U.S. ARMY CORPS OF ENGINEERS
PORTLAND DISTRICT

ENGINEERING AND CONSTRUCTION
PRODUCT DEVELOPMENT
QUALITY MANAGEMENT SYSTEM

POLICY AND PROCEDURE MANUAL

ISSUE NO. 1

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PORTLAND DISTRICT
ENGINEERING AND CONSTRUCTION PRODUCT DEVELOPMENT

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INTRODUCTION

This manual defines and documents Engineering and Construction Division's Quality Management System (QMS) for development of engineering and construction products. The policies and procedures contained herein outline management's responsibilities for establishing, implementing, maintaining and communicating the QMS to our employees and customers.

This QMS is an extension of our Project Management business processes. It supports our efforts to become the engineering agency of choice and to achieve the Corps Vision. This system establishes a structured foundation that promotes positive actions of inspection, quality control, quality assurance and strategic planning to support the continuous improvement of engineering and construction products, and to ensure conformance to our policies, procedures, and requirements.

Questions or comments concerning this manual and/or QMS administration may be directed to Jeffrey S. Sedey, Management Representative at (503) 808-4810.

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ENGINEERING AND CONSTRUCTION PRODUCT DEVELOPMENT

QUALITY MANAGEMENT SYSTEM

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PART I - POLICY

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ENGINEERING AND CONSTRUCTION DIVISION
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PART I - POLICY

TABLE OF CONTENTS

QUALITY POLICY

Engineering and Construction Division is committed to developing and providing engineering, scientific, and construction management services meeting or exceeding customer requirements, on time, and within budget, and is dedicated to continuously improving our business processes and products.

SCOPE AND OBJECTIVES

SCOPE: The policy and procedures described herein apply to the work activities and personnel of the U.S. Army Corps of Engineers, Portland District, who are assigned specific responsibilities for the development of engineering and construction products.

OBJECTIVES: On a continuous basis, the Portland District plans, designs, and constructs environmentally viable water resources projects through development, execution, measurement, and adjustments of work processes. In support of these efforts, this Quality Management System is intended to meet these objectives:

- integrate our policies and procedures with Portland District's Project Management Business Process;
- identify technical requirements and customer needs prior to starting work;
- coordinate with the customer during and at completion of work to compare needs and requirements with results;
- assure technical adequacy of every engineering and construction product developed;
- identify areas of success or where improvements can be made for future use.

Part I - Policy Revision Record

DATE	REVISION NO.	DESCRIPTION
25 Oct 06		Issue No. 1
01 Feb 08	1	Corrected misspelling in page 2-4 and updated Appendix C

SECTION 1

MANAGEMENT ORGANIZATION

1.1 PURPOSE

This section defines Engineering and Construction Division's (EC) organizational responsibilities for the management and implementation of activities associated with the management system employed to develop engineering and construction products.

1.2 SCOPE

The accountability and responsibility for the quality of EC products produced by Portland District rests with all employees involved in the development of such products regardless of their organizational location.

1.3 POLICY

1.3.1 EC maintains an organizational structure that defines responsibilities, authority and lines of communication for areas that affect product and service quality.

1.3.2 The quality policy defines EC's commitment to quality engineering and construction products and toward satisfying our customers. The EC product development policy is displayed in various locations throughout EC. This policy is initially explained during orientation training of new employees so that each employee thoroughly understands the policy.

1.3.3 Portland District's organization chart is available on the district LAN at https://w3.nwp.usace.army.mil/ec/docs/Org.pdf (internal access only). Functional statements for Portland District organizations are included in district regulation: NWPR 10-1-3. The following summaries describe the relative authority and responsibility of the staff who manage, perform, and verify work affecting product quality.

a. Chief, Engineering and Construction Division (EC) is responsible for: the overall establishment, execution, and effectiveness of the engineering product development portion of the quality management system (QMS); providing general direction of activities of EC; promulgation of instructions with respect to EC operations; managing and providing the services associated with EC capabilities; and chairing a management review meeting at least quarterly. The management review meeting agenda shall include a review of the effectiveness of the management system, maintenance of the Policy and Procedure Manual, adequacy of resources and training, internal audit and corrective action effectiveness, and verification.

b. Each EC Branch Chief is responsible for the following actions:

(1) The planning, organization, coordination, and efficient execution of work in their respective Branch.

(2) Setting priorities with regard to resource constraints.

(3) Managing product quality by developing, maintaining, and coordinating positive control of quality related aspects, and using an audit system that includes monitoring and reporting to assure compliance with quality assurance provisions and the ISO 9001 standard.

(4) Providing management with an independent quality performance evaluation for each department.

(5) Directing corrective/preventive action on all problems related to costs, resources, work progress, and material requirements.

(6) Executing and monitoring key performance measures related to Command Management Review criteria.

(7) Developing key performance measures to evaluate the effectiveness of the QMS and to evaluate progress in adopting the continuous improvement concept.

(8) Overall compliance with this quality system.

(9) Assuring all employees in their Branch are familiar with and understand the QMS.

(10) Active participation in the leadership of Portland District.

c. Each EC Section Chief is responsible for accomplishing all work as assigned and related to the technical discipline of their department.

d. Each EC employee is responsible for:

(1) Understanding the requirements for producing quality products.
(2) Understanding their involvement and influence in product development.
(3) Performing work in accordance with our policies and procedures.

1.4 APPLICABLE PROCEDURES

Compliance with this policy is achieved through conformance to the responsibilities described in paragraph 4.0 of each procedure contained in the Policy and Procedure Manual.

SECTION 2

QUALITY MANAGEMENT SYSTEM (QMS)

2.1 GENERAL REQUIREMENTS

This policy establishes the requirements for EC to document, implement, and maintain a quality management system and continually improve its effectiveness in accordance with the requirements of ISO 9001-2000.

EC shall

(a) identify the process(es) needed for the QMS and their application throughout EC,

(b) determine the sequence and interaction of these processes,

(c) determine criteria and methods needed to ensure that both the operation and control of these processes are effective,

(d) ensure the availability of resources and information necessary to support the operation and monitoring of these processes,

(e) monitor, measure, and analyze these processes, and

(f) implement actions necessary to achieve planned results and continual improvement of these processes.

These processes shall be managed by EC in accordance with the requirements of ISO 9001-2000.

Where EC chooses to outsource any process that affects product conformity with requirements, EC shall ensure control over such processes. Control of such outsourced processes shall be identified within the quality management system.

NOTE: Within the EC QMS process (see figure 2-1), EC uses two processes to develop EC products: the EC Design Process (see figure 2-2) and the EC Construction Management Process (see figure 2-3). Each process entails subprocesses that are described by procedure(s) that govern product development for each subprocess. The EC Design Process precedes the EC Construction Management Process. All of these processes are presented as flow charts with brief narrative at the end of this SECTION.

2.2 DOCUMENTATION REQUIREMENTS

2.2.1 General. The QMS documentation shall include

(a) documented statements of work scope, schedule, budget, and quality objectives,

(b) a quality manual,

(c) documented procedures required by QMS POLICY,

(d) documents needed by EC to ensure the effective planning, operation, and control of its processes, and

(e) records required by QMS POLICY (see 2.2.4 of this SECTION).

NOTE 1: where the term "documented procedure" appears within a POLICY SECTION, this means that the procedure is established, documented, implemented, and maintained.

NOTE 2: The extent of the QMS documentation can differ from one part of EC to another due to

(a) the size of EC element and type of activities,
(b) the complexity of processes and their interactions, and
(c) the competence of personnel.

NOTE 3: The documentation can be in any form or type of medium.

2.2.2 Quality Manual. EC shall establish and maintain a quality manual that includes

(a) the scope of the QMS, including details of and justification for any exclusions,
(b) the documented procedures established for the QMS, or reference to them, and
(c) a description of the interaction between the processes of the QMS.

2.2.3 Control of Documents. Documents required by the quality management system shall be controlled. Records are a special type of document and shall be controlled according to the requirements given in 2.2.4 of this SECTION.

A documented procedure shall be established to define the controls needed

(a) to approve documents for adequacy prior to issue,

(b) to review and update as necessary and re-approve documents,

(c) to ensure that changes and the current revision status of documents are identified,

(d) to ensure that relevant versions of applicable documents are available at points of use,

(e) to ensure that documents remain legible and readily identifiable,

(f) to ensure that documents of external origin are identified and their distribution controlled, and

(g) to prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose.

2.2.4 Control of Records. Records shall be established and maintained to provide evidence of conformity to requirements and of the effective operation of the quality management system. Records shall remain legible, readily identifiable, and retrievable. A documented procedure shall be established to define the controls needed for the identification, storage, protection, retrieval, retention time, and disposition of records.

2.3 APPLICABLE PROCEDURES

Compliance with this policy is achieved through conformance to all QMS procedures included in this Manual.

