoration Program (DERP)
- Installation Restoration Program (IRP)
- Formerly Used Defense Sites (FUDS)
- Base Realignment and Closure (BRAC)
- Environmental Compliance Assessment Systems (ECAS)
- Military and Civil Works HTRW
- Environmental Protection Agency (EPA) Superfund
- SFO/WFO projects.

Community outreach, regulator coordination/partnering, fast start capability, and one-stop services are capabilities often employed in the projects.

Military Design

Military Design engineering services include design analyses, technical studies and consultation, technical services and resource management, construction support, base master planning, Geographic Information Systems (GIS), Western Technical Center of Expertise (TCX) for Family Housing, installation maintenance and repair, DD Form 1391 preparation, and Operations and Maintenance (O&M) manuals. Typical projects include buildings, pavements, O&M funded work, water wells and infrastructure for Army, Air Force, other armed services, and similar work for SFO and WFO clients.

Quality Management System

Due to the need to continuously improve responsiveness to and satisfaction of our customers, to grow in overall quality of performance, and to better posture ED to carry out the Corps Vision, ED management has established an EQS that complies with the internationally recognized standard ISO 9001:2000.

Engineering Quality System (EQS)

Our EQS addresses specific functions and processes that affect product quality, and provides for methods of planning, implementing, documenting, monitoring, and auditing these activities. The levels of the EQS are the following:

- Level 1- Policy.
- Level 2- Procedures.
- Level 3 - Work Instructions.
- Level 4 - Records.

General

ED has established and maintains an EQS so that its products conform to specified requirements. An overall quality hierarchy is shown in Figure 1 Engineering Quality System defines the EQS components in a tiered structure of four levels:

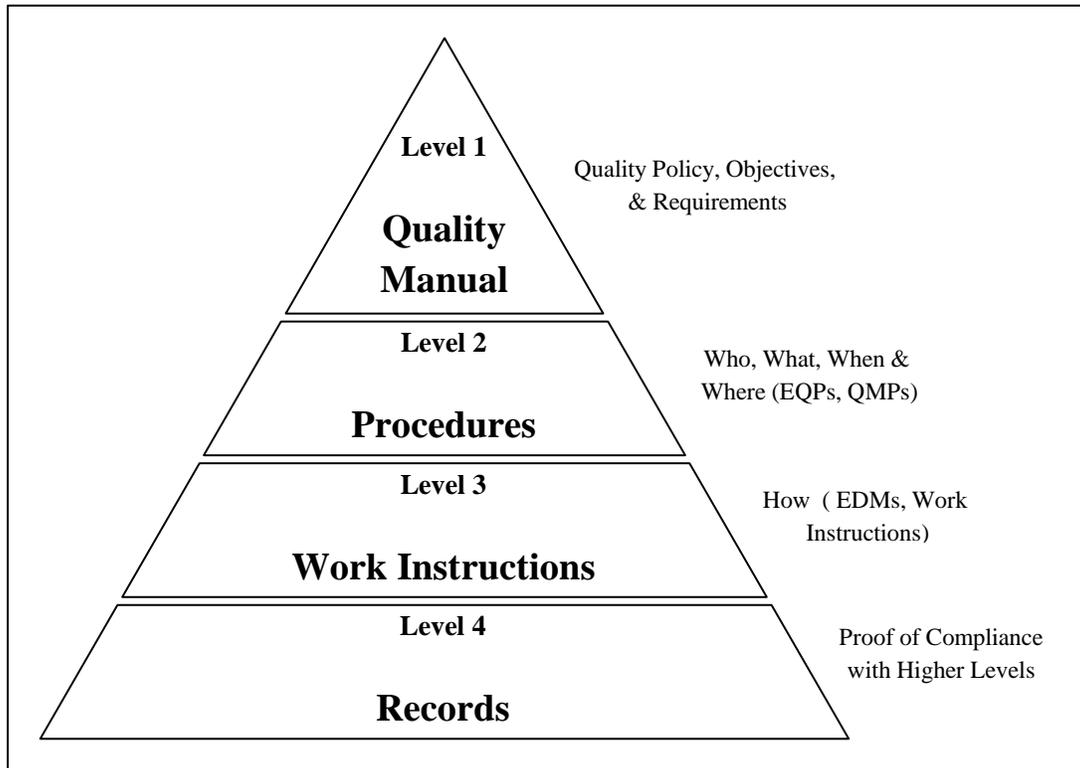
Level 1 is the Quality Manual which defines overall ED quality policy, ED policy for each of the ISO 9001:2000 elements, and Army, USACE, Division, District, and ED policies with respect to quality and ISO 9001:2000, and refers to our EQS documents.

Level 2 consists of the EQS procedures that describe the “who,” “what,” “when,” and “where” of the system.

The EQS procedures may in turn point to EQS work instructions at Level 3 which covers the “how to,” including standard operating procedures (SOP), relevant federal legislation, Army/Engineering regulations, technical guidance, and guide specifications. The EQS also incorporates our legacy Engineering Division Memorandums (EDM) as work instructions.

Level 4 consists of the quality records that demonstrate that Levels 1, 2, and 3 are being effectively accomplished.

Figure 1 Engineering Quality System



The interaction between the EQS processes occurs across all levels as shown in Figure 2 EQS process interaction. Development of highly complex engineering projects and deliverables requires a robust and adaptable system.

The EQS will be used for all ED products. Deviations from this system will be rare and must be approved in writing by a member of the Management Team prior to accepting the work.

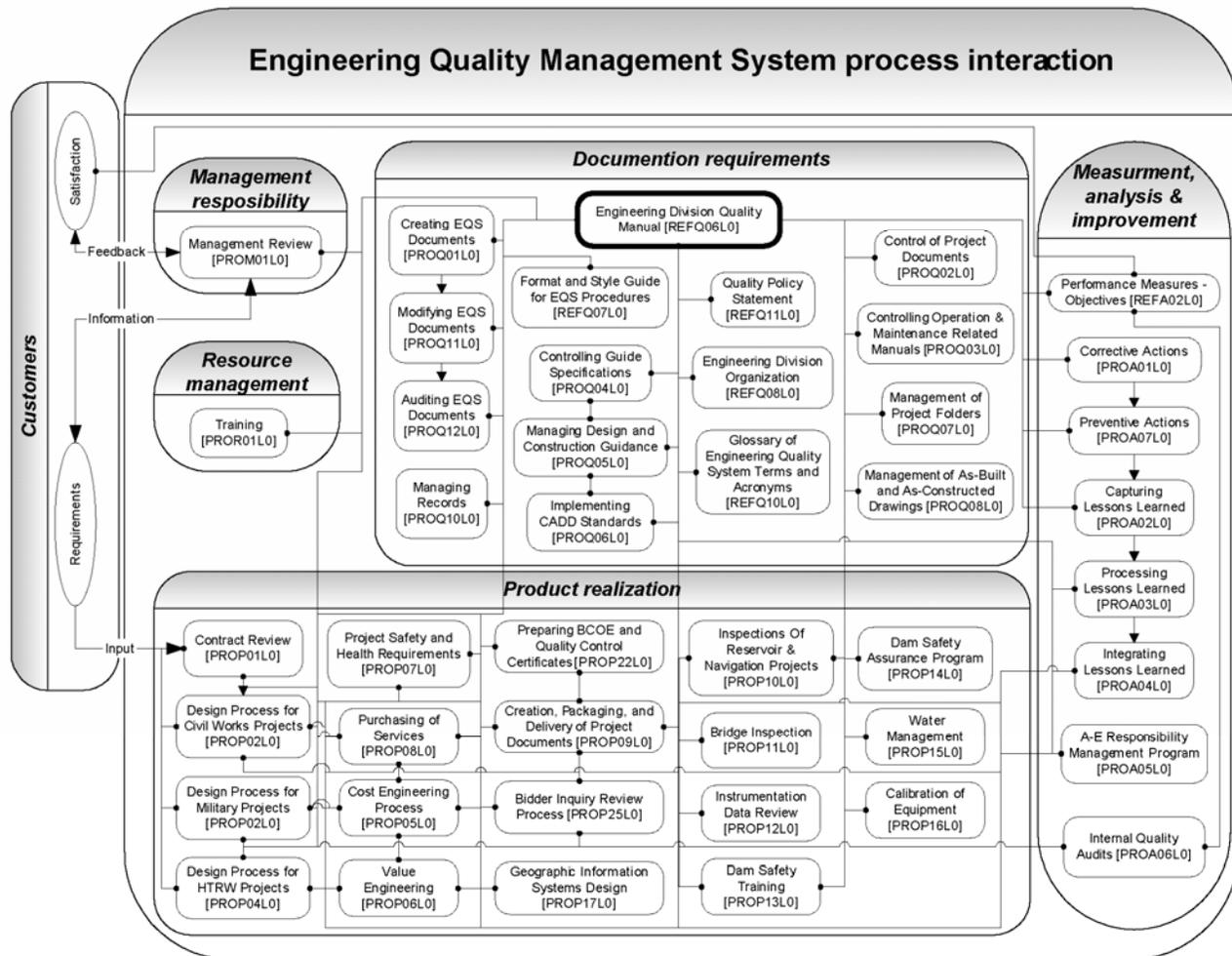
Document and Data Control

All quality-related documentation is formally controlled to avoid use of outdated guidance. The EQS documentation is electronically maintained.