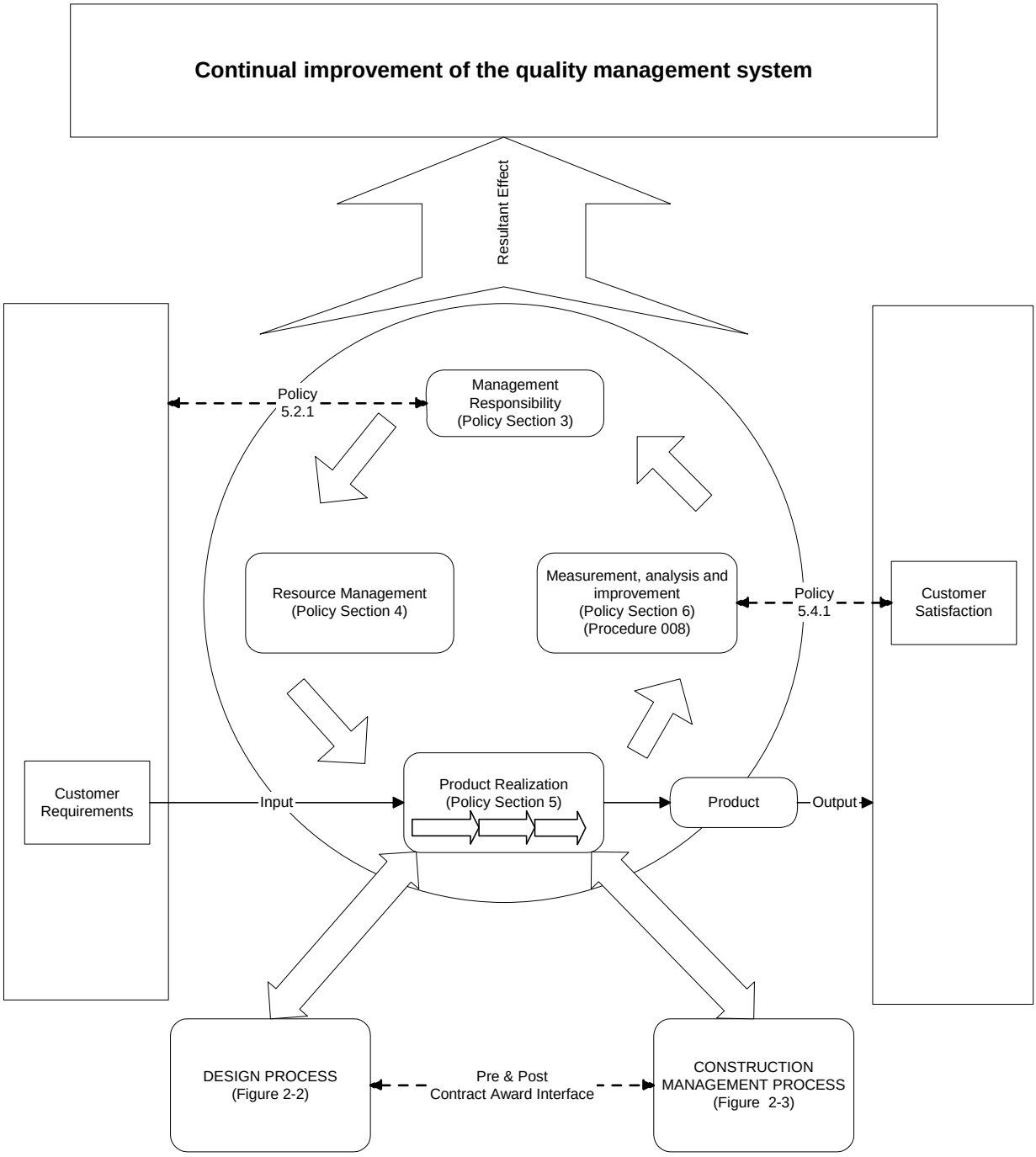


Figure 2-1

Value-added activities

Information flow

QMS procedures incorporated in the Design Process include:

Procedure 002 – Product Development and Scoping Work
Procedure 003 – Revising Work Scope
Procedure 004 – Performing Product Review
Procedure 006 – Performing Engineering During Construction
Procedure 007 – Purchase of Architect-Engineer and Professional Services
Procedure 009 – Control of Quality Records
Procedure 010CA – Corrective Action
Procedure 010PA – Preventive Action
Procedure 011 – Control of Nonconforming Product
Procedure 012 – Training Needs
Procedure 013 – Certification of Inspection, Measuring, and Test Equipment
Procedure 014 – Verification of Test Software

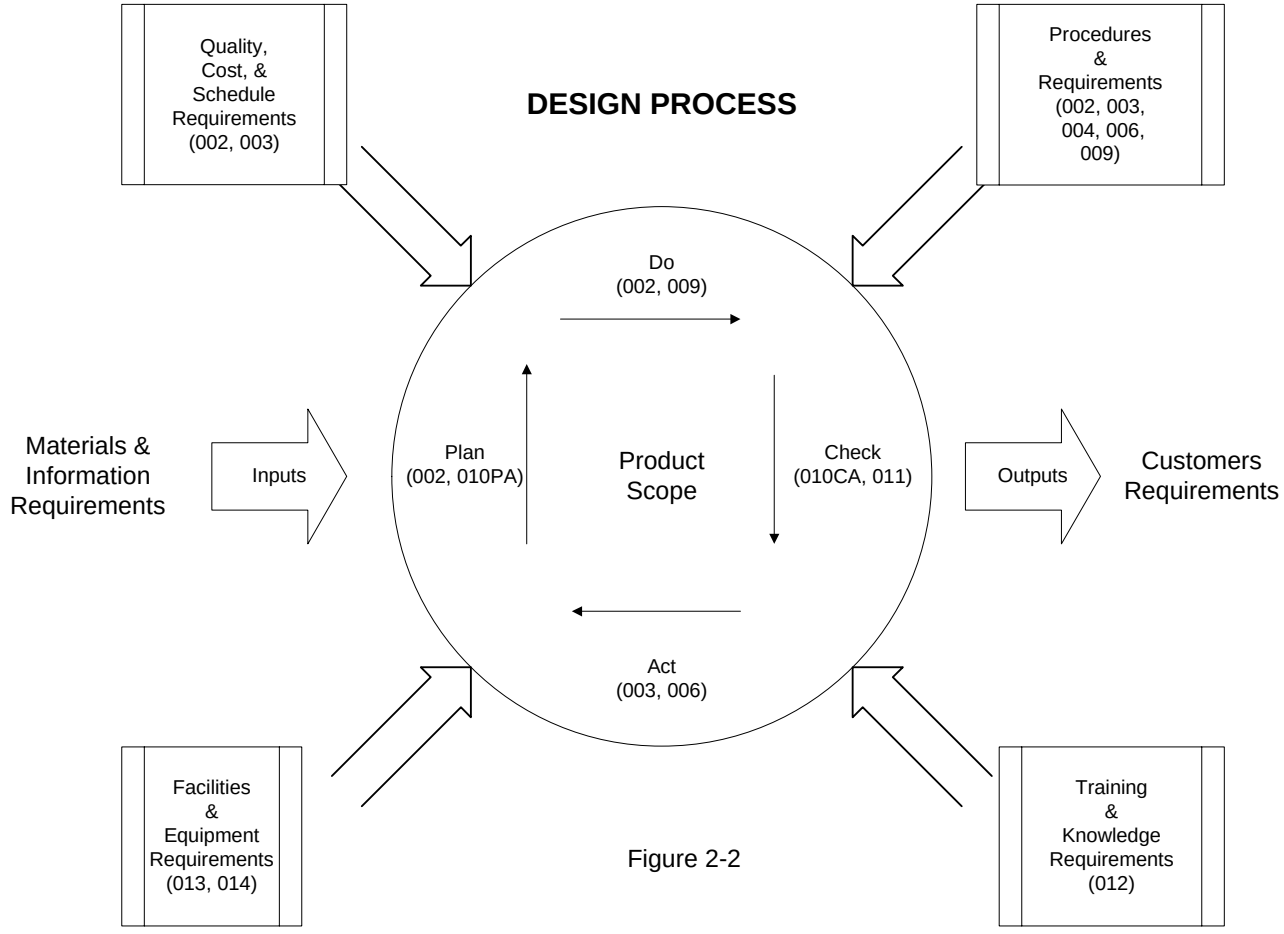


Figure 2-2

QMS procedures incorporated in the Construction Management Process include:

Procedure 002 – Product Development and Scoping Work
Procedure 003 – Revising Work Scope
Procedure 005 – Execution of Construction Contract Work
Procedure 006 – Performing Engineering During Construction
Procedure 007 – Purchase of Architect-Engineer and Professional Services
Procedure 009 – Control of Quality Records
Procedure 010CA – Corrective Action
Procedure 010PA – Preventive Action
Procedure 011 – Control of Nonconforming Product
Procedure 012 – Training Needs
Procedure 013 – Certification of Inspection, Measuring, and Test Equipment
Procedure 014 - Verification of Test Software