EQS Documents

EQS documents for all products and services performed by ED are listed in *Documents Master List* [[DOCLIST](#)] and other documents are available on the Internet at [<http://iso9000.spk.usace.army.mil/Documents.html>]. *Creating EQS Documents* [[PROQ01L0](#)] describes the development requirements for the EQS documents. *Modifying EQS Documents* [[PROQ11L0](#)] describes the revision requirements for the EQS documents. *Auditing EQS*

Figure 2 EQS process interaction



Documents [PROQ12L0] describes the administration requirements for the EQS documents. Implementation training for the EQS documents is addressed in Training.

We revise, review, approve, issue, and publish EQS documents and data under controlled conditions. Documents and data may become records when they are no longer subject to change. All obsolete documents may be retained as records for legal or knowledge preservation purposes.

Specific documents and data include the following:

- Customer requirements and requests for work.
- Quality Manual, technical guidance/criteria, and work instructions (SOP).
- Engineering products such as Design Memorandums and reports, HTRW reports, and Plans and Specifications.

General

The following documents and data in ED are all subject to document control procedures and are maintained by the organization indicated:

Document or Data Type	EQS Document Title	Responsible Office	Number
EQS	Modifying EQS Documents	ED	PROQ11L0
Manuals	Controlling Operations & Maintenance Related Manuals	ED-D, ED-G	PROQ03L0
Higher Authority Regulations	Managing Design and Construction Guidance	IM (official), ED	PROQ05L0
EDM	Modifying EQS Documents	ED	PROQ11L0
Civil Works Design data	Control of Project Documents	ED-D	PROQ02L0
Military Design data	Control of Project Documents	ED-D	PROQ02L0
HTRW Design data	Control of Project Documents	ED-G	PROQ02L0
Guide Specifications	Controlling Guide Specifications	ET&S	PROQ04L0
Industry Standards, Reference Standards	Managing Design and Construction Guidance	ET&S	PROQ05L0
CADD Standards	Implementing CADD Standards	ET&S	PROQ06L0
Plans and Specs	Managing As-Built & As-Constructed Drawings	ET&S	PROQ08L0
Records	Managing Records	ED	PROQ10L0
Surveys	Controlling Survey Records	ED-G	PROQ09L0
Logs of Borings	Controlling Survey Records	ED-G	PROQ09L0

Document and Data Approval and Issue

All other controlled documents developed by ED are reviewed, approved, and issued under the supervision of the organization indicated above. Currency of controlled documents is maintained by the organization indicated. Documents on the LAN are controlled electronically, and guidance from higher authority is maintained by hard copy in ED. Obsolete hard copy documents are removed from files. All personnel have access to pertinent documents through the district LAN or through ED files. Outdated documents are retained for reference purposes.

Document and Data Changes

Changes to the ED Quality Manual and EQS documents are performed in accordance with (IAW) *Modifying EQS Documents* [[PROQ11L0](#)]. Changes to other controlled documents will

be accomplished in a similar manner except authority and approval is delegated to the chief of the relevant organization indicated. Maintenance and distribution shall also be handled in identical manner with *Modifying EOS Documents* [[PROQ1110](#)].

Interim or handwritten changes are not permitted.

Quality Records

Our EQS provides for storage, maintenance, and retrieval of quality records. Quality records may consist of either hard copy or electronically stored data and may include memos, inspection reports, audit reports, corrective action requests, specification reviews, meeting minutes, material or product certifications, As-Built drawings, final design documents, etc.

Control of Quality Records

ED maintains documented procedures to identify, collect, index, file, maintain, store, access and dispose of quality records. Records are always available for the customer's review.

Copies of records are distributed to other offices (Library of Congress, ERDC/WES Library, et cetera) as governed by regulation. Retention times are determined in ARIMS (with IMO) or by regulation. ARIMS and other regulations also govern records disposal.

Management Responsibility

ED maintains an organizational structure that defines responsibilities, authorities, and lines of communication for areas that affect product and service quality. Accountability and responsibility for quality rests with all ED employees, but especially management. Management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction.

Our responsibilities include:

- Set priorities.
- Provide quality products
- Provide required resources.
- Develop and monitor key performance measures.
- Direct corrective/preventive actions.
- Evaluate system effectiveness.