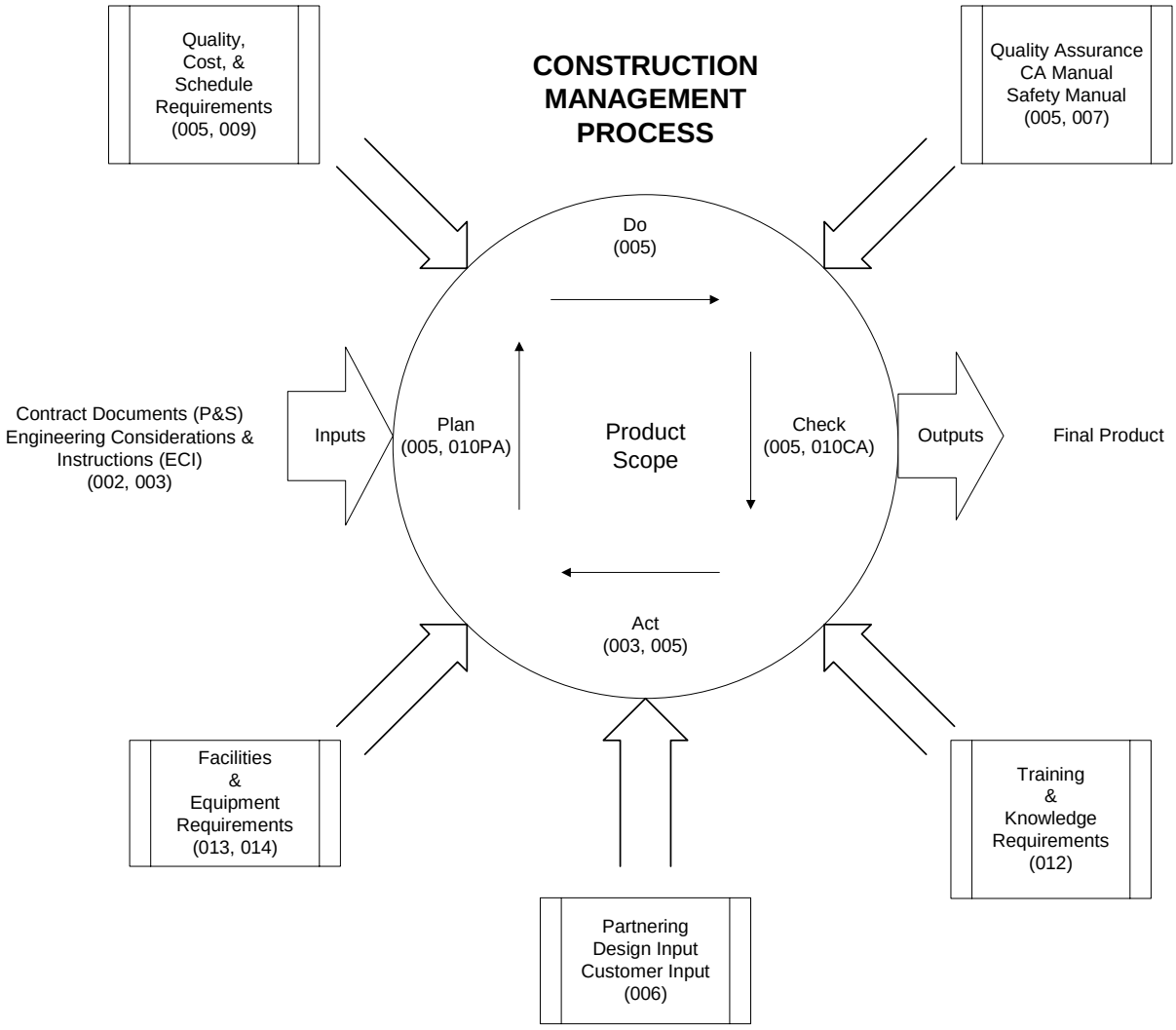


Figure 2-3

SECTION 3

MANAGEMENT RESPONSIBILITY

3.1 MANAGEMENT COMMITMENT

Top management shall provide evidence of its commitment to the development and implementation of the quality management system and continually improving its effectiveness by

(a) communicating to EC the importance of meeting customer as well as statutory and regulatory requirements,

(b) establishing the quality policy,

(c) ensuring that quality objectives are established,

(d) conducting management reviews, and

(e) ensuring the availability of resources.

3.2 CUSTOMER FOCUS

Top management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction (see 5.2.1 of POLICY SECTION 5 and 6.2.1 of POLICY SECTION 6).

3.3 QUALITY POLICY

Top management shall ensure that the quality policy

(a) is appropriate to the purpose of EC,

(b) includes a commitment to comply with requirements and continually improve the effectiveness of the quality management system,

(c) provides a framework for establishing and reviewing quality objectives,

(d) is communicated and understood within EC, and

(e) is reviewed for continuing suitability.

3.4 PLANNING

3.4.1 Quality Objectives. Top management shall ensure that quality objectives, including those needed to meet requirements for products [see 5.1(a)of POLICY SECTION 5], are established at relevant functions and levels within EC. The quality objectives shall be measurable and consistent with the quality policy.

3.4.2 Quality Management System Planning. Top management shall ensure that

(a) the planning of the quality management system is carried out in order to meet the requirements given in 2.1 of POLICY SECTION 2 as well as the quality objectives, and

(b) the integrity of the quality management system is maintained when changes to the quality management system are planned and implemented.

3.5 RESPONSIBILY, AUTHORITY, AND COMMUNICATION

3.5.1 Responsibility and Authority. Top EC management shall ensure that responsibilities and authorities are defined and communicated within EC.

3.5.2 Management Representative. Top EC management shall appoint a member of management who, irrespective of other responsibilities, shall have responsibility and authority that includes

(a) ensuring that processes needed for the quality management system are established, implemented, and maintained,

(b) reporting to top management on the performance of the quality management system and any need for improvement, and

(c) ensuring the promotion of awareness of customer requirements throughout EC.

NOTE: The responsibility of a management representative can include liaison with external parties on matters relating to the quality management system.

3.5.3 Internal Communication. Top management shall ensure that appropriate communication processes are established within EC and that communication takes place regarding the effectiveness of the quality management system.

3.6 MANAGEMENT REVIEW

3.6.1 General. Top management shall review the QMS at planned intervals to ensure its continuing suitability, adequacy, and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the quality management system, including the quality policy and quality objectives.

Records from management reviews shall be maintained (see 2.2.4 of POLICY SECTION 2).

3.6.2 Review Input. The input to management review shall include information on

(a) results of audits,
(b) customer feedback,
(c) process performance and product conformity,
(d) status of preventive and corrective actions,
(e) follow-up actions from previous management reviews,
(f) changes that could affect the quality management system, and
(g) recommendations for improvement.

3.6.3 Review Output. The output from the management review shall include any decisions and actions related to

(a) improvement of the effectiveness of the quality management system and its processes,
(b) improvement of product related to customer requirements, and
(c) resource needs.

3.7 APPLICABLE PROCEDURES

Compliance with this policy is achieved through conformance to all QMS procedures included in this Manual.

SECTION 4

RESOURCE MANAGEMENT

4.1 PROVISION OF RESOURCES

EC shall determine and provide the resources needed

(a) to implement and maintain the quality management system and continually improve its effectiveness, and

(b) to enhance customer satisfaction by meeting customer requirements.

4.2 HUMAN RESOURCES

4.2.1 General. Personnel performing work affecting product quality shall be competent on the basis of appropriate education, training, skills, and experience.

4.2.2 Competence, Awareness, and Training. EC shall

(a) determine the necessary competence for personnel performing work affecting product quality,

(b) provide training or take other actions to satisfy these needs,

(c) evaluate the effectiveness of the actions taken,

(d) ensure that its personnel are aware of the relevance and importance of their activities and they contribute to the achievement of the quality objectives, and

(e) maintain appropriate records of education, training, skills, and experience (see 2.2.4 of POLICY SECTION 2).

4.3 INFRASTRUCTURE

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

(a) buildings, workspace, and associated utilities,
(b) process equipment (both hardware and software), and
(c) supporting services such as transport or communication).

4.4 WORK ENVIRONMENT

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

4.5 APPLICABLE PROCEDURES

Compliance with this policy is achieved through conformance to all QMS procedures included in this Manual.

SECTION 5

PRODUCT REALIZATION

5.1 PLANNING OF PRODUCT REALIZATION

EC shall plan and develop the process needed for product realization. Planning of product realization shall be consistent with the requirements of the other processes of the quality management system (see 2.1 of POLICY SECTION 2).

In planning product realization, EC shall determine the following, as appropriate:

(a) quality objectives and requirements for the product;

(b) the need to establish processes, documents, and provide resources specific to the product;

(c) required verification, validation, monitoring, inspection, and test activities specific to the product and the criteria for product acceptance;

(d) records needed to provide evidence that the realization processes and resulting product meet requirements (see 2.2.4 of POLICY SECTION 2).

The output of this planning shall be in a form suitable for EC's method of operations.

NOTE 1: A document specifying the processes of the QMS (including the product realization processes) and the resources to be applied to a specific product, project, or contract, can be referred to as a project management plan.

NOTE 2: EC may also apply the requirements given in 5.3 of this SECTION to the development of product realization processes.

5.2 CUSTOMER-RELATED PROCESSES

5.2.1 Determination of Requirements Related to the Product. EC shall determine

(a) requirements specified by the customer, including the requirements for delivery and post-delivery activities,

(b) requirements not stated by the customer, but necessary for specific or intended use, where known,

(c) statutory and regulatory requirements related to the product, and

(d) any additional requirements determined by EC.

5.2.2 Review of Requirements Related to the Product. EC shall review the requirements related to the product. This review shall be conducted prior to EC's commitment to supply a product to the customer (e.g. submission of tenders, acceptance of contracts or orders, acceptance of changes to contracts or orders) and shall ensure that

(a) product requirements are defined,

(b) contract or order requirements differing from those previously expressed are resolved, and

(c) EC has the ability to meet the defined requirements.

Records of the results of the review and actions arising from the review shall be maintained (see 2.2.4 of POLICY SECTION 2).

Where the customer provides no documented statement of requirement, the customer requirements shall be confirmed by EC before acceptance.

Where the product requirements are changed, EC shall ensure that relevant documents are amended and that relevant personnel are made aware of the changed requirements.

NOTE: In some situations, such as internet sales, a formal review is impractical for each order. Instead, the review can cover relevant product information such as catalogues or advertising material.

5.2.3 Customer Communication. EC shall determine and implement effective arrangements for communicating with customers in relation to

(a) product information,
(b) inquiries, contracts, or order handling, including amendments, and
(c) customer feedback, including customer complaints.

5.3 DESIGN AND DEVELOPMENT

5.3.1 Design and Development Planning. EC shall plan and control the design and development of product.

During the design and development planning, EC shall determine

(a) the design and development stages,

(b) the review, verification, and validation that are appropriate to each design and development stage, and

(c) the responsibility and authorities for design and development.

EC shall manage the interfaces between different groups involved in design and development to ensure effective communication and clear assignment of responsibility.

Planning output shall be updated, as appropriate, as the design and development progresses.

5.3.2 Design and Development Inputs. Input relating to product requirements shall be determined and records maintained (see 2.2.4 of POLICY SECTION 2). These inputs shall include:

(a) functional and performance requirements,

(b) applicable statutory and regulatory requirements,

(c) where applicable, information derived from previous similar designs, and

(d) other requirements essential for design and development.

These inputs shall be reviewed for adequacy. Requirements shall be completed, unambiguous, and not in conflict with each other.

5.3.3 Design and Development Outputs. The outputs of design and development shall be provided in a form that enables verification against the design and development input and shall be approved prior to release.

Design and development outputs shall

(a) meet the input requirements for design and development,

(b) provide appropriate information for purchasing, production, and for service provision,

(c) contain or reference product acceptance criteria, and

(d) specify the characteristics of the product that are essential for its safe and proper use.