This section describes management responsibilities for the EQS, including quality policy and objectives, and organizational roles and authorities, resources, management quality representatives, and management review.

Vision Statement

Sacramento District is dedicated to continuing its quest for timely quality performance, to be responsive to our customers, and the pursuit of customer satisfaction.

The *U.S. Army Corps of Engineers Strategic Vision* [<http://www.hq.usace.army.mil/cepa/vision/vision.htm>] the Command Strategic Planning, vision statement, campaign plan, master strategy and innovations for the Corps. The *ER 5-1-11 USACE BUSINESS PROCESS* [<http://www.usace.army.mil/publications/eng-regs/er5-1-11/entire.pdf>] and Sacramento District Business Plan establish common project management processes to assure successful project delivery to our customers.

ED fully supports the vision statement and strategies of HQUSACE and has incorporated them into the Quality Manual where appropriate. ED will continue to improve our business processes and philosophy based on the HQ strategies, PMBP, and our business plan.

Customer Focus

Our EQS requires an understanding of the customer's requirements, and addresses the ability and capability to meet those requirements. Our responsibilities include the following:

- Ensuring agreement with customers.
- Accomplishing work in conformance with requirements.
- Coordinating with all District team members.
- Conducting a review of each work request to determine our ability to accomplish the effort within established budget and schedule.

Quality Policy

ED's quality policy is contained in the *Quality Policy Statement* [REFQ11L0]. Understanding and implementing the ED quality policy are accomplished through the publication of the documented EQS. ED management staff will also communicate the quality policy through the induction routines employed in training new employees.

Planning

Quality Objectives

Performance Measures and Objectives are contained in the *Performance Measures – Objectives* [REFA02L0]. The ED quality Performance Measures – Objectives are accomplished through the publication of the EQS. ED management staff will also communicate the quality Performance Measures and Objectives by training new employees and annual refresher training of all employees.

Quality Planning

The EQS was developed IAW *ER 1110-1-12 Engineering and Design Quality Management* [<http://www.usace.army.mil/inet/usace-docs/eng-regs/er1110-1-12/entire.pdf>] and *CESPD R 1110-1-8, Appendix D ENGINEERING SUBPLAN* [<http://www.spd.usace.army.mil/appd.pdf>]. The above USACE and Division regulations direct and define preparation of individual Quality Control Plans (QCP). QCP are developed IAW USACE regulation, South Pacific Division (SPD) regulation, ED policy, and product-specific requirements as outlined in guidance on the Project Management Plan (PMP), *PMP/PgMP Development* [PROC2000] [http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/proc2000.htm]. *QCP*

shall be developed and approved within 90 days after start of work for Civil Works and HTRW projects.

Organization

The *Engineering Division Organization* [REFQ08L0] shows the organization of ED Branches Branch and Sections. The Sacramento District Organization and Position Charts are maintained by the Resource Management Office and define lines of responsibility of all management personnel. These charts are updated by the Resource Management Office annually, and when necessary due to reorganization. ED management personnel include the Chief, Assistant Chief, Branch Chiefs, and Section Chiefs.

Responsibility and Authority

Quality roles, responsibilities and authorities are reviewed annually by the EQS management team (*Management Review* [PROM01L0]), and as needed. Understanding of appropriate ED organizational roles are reviewed for all employees, as needed, and are reviewed for new employees during induction routines.

Management Representative and Management Team

ED's Management Representative for all quality matters, both in-house and external, is designated in the CESP-K-ED memorandum shown in *Letter of Appointments to ISO 9001:2000:2000 Management Team* [REFQ09L0].

The Management Team and Project Manager for the EQS are also designated in the Letter of Appointments. The EQS Project Manager functions as the quality advocate for ED.

Management Review

The ISO Management Team, IAW *Management Review* [PROM01L0], formally reviews the suitability and effectiveness of the EQS at least annually. Informal reviews are conducted, as needed. The objective of the review is to examine overall performance of the EQS and to identify necessary changes.

Informal quality management assessments are made on an ad hoc basis, when necessary, using a variety of quality performance measurement tools including customer surveys.

Resource Management

ED Management is responsible for ensuring that the qualifications of employees under their supervision are appropriate for all assigned tasks and resulting quality.

Provision of Resources

Management ensures that adequate equipment and systems (computer hardware, software and networks) are available to implement and maintain the quality management system and continually improve its effectiveness.

Each project PMP also addresses resources for quality management to enhance customer satisfaction by meeting customer requirements.

Human Resources

General

All ED personnel are trained to the degree necessary or possess the skills necessary to ensure that ED products conform to stated project requirements.

Competence, Awareness and Training

All permanent ED personnel have a Mission Essential Task List (METL) and an Individual Development Plan (IDP) stored in the Automated Training Management Program (ATMP). Required training is identified on the employee's IDP. Supervisors review Job Descriptions, quarterly.

Staff expertise includes skills necessary to perform Quality Control (QC) and Quality Assurance (QA) activities, and an understanding of the EQS. Management ensures that fiscal and staffing resources are adequate to perform QC and QA activities, as required by customers, for all products.

ED personnel are scheduled to take part in a variety of quality related training programs including formal classes and seminars, long-term training, and developmental assignments. EQS Supervisors and managers conduct annual training for all ED team members on the EQS. Employees and supervisors maintain training records as appropriate and necessary. Training procedures are described in *Training [PROR01L0]*.

Infrastructure

Management shall determine, provide and maintain the infrastructure needed to achieve conformity to product requirements. Infrastructure includes, as applicable

- Buildings, workspace and associated utilities,
- Process equipment (both hardware and software), and
- Supporting services (such as transport or communication).

Work Environment

Management shall determine and manage the work environment needed to achieve conformity to product requirements.

Product Realization

Planning Of Product Realization

ED has planned and developed the processes needed for product realization. Planning of product realization is consistent with the requirements of the other processes of the EQS. ED personnel develop a QCP for each engineering product or service. The QCP shows how the technical,

schedule, design verification, coordination, and cost requirements for the product or service will be met. Specific PMP define customer expectations and requirements, industry practices, applicable criteria, technical roles and responsibilities (including composition of the design and review teams), design verification, schedule and milestones, and unique, sensitive or high visibility concerns. When engineering products are developed by A-E firms, the A-E firm must develop its own QCP, and ED will develop a corresponding Quality Assurance Plan (QAP) which addresses those activities taken to ensure the overall effectiveness of the A-E's quality control process. Procedures covering the requirements of Quality planning are found in *Design Process for Civil Works Projects [PROP02L0]*, *Design Process for Military Projects [PROP03L0]*, and *Design Process for HTRW Projects [PROP04L0]*. *Management of Project Folders [PROQ07L0]* covers documentation process of QCP.

Customer-Related Processes

Determination of Requirements Related To the Product

Our EQS requires an understanding of the customer's requirements, and addresses the ability and capability to meet those requirements. Our responsibilities include the following:

- Ensuring agreement with customers.
- Accomplishing work in conformance with customer requirements.
- Coordinating work with all District team members.
- Conducting a review of each work request to determine our ability to accomplish the effort within established budget and schedule.

Review of Requirements Related To the Product

ED maintains documented procedures for contract review in *Contract Review [PROP01L0]*. The appropriate Branch and Section Chiefs review each inquiry or request to supply services as outlined. Where the customer or PM provides no documented statement of services, the customer requirements shall be confirmed by the Resource Provider before acceptance following instructions provided in *Draft/Advanced Copy Scope of Service Agreement [FORP001Y]*. The scopes will be incorporated into the PMP and processed IAW *Resource Estimate Development [PROC2040]*

[\[http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/PROC2040.htm\]](http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/PROC2040.htm) and *PMP/PgMP Approval [PROC2070]*

[\[http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/proc2070.htm\]](http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/proc2070.htm).

In the event that ED or the customer should seek to vary the contract conditions or requirements, revisions as agreed to by the customer and the ED design elements involved will be made to the project scope following *Contract Review [PROP01L0]*. The revised scopes will be incorporated into the PMP and processed IAW *Resource Estimate Development [PROC2040]*

[\[http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/PROC2040.htm\]](http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/PROC2040.htm) and *Change Management [PROC3010]*

[\[http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/proc3010.htm\]](http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/proc3010.htm).

Customer Communication

Customer communication will be in conformance with the Communications Plan developed for the project IAW *Communications Plan [REF8006G]*
[\[http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/REF8006G.htm\]](http://bp.usace.army.mil/robo/projects/pmbp_manual/PMBP_Manual/REF8006G.htm).

Design and Development

ED maintains EQS procedures for developing quality engineering products and providing quality engineering services. In addition, to ensure that specified requirements are met, ED maintains procedural documentation to control and verify the design and development functions for its deliverables.

Our EQS requires that we:

- Develop, plan and schedule overall design efforts.
- Develop a design budget.
- Allocate resources.
- Maintain liaison between different entities that input to the product design.
- Review, identify, and verify the design requirements.
- Validate design and its quality upon completion.
- Control all design changes or modifications.