5.3.4 Design and Development Review.

At suitable stages, systematic reviews of design and development shall be performed in accordance with planned arrangements (see 5.3.1 of this SECTION)

(a) to evaluate the ability of the results of design and development to meet requirements, and

(b) to identify any problems and propose necessary actions.

Participants in such reviews shall include representatives of functions concerned with the design and development stage(s) being reviewed. Records of the results of the reviews and any necessary actions shall be maintained (see 2.2.4 of POLICY SECTION 2).

5.3.5 Design and Development Verification. Verification shall be performed in accordance with planned arrangements (see 5.3.1 of this SECTION) to ensure that the design and development outputs have met the design and development input requirements. Records of the results of the verification and any necessary actions shall be maintained (see 2.2.4 of POLICY SECTION 2).

5.3.6 Design and Development Validation. Design and development validation shall be performed in accordance with planned arrangements (see 5.3.1 of this SECTION) to ensure that the resulting product is capable of meeting the requirements for the specified application or intended use, where known. Wherever practicable, validation shall be completed prior to the delivery or implementation of the product. Records of the results of validation and any necessary actions shall be maintained (see 2.2.4 of POLICY SECTION 2).

5.3.7 Control of Design and Development Changes. Design and development changes shall be identified and records maintained. The changes shall be reviewed, verified, and validated, as appropriate, and approved before implementation. The review of design and development changes shall include evaluation of the effect of the changes on constituent parts and product already delivered.

Records of the results of the review of changes and any necessary actions shall be maintained (see 2.2.4 of POLICY SECTION 2).

5.4 PURCHASING

5.4.1 Purchasing Process. EC shall ensure that purchased product conforms to specified purchase requirements. The type and extent of control applied to the supplier and the purchased product shall be dependent upon the effect of the purchased product on subsequent product realization or the final product.

EC shall evaluate and select suppliers based on their ability to supply product in accordance with EC's requirements. Criteria for selection, evaluation, and re-evaluation shall be established. Records of the results of evaluations and any necessary action arising from the evaluation shall be maintained (see 2.2.4 of POLICY SECTION 2).

5.4.2 Purchasing Information. Purchasing information shall describe the product to be purchased, including where appropriate

(a) requirements for approval of product, procedures, processes, and equipment,

(b) requirements for qualification of personnel, and

(c) quality management system requirements.

EC shall ensure the adequacy of specified purchase requirements prior to their communication to the supplier.

5.4.3 Verification of Purchased Product. EC shall establish and implement the inspection or other activities necessary for ensuring that purchased product meets specified purchase requirements.

Where EC or its customer intends to perform verification at the supplier's premises, EC shall state the intended verification arrangements and method of product release in the purchasing information.

5.5 PRODUCT AND SERVICE PROVISION

5.5.1 Control of Production and Service Provision. EC shall plan and carry out production and service provisions under controlled conditions. Controlled conditions shall include, as applicable

(a) the availability of information that describes the characteristics of the product,
(b) the availability of work instructions, as necessary,

(c) the use of suitable equipment,
(d) the availability and use of monitoring and measuring devices,
(e) the implementation of monitoring and measurement, and
(f) the implementation of release, delivery, and post-delivery activities.

5.5.2 Validation of Processes for Production and Service Provision. EC shall validate any processes for production and service provision where the resulting output cannot be verified by subsequent monitoring or measurement. This includes any processes where deficiencies become apparent only after the product is in use or the service has been delivered.

Validation shall demonstrate the ability of these processes to achieve planned results.

EC shall establish arrangements for these processes including, as applicable

(a) defined criteria for review and approval of the processes,
(b) approval of equipment and qualification of personnel,
(c) use of specific methods and procedures,
(d) requirements for records (see 2.2.4 of POLICY SECTION 2), and
(e) revalidation.

5.5.3 Identification and Traceability. Where, appropriate, EC shall identify the product by suitable means throughout the product realization.

EC shall identify the product status with respect to monitoring and measurement requirements.

Where traceability is a requirement, EC shall control and record the unique identification of the product (see 2.2.4 of POLICY SECTION 2).

NOTE: In some industry sectors, configuration management is a means by which identification and traceability are maintained.

5.5.4 Customer Property. EC shall exercise care with customer property while it is under EC's control or being used by EC. EC shall identify, verify, protect, and safeguard customer property provided for use or incorporation into the product. If any customer property is lost, damaged, or otherwise found to be unsuitable for use, this shall be reported to the customer and records maintained (see 2.2.4 of POLICY SECTION 2).

NOTE: Customer property can include intellectual property.

5.5.5 Preservation of Product. EC shall preserve the conformity of product during internal processing and delivery to the intended destination. This preservation shall include identification, handling, packaging, storage, and protection. Preservation shall also apply to the constituent parts of a product.

5.6 CONTROL OF MONITORING AND MEASURING DEVICES

EC shall determine the monitoring and measurement to be undertaken and the monitoring and measuring devices needed to provide evidence of conformity of product to determined requirements (see 5.2.1 of this SECTION).

EC shall establish processes to ensure that the monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements.

When necessary to ensure valid results, measuring equipment shall

(a) be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification shall be recorded;

(b) be adjusted or re-adjusted as necessary;

(c) be identified to enable the calibration status to be determined;

(d) be safeguarded from adjustments that would invalidate the measurement result;

(e) be protected from damage and deterioration during handling, maintenance, and storage.

In addition, EC shall assess and record the validity of the previous measuring results when the equipment is found not to conform to requirements. EC shall take appropriate action on the equipment and any product affected. Records of the results of calibration and verification shall be maintained (see 2.2.4 of POLICY SECTION 2).

When used in the monitoring and measurement of specified requirements, the ability of computer software to satisfy the intended application shall be confirmed. This shall be undertaken prior to initial use and reconfirmed as necessary.

NOTE: See ISO 10012-1 and ISO 10012-2 for guidance.

5.7 APPLICABLE PROCEDURES

Compliance with this policy is achieved through conformance to all QMS procedures included in this Manual.

SECTION 6

MEASUREMENT, ANALYSIS, AND IMPROVEMENT

6.1 GENERAL

EC shall plan and implement the monitoring, measurement, analysis, and improvement processes needed

(a) to demonstrate conformity of the product,

(b) to ensure conformity of the quality management system, and

(c) to continually improve the effectiveness of the quality management system.

This shall include determination of applicable methods, including statistical techniques, and the extent of their use.

6.2 MONITORING AND MEASUREMENT

6.2.1 Customer Satisfaction. As one of the measurements of the performance of the quality management system, EC shall monitor information relating to customer perception as to whether EC has met customer requirements. The methods for obtaining and using this information shall be determined.

6.2.2 Internal Audit. EC shall conduct internal audits at planned intervals to determine whether the quality management system

(a) conforms to the planned arrangements (see 5.1 of POLICY SECTION 5), to the requirements of ISO 9001-2000, and to the quality management system requirements established by EC, and

(b) is effectively implemented and maintained.

An audit program shall be planned, taking into consideration the status and importance of the processes and areas to be audited, as well as the results of previous audits. The audit criteria, scope, frequency, and methods shall be defined. Selection of auditors and conduct of audits shall ensure objectivity and impartiality of the audit process. Auditors shall not audit their own work.

The responsibilities and requirements for planning and conducting audits, and for reporting results and maintaining records (see 2.2.4 of Policy Section 2) are defined in Procedure No. 008

The management responsible for the area being audited shall ensure that actions are taken without undue delay to eliminate detected nonconformities and their causes. Follow-up activities shall include the verification of the actions taken and the reporting of verification results (see 6.5.2 of this SECTION).

NOTE: See ISO 10011-1, ISO 10011-2, and ISO 10011-3 for guidance.

6.2.3 Monitoring and Measurement of Processes. EC shall apply suitable methods for monitoring and, where applicable, measurement of the quality management system processes. These methods shall demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, correction and corrective action shall be taken, as appropriate, to ensure conformity of the product.

6.2.4 Monitoring and Measurement of Product. EC shall monitor and measure the characteristics of the product to verify that product requirements have been met. This shall be carried out to appropriate stages of the product realization process in accordance with the planned arrangements (see 5.1 of POLICY SECTION 5).

Evidence of conformity with the acceptance criteria shall be maintained. Records shall indicate the person(s) authorized release of product (see 2.2.4 of POLICY SECTION 2).

Product release and service delivery shall not proceed until the planned arrangements (see 5.1 of POLICY SECTION 5), have been satisfactorily completed, unless otherwise approved by a relevant authority, and, where applicable, by the customer.

6.3 CONTROL OF NONCONFORMING PRODUCT

EC shall ensure that product which does not conform to product requirements is identified and controlled to prevent its unintended use or delivery. The controls and related responsibilities and authorities for dealing with nonconforming product shall be defined in a documented procedure.

EC shall deal with nonconforming product by one or more of the following ways:

(a) by taking action to eliminate the detected nonconformity;

(b) by authorizing its use, release, or acceptance under concession by a relevant authority, and where applicable, by the customer;

(c) by taking action to preclude its original intended use or application.

Records of the nature of nonconformities and any subsequent actions taken, including concessions obtained, shall be maintained (see 2.2.4 of POLICY SECTION 2).

When nonconforming product is corrected, it shall be subject to re-verification to demonstrate conformity to the requirements.

When nonconforming product is detected after delivery or use has started, EC shall take action appropriate to the effects, or potential effects, of the nonconformity.

6.4 ANALYSIS OF DATA

EC shall determine, collect, and analyze appropriate data to demonstrate the suitability and effectiveness of the quality management system and to evaluate where continual improvement of the effectiveness of the quality management system can be made. This shall include data generated as a result of monitoring and measurement and from other relevant sources.

The analysis of data shall provide information relating to

(a) customer satisfaction (see 6.2.1 of this Section),

(b) conformity to product requirements (see 5.2.1 of Policy Section 5),

(c) characteristics and trends of processes and products, including opportunities for preventive action, and

(d) suppliers.

6.5 IMPROVEMENT

6.5.1 Continual Improvement. EC shall continually improve the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review.