Design development documents are continually updated as the design evolves. Specific guidance controlling these aspects is governed by *Contract Review [PROP01L0]*; *Design Process for Civil Works Projects [PROP02L0]*; *Design Process for Military Projects [PROP03L0]*; *Design Process for HTRW Projects [PROP04L0]*; *Cost Engineering Process [PROP05L0]*; *Value Engineering [PROP06L0]*; *Project Safety and Health Requirements [PROP07L0]*; and *Purchasing of Services [PROP08L0]*.

Design and Development Planning

A QCP and QAP (consistent with the PMP) are developed for every project accepted by ED involving design and development activity. A QAP is developed for every activity that is further contracted out to an A-E consulting firm for execution. Specific qualified staff is assigned to each activity, and the estimated resources are identified for both personnel and equipment. The organizational and technical interfaces having input to the process are identified within the PMP or the Program Management Plan (PgMP) and the QCP. As required by these plans, regular PDT meetings ensure that all necessary information is reviewed. Minutes of these meetings are maintained, including all meetings with the client.

Design and Development Inputs

All design input is documented within the activity, and includes relevant statutory and regulatory requirements. The review process ensures that such inputs are adequate for the requirements of the design process. Any incomplete or ambiguous requirements are identified in the minutes of review meetings and resolved with the appropriate parties before the design activities proceed. Contract review is considered an integral and essential part of this activity.

Design and Development Outputs

The output from each stage of the design process is documented as part of the design review activity and is stated in terms of measurable requirements. The design output will comply with input requirements; specify acceptable criteria; and identify any areas requiring special considerations such as operating, storage, handling, maintenance, and disposal requirements. The construction considerations are passed on through the document titled “Engineering Considerations and Instructions to Field Personnel.”

Design and Development Review

The QCP for each product identifies appropriate review stages for that product, and meetings involving all relevant personnel are held as required to ensure that the design and development activity are proceeding in an appropriate manner. Records of all design reviews are maintained.

Design and Development Verification

Each stage of the development activity is subject to verification activities, which form part of the design review. Design verification is performed IAW the QCP and ensures compliance with all applicable criteria. The verification process may include, but is not limited to, the following:

- Major assumption and calculation checks by peers or senior personnel
- Designer/Reviewer consultations
- Performing alternative calculations
- Comparing new design against a similar proven design
- Conducting physical model studies
- Utilizing recognized experts and/or consultants.

Design and Development Validation

For construction projects, at the 90% design stage or at the conclusion of the design activity, but prior to construction advertisement, a plan-in-hand site inspection shall be conducted. The results of this validation process are compared to the original design input requirements to ensure that the output from the design process meets the original intent of the customer and is consistent with “on the ground” existing features.

Control of Design and Development Changes

Design change control is exercised from that stage of any project when the original designer of the product releases the design to other team members for evaluation or integration. All deliverables regardless of the stage of design (10%, 35%, 65%, 100%, etc.) shall clearly depict the stage of design on the documents. All design documents (reports, memorandums, design analyses, drawings, and specifications) shall contain the name/signature of the designer, checker, and the Design Leader (DL). All design changes and modifications shall be identified on the design documents marked with the date implemented, a brief description of the change, and signature approval by the authorized personnel. The customer and design team shall receive design changes prior to implementation. Records of these reviews are maintained IAW Design and Development Review above.

Purchasing

Our EQS requires that the purchase and procurement of materials and services conform to specified requirements. Purchases are authorized, prepared, reviewed, and verified IAW guidance.

Purchasing Process

ED maintains documented procedures to ensure that purchased products conform to specified requirements. All subcontractors for all design-related services are selected through an evaluation process to determine the most qualified firms based on ability and other quality-related factors. Appropriate levels of control over the subcontractor are fully described in the QAP and the contract scope of work. The requirements of this element are covered by *Purchasing of Services* [[PROP08L0](#)].

Examples of methods used to monitor subcontractor performance are:

- Interim performance evaluations
- Performance Evaluations at the end of Design and Construction
- In-process visits
- DrChecks comments

Purchasing Information

The contracts for services detail fully the product or service required including references to standards and codes where applicable. All such documents are reviewed for completeness of specified requirements prior to issuance. The *Purchasing of Services* [[PROP08L0](#)] addresses these requirements.

Verification of Purchased Product

ED verification shall be accomplished IAW the project QAP. At times this may be performed on the subcontractor's premises. The customer is always permitted to verify the product on ED's premises or on the subcontractor's premises. The customer is not allowed, however, to modify the contract by directly dealing with the subcontractor. A contract change will always be the responsibility of ED to coordinate with the Contracting Officer or his/her representative. Although the customer is permitted to conduct verifications, as deemed appropriate, ED maintains full responsibility to ensure that an acceptable product is provided. This responsibility can never be assumed to pass to the customer. Irrespective of any prior customer verifications, the customer maintains the right to subsequently reject any product deemed as nonconforming to its properly defined requirements established in *Contract Review* [[PROP01L0](#)], and the project's PMP.

Production and Service Provision

Our EQS requires the establishment and maintenance of procedures specific to performing and verifying that servicing work appropriately meets customer needs. Typical servicing work includes support provided through Engineering During Construction, site visits, periodic inspections, hydro monitoring, Water Management, and Project Operation.

Control of Production and Service Provision

ED maintains the following procedures for providing post-design services appropriate to the needs of our customers.

- *Inspections of Reservoir and Navigation Projects* [[PROP10L0](#)]
- *Inspections of Bridges* [[PROP11L0](#)]
- *Instrumentation Data Review* [[PROP12L0](#)]
- *Dam Safety Training* [[PROP13L0](#)]
- *Dam Safety Assurance Program* [[PROP14L0](#)]
- *Water Management and Project Operation* [[PROP15L0](#)]

Validation of Processes for Production and Service Provision

This element does not apply to our EQS. All of our project designs or products are verified by subsequent monitoring or measurement.

Identification and Traceability

Project Numbers are assigned to projects by Project Management IAW the PMBP *Initiating a Project - NAV2020G* [http://bp.usace.army.mil/robo/projects/pmbp_manual/pmbp_manual/nav2020g.htm]. Project directories are created for each project IAW *Creating Project Directories* [[INSP25L0](#)]. Specification and drawing file numbers are assigned by the Specifications Unit and additional project metadata is saved to a project.txt file located in the project directory. File naming conventions are provided in *SPK File Naming Convention for Military CADD Drawings* [[CODP01L0](#)] and *SPK File Naming Convention for Civil Works CADD Drawings* [[CODP02L0](#)]

Product status is identified by project phases in our various design procedures:

- *Design Process for Civil Works Projects* [[PROP02L0](#)]
- *Design Process for Military Projects* [[PROP03L0](#)]
- *Design Process for HTRW Projects* [[PROP04L0](#)]

Customer Property

This element does not apply to our EQS. ED does not use or incorporate any customer property into the project design or products.

Preservation of Product

Our EQS provides for the handling, storage, packaging, and transporting of products within ED control to prevent loss, damage or undue deterioration. Products stored for an extended duration shall be visually re-inspected for signs of damage or deterioration prior to use. ED maintains documented procedures to control handling, packaging, delivery, preservation, and storage of all ED products. These requirements are also covered in *Document and Data Control* above. *Handling, Storage, Packaging, Preservation, and Delivery* [[PROP09L0](#)] covers the specific procedures for the primary ED product deliverables of plans, specifications and reports.

Control of Monitoring and Measuring Devices

Our EQS calls for the calibration and maintenance of measuring and test equipment used for inspection, measurement or testing purposes. ED maintains procedures to control, calibrate, and maintain inspection, measuring, and test equipment (including test software) used during engineering and design.

Measuring and test equipment, including special tools developed for inspection purposes, shall be calibrated, maintained and inspected as shown in *Calibration of Equipment [PROP16L0]*. All such equipment is used in a manner that ensures that the measurement uncertainty is known and is consistent with the required capability. Control and calibration of instrumentation and calibration standards are IAW industry standards.

Computer-based software used to determine dimensions, dimensional accuracy, or used, as a basis to determine acceptability of a product shall be inspected, checked and verified at prescribed intervals.

All equipment requiring control is identified, and records are kept to demonstrate item identity, storage requirements, and frequency of calibration, standards to be used, calibrations carried out, remedial actions and state of accuracy prior to and after calibration. All such equipment is used in a manner that ensures that the measurement uncertainty is known and is consistent with the required measurement capability. The documented procedures also establish the extent and frequency of checks and specify the maintenance of records as evidence of control. All records are available to the customer.

Measurement, Analysis and Improvement

General

The ISO Management Team, IAW *Management Review [PROM01L0]*, formally reviews the suitability and effectiveness of the EQS at least annually. Informal reviews are conducted as needed. The objective of the review is to examine overall performance of the EQS and to identify necessary changes.

Informal quality management assessments are made on an ad hoc basis when necessary, using a variety of quality performance measurement tools, including customer surveys.

Monitoring and Measurement

Customer Satisfaction

ED will monitor and measure customer satisfaction in conformance to the District metrics. This metric has two components: 1) we will obtain and measure information through the customer feedback process and apply a rating to it; 2) we will measure whether the customer loyalty acquired via the Customer Feedback Process pays off by increasing the number of discretionary projects received.