6.5.2 Corrective Action. EC shall take action to eliminate the cause of nonconformities in order to prevent recurrence. Corrective actions shall be appropriate to the effects of the nonconformities encountered.

A documented procedure shall be established to define requirements for

(a) reviewing nonconformities (including customer complaints),

(b) determining the causes of nonconformities,

(c) evaluating the need for action to ensure that nonconformities do not occur,

(d) determining and implementing action needed,

(e) records of the results of action taken (see 2.2.4 of POLICY SECTION 2), and

(f) reviewing corrective action taken.

6.5.3 Preventive Action. EC shall determine action to eliminate the causes of potential nonconformities in order to prevent their occurrence. Preventive actions shall be appropriate to the effects of the potential problems.

A documented procedure shall be established to define requirements for

(a) determining potential nonconformities and their causes,

(b) evaluating the need for action to prevent occurrence of nonconformities,

(c) determining and implementing action needed,

(d) records of results of action taken (see 2.2.4 of Policy Section 2), and

(c) reviewing preventive action taken.

6.6 APPLICABLE PROCEDURES

Compliance with this policy is achieved through conformance to all QMS procedures included in this Manual.

ENGINEERING AND CONSTRUCTION PRODUCT DEVELOPMENT

QUALITY MANAGEMENT SYSTEM

POLICY AND PROCEDURE MANUAL

Issue No. 1

PART I - POLICY

APPENDIXES

CONTENTS

APPENDIX A

CENWP-EC (5-4a) 19 OCT 2006

FOR CENWP-EC-T (JEFFREY S. SEDEY)

SUBJECT: Management Representative Appointment

1. You are hereby appointed Management Representative of the engineering and construction product development Quality Management System.

2. Your duties and responsibilities under this appointment require your proactive involvement to maintain the Quality Management System in conformance with ISO 9001 2000 standards. To achieve this requirement, you are authorized to develop, implement, monitor, measure, administer, continuously modify, revise, and improve the Quality Management System, in order to maintain conformance with ISO 9001 2000 criteria. Included in the administration of your duties is managing the qualifications and certifications of internal audit personnel, managing corrective action requests, conducting follow-up inspections and audits, assuring verification controls are established.

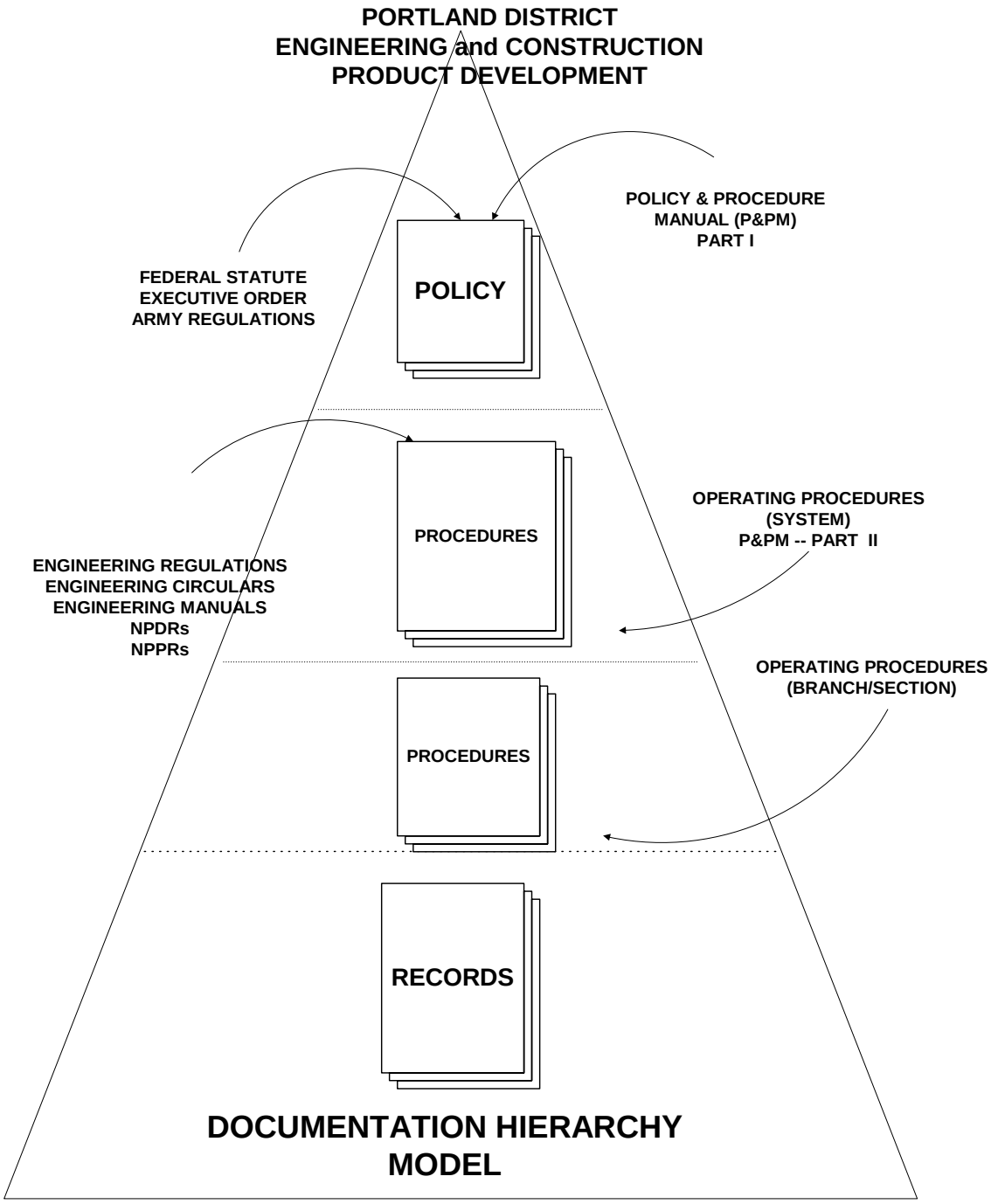
3. The duties and responsibilities of this appointment are delegable and shall not exceed the authorization scope. The term of this appointment is indefinite until further notice.

HOWARD B. JONES, P.E.
Chief, Engineering and Construction Division

CF:

CENWP-EC-D
CENWP-EC-H
CENWP-EC-R
CENWP-PM-E
CENWP-PM-F

APPENDIX B



This figure identifies the relationship between our Quality Policy, the procedures that guide our work efforts, and the records we keep to document our activities.

APPENDIX C

APPENDIX C

GLOSSARY

Aerial Photography: Contract flying and photo of defined areas, primarily for mapping purposes. This includes the film and photo hard copies. All aerial photography is performed to standard specifications to assure ground accuracy.

Administrative Contracting Officer (ACO): A person who has completed the required training and experience in the Federal Acquisition Regulations and has received a contracting warrant from the U.S. Army Corps of Engineers, Principle Assistant Regarding Contracting. When designated as an ACO the employee has authority to make payments and issue changes to construction contracts that are within the limits of their warrant.

Architect/Engineer Contract Administration Support System (ACASS): The Department of Defense electronic database containing architect/engineer performance evaluations.

Architect/Engineer Responsibility Coordinator (AERC): An experienced engineer or architect, trained as required in EP 715-1-7, who is responsible for the day-to-day management of the AERMP.

Architect/Engineer Responsibility Management Program (AERMP): A formal process for holding A/E firms accountable for their work and recovering damages to the Government caused by A/E firm negligence.

Architect/Engineer Responsibility Review Board (AERRB): The group responsible for reviewing deficiencies in A/E performance and advising appropriate action. The Chief, EC chairs the AERRB and voting members include at least senior representatives from Planning, Programs and Project Management Division, Construction Branch, and Office of Counsel.

Architect/Engineer (A/E) Services: Architect/engineer services are (1) services that are defined by State law that must be provided by a registered architect-engineer; (2) services of an architectural or engineering nature performed by contract that are associated with research, planning, development, design; and (3) other services of an architectural or engineering nature that architect-engineers may logically perform. Surveying and mapping are A/E services. A contract for mixed work is considered A/E services when those services are substantially or to a dominant extent architectural and/or engineering in nature (PL 92-682 Brooks Bill).

Architect/Engineer Unit: A unit within EC-CR that provides contract administration for Architect/Engineer and professional services contracts.

Army Records Information Management System (ARIMS): A filing system used by the Army controlled by AR25-400-2.

As-Built Drawings: The updated plans reflecting the actual construction of a project. This includes amendments issued during bidding, modifications during construction, user requested changes, field changes, shop drawing modifications, and contractor designs.

As-Constructed Drawings: Drawings generated and submitted as paper markups or electronic CADD files by the construction contractor that reflect the actual construction of a project.

Beneficial Occupancy: When a nearly complete construction project is ready for the customer to use and take possession of the constructed facility.

Biddability, Constructibility, Operability, and Environmental (BCOE) Review: A final review of procurement documents that ensures Biddability, Constructibility, Operablility, and Environmental aspects of proposed work are considered during design and construction.

Calibration: Measurement or comparison with a specific standard to determine the correct value of each scale reading on measuring or test equipment.

Calibration Equipment: An apparatus that has a known relationship to calibration standards. Used to put measuring and test equipment into acceptable calibration.

Calibration Standards: The accepted reference benchmark used to establish a unit for measurement of a physical quantity.

Central Map Files: A location for storage of project files and other information. Central Map Files is the storage location for project files when storage at the functional Section/Branch is no longer appropriate. Central Map Files will be managed to assure proper retirement of project folders.

Certification: Certification is the official sanction or validation (usually by signature) that technical review has been performed.

Charrette Process: An intensive work session conducted by a facilitator preferably at the potential project site (or in the vicinity) that brings together all stakeholders of a project to identify their needs, concerns, and limitations, and establishes the initial scope and expected outcome. Stakeholders may include customers, users, regulators, city, County, and State officials and agencies, other Federal agencies, and the planners/designers of the product.

Chemical Quality Assurance Report (CQAR): A report that verifies quality of laboratory chemical testing procedures, data, and results.

Computer-Aided Design and Drafting (CADD): The production of drawings, specifications, parts list, and other design-related elements using special graphics- and calculations-intensive computer programs.

Computer-Aided Design and Drafting (CADD) Unit. A unit within EC-CR that manages and provides support for the CADD system.

Consultant Services: Engineering services acquired by purchase from Architect-Engineering firms.

Continuing Authorities Program: The six legislative authorities under which the Secretary of the Army, acting through the Chief of Engineers, is authorized to plan, design, and construct certain types of water resources improvements without specific Congressional authorization.

Continuing Authorities Program Manager (CAP Manager): An individual assigned overall responsibilities for oversight and accomplishment of CAP, Environmental Authority, and Planning Assistance to States product development.

Contract Administration (CA): A function performed by Construction field personnel in accordance with requirements in the contract and during the execution of construction contracts. Specifically, it covers preparing and negotiating contract modifications, resolving contractor claims, processing contract payments, reviewing contract submittals and payrolls, preparing contract correspondence letters, inputting contract-related information in RMS, and carrying out various other contract administration work.

Contracting Officer: The individual with authority to enter into new contracts, modify existing contracts, and terminate existing contracts. A Contracting Officer must be warranted by the Corps, Principle Assistant Regarding Contracting and satisfy the required training and experience. The Contracting Officer has authority to take all contract actions allowed by law and regulations, but may delegate some authority to Administrative Contracting Officers and Contracting Officer's Representatives.

Contracting Officer's Representative (COR): An individual delegated limited authority from the Contracting Officer to administer a contract. Generally the COR is authorized to approve submittals and schedules, and coordinate the work of the contractor. The COR may recommend to the Contracting Officer whether or not to approve progress payments. A COR is not authorized to change the contract or to obligate the Government to additional costs.

Contractor Quality Control The processes a contractor uses to ensure the quality of work provided for the customer meets the requirements of the contract. (Reference ER 1180-1-6 for Construction Contracts).

Controlled Document: Any written procedure, policy, standard manual, or work instruction (hard copy or electronic media), used to support the QMS. Copies, if distributed in hard copy form, are identified on the master list.

Corps of Engineers Financial Management System (CEFMS): A computer data base and program that contains all financial aspects of Corps business.

Corrective Action: Action taken to eliminate the cause(s) of an existing nonconformity in order to prevent recurrence.

Current File Plan: A plan designating the physical location(s) at which an agency's files are to be maintained, the specific types of files to be maintained, and the activity having custodian responsibility.

Customer: Any organization (e.g. PM, OP) or person requesting a planning, engineering, or construction product or service.

Customer Request: Any request for work (verbal, written, Congressional add, etc.) requiring the use of planning, engineering, or construction expertise in the accomplishment of products.

DD Form 1556 Request, Authorization, Agreement, Certification of Training and Reimbursement: The DD 1556 form officially documents a training instance.

Design-Build: A contract for design and construction services.

Design Documentation Report (DDR): The designing office's record of the total design process, covering design activities from the start of design through completion of construction.

Design Report: One of a variety of reports that describes engineering and/or design activities. Such reports include DDRs, FDMs, Letter Reports, Major Rehabilitation Reports, etc.

EC Tool Kit: A template for QMS requirements (e.g. scope, schedule, and budget forms, Technical Review Certification, etc.) available in electronic format.

ENG Form 3078: Form used to transmit requests for new guidance/criteria or revisions/corrections to existing guidance/criteria.

Design Report: One of a variety of reports that describes engineering and/or design activities. Such reports include DDRs, FDMs, Letter Reports, Major Rehabilitation Reports, etc.

ENG Form 3078: Form used to transmit requests for new guidance/criteria or revisions/corrections to existing guidance/criteria.

Engineering and Construction/Operations Agreement (ECOA): The ECOA is the document that serves as a basis for scheduling resources and allocation of O&M funds. The scope of the ECOA includes all work requested for On-site Operating Project locations, Off-site Operating Project locations, Channels and Harbors, Planning functions, and other miscellaneous O&M work. The agreement includes all tasks that are funded by OP Division and tasks identified as unfunded requirements by OP Division. Budgeted tasks included in the ECOA are not considered financed until a notice-to-proceed (NTP) has been received.

Engineering Considerations and Instructions (ECI): Special considerations and instructions developed for field personnel for a specific project which warrant additional attention or require action that may or may not be detailed in the construction drawings or specifications.

Engineering During Construction (EDC): Activities involving design intent information; an engineering/construction liaison; monitoring the status of projects under construction; making changes to the design of specific portions of a project under construction; partnering activities; contract submittal review and EDC documentation preparation.

Engineering During Construction (EDC) Documents : Typically Site Visit Reports, contract submittal reviews, design notes and/or sketches for revisions to contract plans and specifications (P&S), revised P&S as needed, technical review actions, contract modification forms, Value Engineering document evaluations, HTRW documents, and review documents for As-Constructed drawings, O&M documents and warranty sheets.

Feasibility Cost Sharing Agreement (FCSA) : The legal agreement between the Department of Army, represented by the District Commander, and the non-Federal sponsor to jointly conduct and fund the detailed Feasibility Study.

Feasibility Phase : The time period commencing with issuance of initial Federal feasibility funds following execution of the FCSA and concluding on the date the feasibility report is submitted to OMB or study termination.

Feasibility Study : The detailed analysis of water resources problems and/or opportunities to determine if sufficient merit exists to recommend a plan for authorization.

Feature Design Memorandum (FDM): A report documenting the preliminary design of a specific project or work feature.

Geographic Information System (GIS): A system of computer hardware, software, and procedures designed to support the capture, management, analysis, and display of spatial reference data for solving complex planning and management problems.

Geospatial Data: Information that identifies geographic location and characteristics of natural or constructed features and boundaries on the earth.

Headquarters, U.S. Army Corps of Engineers (HQUSACE): Head office of the Corps located in Washington, D.C.

Horizontal and Vertical Control: Survey control information of known survey monuments. Maintained information includes coordinates, elevations, and descriptions.

Indefinite Delivery Contract (IDC): A specific type of contracting method used when there is a recurring requirement for a particular type of work, but the timing and/or full extent of the requirement is not certain at the time of contract award. The contract establishes all the terms for the type of work and specific orders are placed when the need arises.

Indefinite Quantity Contract: A variation of an Indefinite Delivery Contract.

Individual Development Plan (IDP): The process which offers a systemic approach for identifying developmental objectives (long-term and short-term), required training, recommended training, and developmental assignments for Corps of Engineers' employees.

Internal Audit: The systematic and independent examination of the quality management system. This is achieved by gathering objective evidence in order to determine whether quality activities and related results comply with established quality procedures and processes and whether these arrangements are implemented effectively and are suitable to achieve objectives.

International Register of Certificated Auditors (IRCA): An international registry of certificated auditors that is administered by the Institute of Quality Assurance in the United Kingdom (Great Britain).

Job Approval Checklist: A certification by the relevant offices that all appropriate BCOE comments have been incorporated in the invitation for bid documents.

Justification for Liquidated Damages: A document providing justification and detailed cost figures for damages incurred by the Government due to construction contractor nonperformance. This document is typically provided by Construction Branch.

Letter Reports: A design report of limited scope that addresses the engineering and environmental features of a project.

Lump Sum Contract: An agreement to pay a specific price when the items called for by the contract have been delivered and accepted. Such contracts are used when a reasonably definite statement of work is available; and fair and reasonable prices can be established at the outset.

Major Rehabilitation Reports: Evaluation reports on operating projects that document the reliability and/or efficiency improvement of major project components, the result of which is deferral of capital outlays and/or enhanced operational efficiency.

Major Subordinate Command (MSC): A reference to Division offices of the Corps of Engineers.

Management Representative: The member of the management team who shall have defined authority for ensuring that the management system outlined herein is established, implemented and maintained, and reporting on the performance of the system for review and as a basis for improvement.

Mapping: Paper copies and/or electronic files generated by in-house or contract personnel for particular projects.

Memorandum of Agreement (MOA): An agreement between Portland District's organizational representative (often a specific division) and any non-DOD, state, local government agency, etc.

Metadata: Information describing the content, quality conditions, and other characteristics of data.

National Economic Development (NED): A term that addresses the economic value of goods and services, when viewed from the Federal perspective. It can describe a benefit category or plan (NED Plan) that reasonably maximize NED benefits, consistent with protecting the Nation's environment.

National Environmental Policy Act (NEPA) Documentation: Discussion of the process and findings, especially applicable to the environment, leading to decisions within the Feasibility Study, as required by the National Environmental Policy Act

Nonconformance: The departure or absence of one or more quality characteristics or quality system elements from specific requirements.

Nonconforming Product: A product which does not conform to specified requirements which can result from:

(1) A design deficiency (a product which contains design errors or omissions, lacks adequate coordination between disciplines, fails to meet specified requirements of the scope of work, or is lacking in the design quality expected).

(2) Errors in guidance or criteria, or lack of understanding of the customer's needs

Nonconformity A specified requirement not fulfilled.

Non-Federal Sponsor: An entity recognized and acknowledged by the Federal Government as having the legal and financial authority to provide cash and property needed to fulfill study or project requirements.

Notice to Proceed (NTP):

(1) For construction contract work, the letter from the Contracting Officer to the Contractor directing them to begin contract work. This letter is issued after the contract has been awarded and the Contractor has provided performance and payment bonds.

(2) The vehicle which permits initiation of work on assigned OP-funded tasks. An OP memorandum must be received prior to the commencement of work on the task. An OP Division approved work quality plan does not constitute a notice-to-proceed on work for that task.

Official Personnel File: Files that contain complete employee information such as personnel actions, awards, training, performance appraisals, assigned responsibilities and any on-the-job injuries.

Off-Site Work: Programs managed within EC Division because the functional responsibility resides in this Division, e.g. Dam Safety.