Internal Audit

Our EQS provides for the planning, scheduling, implementation, and documentation of internal audits to ensure quality-related activities comply with written procedures.

Each functional unit shall be audited on a periodic basis. Internal auditors shall not audit their own functional unit.

Internal audit results include a statement as to the effective application of the EQS, and possible suggestions of what corrective/preventive actions are needed.

When nonconforming conditions are found, a corrective action plan shall be developed and implemented. Special follow-up audits shall be scheduled to ensure the corrective/preventive action was implemented and effective.

To verify that quality activities and related results comply with planned arrangements and to determine the effectiveness of the EQS, ED maintains a documented procedure for conducting internal audits. This procedure specifies the schedule and ensures that independent personnel conduct the audit, results are recorded, timely corrective action is taken, and appropriate follow-up audits are conducted to verify compliance. Detailed procedures are contained in *Internal Quality Audits [PROA06L0]*.

Monitoring and Measurement of Processes

ED will monitor and measure processes in conformance to the District metrics to ensure quality work by establishing the baseline metrics and ensure ITR processes are uniformly applied throughout the District. The lower tiered metrics will identify where quality actually falls short, allowing process improvements.

Monitoring and Measurement of Product

ED will monitor and measure product quality in conformance to the District metrics. The metric is similar to a grade point average. It is an index that is comprised of the average letter grade assigned to all designs reviewed within the reporting period, the average number of contractor changes per contract during the solicitation phase, the average number of contract modifications for the contract, and the average number of warranty claims per contract.

Control of Nonconforming Product

Control of nonconforming product will be accomplished IAW *Corrective Actions [PROA01L0]*.

Analysis of Data

Our EQS provides for the use of statistical techniques to confirm process and product acceptability, and to provide a basis for continuous improvement. We use statistical techniques for monitoring customer satisfaction, assessing trends, and measuring overall performance.

Improvement

Our EQS provides for the identification, documentation, investigation, and implementation of corrective and preventive measures, including following up inspections to ensure effectiveness.

Corrective action involves the investigation and documentation of the cause(s) of customer complaints, determination and implementation of corrective action needed and follow-up monitoring/auditing. Preventive action includes monitoring of work processes, reviews/analysis of tests, inspection data, and audit results to prevent nonconforming products.

Continual Improvement

ED maintains several systems aimed at correcting the causes of nonconformities. Those systems include Lessons Learned, EIRS Bulletins, SPECSINTACT, and DrChecks. In addition, ED's design development procedures require several actions to prevent nonconformities. Design *Process for Civil Works Projects* [[PROP02L0](#)]; *Design Process for Military Projects* [[PROP03L0](#)]; and *Design Process for HTRW Projects* [[PROP04L0](#)] cover those procedures.

Corrective Action

The processes identified in *Corrective Actions* [[PROA01L0](#)] will be implemented for development of all ED deliverables. ED will eliminate the cause of a nonconformance in order to prevent the occurrence of nonconforming products. Corrective action may be taken on the product, process and EQS. New lessons learned will be developed IAW references *Capturing Lessons Learned* [[PROA02L0](#)] and *Processing Lessons Learned* [[PROA03L0](#)]. The following are examples of corrective actions:

- The creation of Lessons Learned.
- Sharing of lessons learned with other Corps elements.
- The *Criteria Change Request (CCR)* [<https://www.projnet.org/projnet/binKornHome/index.cfm?strKornCob=CCRPublicAgencySelect>] process for requesting guidance/criteria correction or change.
- Revisions of procedures, work instructions, criteria, standard details, etc.

These procedures encompass numerous areas of concern, including customer concerns, identification of corrective action, follow-up to confirm that corrective action was taken, and continual oversight of quality control procedures ensuring appropriateness and compliance with these procedures.

Preventive Action

For each project deliverable developed by ED, a review of the Lessons Learned shall be initiated and a QCP shall incorporate ones applicable to the project in conformance with *Integrating Lessons Learned* [[PROA04L0](#)]. ED maintains documented procedures that require development of a QCP to ensure that an In-House and/or subcontractor's QCP is appropriate, that audit oversight of the QCP occurs, that potential problem areas are identified, and that these findings are documented and disseminated to all appropriate personnel. ED shall implement the appropriate processes identified in *Preventive Actions* [[PROA07L0](#)] and *A-E Responsibility*

Management Program [\[PROA05L0\]](#) for development of all ED deliverables. Summary information is reviewed through the EQS management team meetings.