On-Site Work: Work requested by Portland District operating facility managers. Typically engineering and design work that results in plans and specifications and a contract for the scoped work.

Partnering: A collaborative process where the Government, the contractor, the using agency, and other stakeholders cooperate as a team to successfully accomplish a project. The Partnering process generally involves team building, establishing mutual goals, and emphasis on communication.

Planning Assistance to States (PAS): Legislative authority authorizing the Corps to cooperate with the States, Tribes, and other public sponsors to provide assistance to support the preparation of comprehensive water and related land resources development plans including watershed and ecosystem planning.

Portland District Project Charts: Project charts that depict specific activities for work. Project charts are prepared, updated, and printed monthly.

Preventive Action: Action taken to eliminate the causes of a potential nonconformity in order to prevent its occurrence.

Procurement Strategy: Techniques and/or methods to be undertaken to assure prompt, cost efficient acquisition of a construction contractor.

Product Development Team (PDT): Individuals of specific technical disciplines/expertise, knowledge and experience involved in and responsible for the creation and development of planning and engineering product(s) within the requirements of the TRP. Team size and composition varies with product size and complexity, scope magnitude, and technical expertise needed. The PDT may be staffed totally or in part by individuals from Portland District, another district, North Pacific Division, other government agencies, Architect-Engineer firms, or special consultants.

Product Quality Review: The basic level of technical review of planning and engineering products. It is assigned and/or completed by the office responsible for direct development of the product. This review covers, but is not limited to appropriateness of assumptions, data quality, analysis methods, and adherence to Corps and industry standards.

Product Review Team (PRT): The review component in the product development process. Each member of the PRT has a similar technical discipline and requisite work experience identified with the particular product being reviewed. The size and involvement of the review team is dependent on cost, complexity, and size of the product. Large, complex products such as feasibility studies, feature design memoranda, and plans and specifications usually require a more extensive and technically experienced review team for major disciplines and product elements. While the disciplines and work experience levels are similar, personnel are not members of both the PDT and PRT for the same product.

Professional Services: Non-engineering services performed by a professional on either an individual or organizational basis. The primary purpose is the performance of an identifiable task rather than the furnishing of an end item of supply.

Project Files: A file or group of files generated for each project containing appropriate items for the project including correspondence, specifications with amendments, design analysis, cost estimates, funding documentation, technical evaluations, review comments, approval documents and any other item identified in AR 25-400-2, as appropriate.

Project Engineer: The individual assigned responsibility by the Resident Engineer for the construction management, contract administration, quality assurance, safety, and other activities for construction contracts. The Project Engineer shall be the primary point of contact for the Contractor, customer, PM, TL, and product development team members for the assigned contracts.

Project Manager/Project Management (PM): A Planning, Programs, and Project Management Division representative/process with responsibilities for overall schedule, budget, and quality requirements of Portland District work.

Project Management Business Process (PMBP): Established by ER 5-1-11, the fundamental USACE business process used to deliver quality products and services, to include support services provided within USACE.

Project Management Plan (PMP): The approach, coordination, control, and measurement to be undertaken to assure a product is developed in accordance with customer requirements and quality standards.

Project Study Plan (PSP): The document which contains the scope, schedule and funding required to complete a Feasibility Study. The scope must be sufficiently comprehensive to identify the products, describe the tasks and define the level of detail for the tasks.

Proponent Office: Office responsible for development of, and providing advice and guidance on, a specific QMS procedure.

Purchase Order: A contract with a total cost less than $100,000.

Purchase Request and Commitment (PR&C): A CEFMS request for goods and services with an estimated price and funding source.

QMS Branch Chiefs The individuals responsible for oversight of, guidance on, and compliance with the Quality Management System. The offices represented include the EC Branch Chiefs.

Quad Sheets: United States Geodetic Survey (USGS), Census Bureau, Defense Mapping Agency (DMA), state and local mapping.

Quality Assurance (QA):

(1) For construction contract work, a system of controls used by the Government to verify that the Contractor complies with contract requirements on work quality. The Government QA verification includes reviews of contract submittals and field checks of the physical work being constructed.

(2) Activities taken to assure the overall effectiveness of the quality process. Its primary emphasis deals with the prevention of nonconforming product through evaluation and assurance that adequate quality controls are being utilized.

Quality Management System (QMS) The policies and procedures that describe the methods and processes to be followed during development of planning, engineering, and construction products.

Quality Standards: The identification and combination of specific criteria, tasks, prerequisites, reviews, checklists, schedules, and budgets to be set and measured to determine if product development meets customer and technical requirements.

Reconnaissance Phase: The period of time commencing with the obligation of appropriated reconnaissance funds and concluding with execution of the FCSA or study termination.

Reconnaissance Study: An initial analysis of problems and/or opportunities to determine if sufficient merit exists to warrant detailed evaluation in a later phase.

Records: All books, papers, maps, photographs, machine-readable materials, or other documentary materials, regardless of physical form or characteristic, created or received by an agency of the U.S. Government under Federal law or in connection with the transaction of public business and preserved or appropriate preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the Government or because of the information value of data in them. (Federal Law-Title 44 US Code 3301.)

Records Coordinator: Appointed individual responsible for the maintaining, servicing, and disposing of records of the office to which assigned.

Records Management Long-term disposition of project files.

Registration Accreditation Board (RAB): An affiliate of the American Society for Quality, which is recognized as the central authority in the United States for registrar accreditation.

Request for Proposal (RFP): A request to a contractor or contractors for a price proposal. For task orders, EC-CR issues an RFP by letter with a statement of work attached. For contract actions that are synopsized, CT issues the RFP and includes not only the statement of work, but numerous other required clauses.

Requirements Contract: A variation of an Indefinite Delivery Contract.

Resident Management System (RMS) A computerized system used by the Resident Office to manage construction contract documentation. RMS has the capability to keep track of correspondence, modifications, submittals, payments, quality assurance reports, and schedules.

Resource Estimate: An estimate of the labor, contracts, materials, supplies, travel, etc. needed to complete a job.

Responsible Employee: A person designated as the only individual who can authorize other users to originate, approve, or certify purchase requests on a specific work item.

Schedule and Cost Change Request (SACCR): The form to be used when requesting changes to design products.

Section 905(b) Analysis: Refers to the Section in the Water Resources Development Act (WRDA) of 1986. It is also called the Reconnaissance Report. Current guidance is contained in Planning Guidance Memorandum 99-01, dated 03 March 1999. This type of report contains an analysis for determining if there is a Federal interest in continuing detailed planned studies in the feasibility phase.

SF254/255 Forms:

(1) An SF254 Form, Architect-Engineer and Related Services Questionnaire is similar to a general resume, detailing a firm's experience, qualifications, and other data. It is completed by A/E firms interested in doing work for the Corps, and input and maintained in the ACASS system

(2) An SF255 form, Architect-Engineer and Related Services Questionnaire for Specific Project, is similar to the SF 254, but requires much more specific information. It is completed by A/E firms in response to a specific requirement for contract services.

Both forms are used in selecting a firm for a specific contract.

Six-Step Planning Process: The systematic and orderly approach in conducting the planning procedure from the study initiation to completion. The steps begin with identification of problems and opportunities and continue through recommendation of a selected plan which best satisfies the Federal objective and local concerns.

Support for Others: Technical assistance performed by the Corps of Engineers and provided to non-Department of Defense Federal agencies, State, and/or local governments of the United States. The work is funded 100 percent by the Government entity.

Synopsis: A brief statement of the scope of required services. A synopsis typically includes project location, closing date for receipt of responses for A/E Contracts or date of availability of a Request for Proposal, and a point of contact for more information. In addition, for A-E contracts, selection criteria and necessary forms to submit are included in the synopsis.

Task: A work item established at the local level with a system generated code.

Task Order (TO): A direct written order against an existing IDC to perform specific tasks in accordance with the terms and conditions of the contract. The activities to be performed are separately negotiated and awarded as part of a contract.

Technical Element: Refers to the person or group of people who are the technical experts or technically responsible at a functional level for that portion of the work. For example, EC-HD is technically responsible for the design parameters of the flow characteristics and design of an open channel.

Technical Lead (TL): The individual assigned responsibility for development of a particular product. The TL is responsible for developing, implementing, and maintaining the Product Scope, Schedule and Budget (SSB). The TL provides management of the PDT, assures coordination and interaction between teams, and is responsible for the coordination of comment responses and their resolution.

Technical Review: An independent evaluation performed for all planning and engineering products to ensure compliance with applicable laws, regulations, quality requirements, and sound technical practices through independent technical evaluation.

Technical Review Checklist: A guide for checking and reviewing the product for errors, omissions, compliance with requirements, and for determining overall product quality and completeness. Checklists, Engineering Regulations, Engineering Manuals, Technical Manuals, and other guidance and regulations shall be used during review as appropriate.

Technical Review Plan (TRP): A written plan to identify and define actions, schedule, and resources necessary to perform technical review. The TRP serves as guidance to document the review process. The TRP is included as an element of the QP prepared for any planning and engineering product. The scope, work complexity, and multiple-technical discipline (in-house and/or other resources) involvement needed for a specified product determines the TRP level of detail.

Top Management: With respect to the EC QMS, top management is the Chief, Engineering and Construction Division and the QMS Branch Chiefs.

Two (2) Year O&M Submissions: The process of forecasting all budgetary items for the O&M program, including information for the upcoming fiscal year and 2 years into the future.

Unique Identifier: A reference marking (e.g. serial number) used to specify a piece of equipment to the exclusion of all others.

Work Item: Manageable components of a project defined by Project Manager that are to be funded and tracked. Work items can be projects established at Headquarters level or subprojects and tasks established at the local level.

Work Scope: A clear definition of product assumptions, tasks, schedule, associated costs, milestones or checkpoints, and coordination requirements.

Working Files: Documents such as rough notes, supporting information, analysis, calculations, or drafts used in the preparation of a formal document or product. Working files are also considered records and are filed under the appropriate ARIMS file number.

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ENGINEERING AND CONSTRUCTION PRODUCT DEVELOPMENT

QUALITY MANAGEMENT SYSTEM

POLICY AND PROCEDURE MANUAL

Issue No. 1

PART II- PROCEDURES

PORTLAND DISTRICT
ENGINEERING AND CONSTRUCTION DIVISION

POLICY AND PROCEDURE MANUAL

ISSUE NO. 1

PART II – PROCEDURES FOR PRODUCT DEVELOPMENT

TABLE OF CONTENTS

DOCUMENT PREPARATION AND ADMINISTRATION

Proponent Office: Technical Resources Branch

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall bc made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the format, preparation, numbering, revision, distribution, and administration of documentation applicable to the Quality Management System (QMS). This procedure shall be used as an example to formulate, prepare, and present documentation affecting engineering and construction product development processes/procedures at all working levels.

2.0 SCOPE

This procedure applies to all controlled documents and data that relate to the requirements of the QMS and shall be observed by every member and organizational element involved in engineering and construction product development.

3.0 REFERENCES

AR 25-400-2 The Army Records Information Management System (ARIMS)

4.0 RESPONSIBILITIES

The Branch and Section Chiefs are responsible for coordinating the review of all documentation and assuring that this procedure is followed by all personnel involved in the creation, distribution, and maintenance of QMS documentation. Approval authority for engineering and construction product development policy and procedures lies with the Chief, EC; unless otherwise delegated.

The Management Representative or designee is to maintain a Procedure Master List identifying procedure name and number, proponent office, original issue date, current issue and revision number, and date for Part II of the Policy and Procedure Manual, and coordinate the issuing of the document numbering and final release of all Policy and Procedure Manual documentation.

All staff involved in planning, engineering, and construction product development are to ensure that this procedure is followed.

5.0 KEYWORDS (see GLOSSARY for definitions)

Controlled Document
Management Representative
Proponent Office
Quality Management System (QMS)

6.0 PROCEDURE

6.1 Authorization to Proceed

Any staff member may request or identify the need for a new procedure or a revision to an existing procedure for any working level by coordinating with appropriate supervisory staff and the Management Representative. The new or revised procedure requirement or concept shall be submitted to the Management Representative or designee for authorization to proceed with development of the procedure. Upon receipt of authorization to proceed, the Branch Chief or Supervisor shall appoint an author, who shall develop the document in accordance with the

requirements of this procedure. The Management Representative shall be advised of any decision to alter issuance of a new/revised procedure.

6.2 Prepare Draft Document

6.2.1 Format

All QMS documents shall be identified by procedure name and number; shall contain page numbering, excluding accompanying memo and distribution list if required; shall display an original issue date, revision number and date; shall contain a revision table; shall display the name and signature blocks for the Management Representative and Chief, EC for Part II Procedures. The Proponent Office shall be printed on the face of other than Division-level procedures. Documents shall be issued on a controlled distribution list which shall identify the document's latest revision date. The master list shall be readily accessible to all users. When possible, documents may be written in the form of flowcharts and/or matrices with a minimum of supporting text.

6.2.2 Procedure Components

All procedures shall carry the same basic components, which shall be:

- **PURPOSE** - used to define why the procedure is being created, and provides objectives.
- **SCOPE** - used to define the applicability of the document within the QMS.
- **REFERENCES** - used to identify any other documents which are related to the task described within the procedure, or which contain technical information relevant to the activity described within the procedure and to which the user should make reference (such as ERs, EMs, ECs, and other USACE guidance).
- **RESPONSIBILITIES** - used to identify the key responsibilities which are required to be fulfilled for the procedure to be implemented effectively.
- **KEYWORDS** - words that are unique to the procedure or process being discussed. Specific definitions are located in the GLOSSARY.
- **PROCEDURE** - used to describe the activities involved in the fulfillment of the procedure at whatever level of detail is appropriate for the skills, experience, and training received in the task by the intended user of the document. Identifies who does what, when, and where as related to the activity being carried out.
- **RECORDS** - used to describe the records which are created by the use of the procedure and any responsibilities for their identification and maintenance.
- **ATTACHMENTS** - used to identify specific attachments applicable to the procedure.

6.2.3 Procedure Contents

The contents of the procedure shall include the components as detailed in Clause 6.2.2 above. Section 6.0 of the new procedure shall indicate applicable subheadings. In the event there are no References, Keywords, or Records, the word "NONE" shall be inserted under the applicable heading. In the event additional details are required to supplement the procedure, these details shall be incorporated as "attachments" to the procedure.

6.3 Review Draft

When a new or revised procedure has been prepared for review and checked by the proponent office, the proposed procedure shall be issued to relevant personnel for review and comment. Any controlled document being revised and circulated for comments shall be clearly identified with the comment "**DRAFT**" or similar language to assure the document against unintended use. The author of the new/revised procedure shall incorporate review comments into the document upon receipt, with due consideration and concurrence of all comments accordingly. In addition, new and/or revised references shall be incorporated in **3.0 REFERENCE** and office master lists when written confirmation of such guidance is provided.

6.4 Issue Document

6.4.1 Approval

Once all comments have been adequately resolved and incorporated, the Proponent Office shall be identified on the cover page. Final approval is by the Chief, EC as provided on the cover page.

6.4.2 Revision Number

Revisions to procedures shall be identified by the Issue and Revision Numbers and date shown in the revision table and on individual pages. Revisions to the procedure shall be indicated by a brief description stating the affected paragraph and subject matter in the revision table.

6.4.3 Document Control

The author shall pass the original document together with other documents and any relevant attachments to the Management Representative or designee for distribution, after final approval of each new/revised procedure. The Management Representative shall issue a procedure number which shall be unique to that procedure and shall update the Procedure Master List. New/Revised procedures generated for implementation at other than the level of this Policy and Procedure Manual shall be handled similarly, but distribution and control shall be maintained within the Branch (or Section/Unit) where the procedure applies.

6.4.4 Distribution

The Management Representative or designee shall distribute approved procedures and subsequent revisions, in accordance with QMS distribution lists. For other than QMS-level documents, distribution shall be in accordance with specific Branch (or Section/Unit) needs and requirements.

7.0 RECORDS

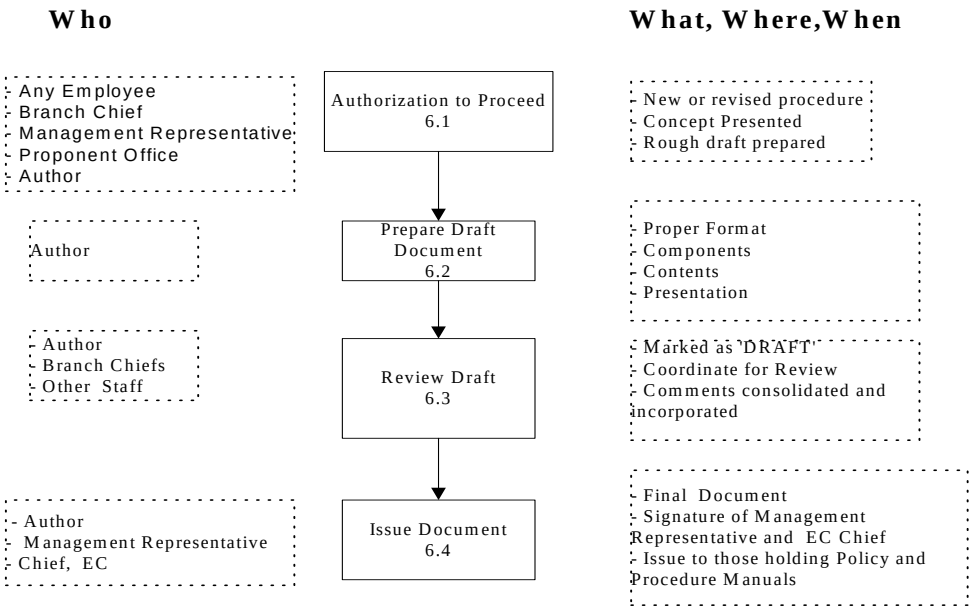
The Management Representative shall establish and maintain current files for each up-to-date QMS document containing:

- Policy/procedure original with master cover and contents pages
- Signed copy of transmittal memorandum
- QMS Procedure Master List, including controlled distribution.

8.0 ATTACHMENTS

1. Flowchart for document preparation and administration
2. Master List sample format
3. Cover page sample format
4. Header and footer format for a Policy/Procedure page

DOCUMENT PREPARATION AND ADMINISTRATION



ATTACHMENT #1

PROCEDURE MASTER LIST

PROCEDURE NUMBER	PROCEDURE TITLE	PROPONENT OFFICE	ORIGINAL ISSUE DATE	ISSUE AND REVISION NO.	DATE

ATTACHMENT #2

3 lines

[SAMPLE FORMAT OF COVER SHEET]

PROCEDURE NAME

8 lines

Proponent Office: ***[Office]***

8 lines

Authorized By: _____
Jeffrey S, Sedey, P.E.
Management Representative

8 lines

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

12 lines

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

ATTACHMENT #3

[THIS PAGE IS A SAMPLE OF APPROPRIATE HEADER AND FOOTER FORMAT OF A PROCEDURE PAGE]

PROCEDURE FOR PRODUCT DEVELOPMENT AND SCOPING WORK

Proponent Office: Technical Resources Branch

Authorized by

Jeffrey S. Sedey, P.E.
Management Representative

Approved By:

Donald R. Chambers, P.E.
Acting Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1
01 Feb 08	I1-R1	Correcting first page to show Branch

1.0 PURPOSE

This procedure describes the general steps, requirements, roles, and responsibilities for developing all engineering and construction products upon request from our customers. The procedure covers the steps necessary to scope, plan, review, approve, accomplish, and deliver products that meet customer requirements.

2.0 SCOPE

This procedure applies to all requests for engineering and construction products and shall be observed by every member and organizational element involved in the development of such products.

3.0 REFERENCES

DFAS-IN Regulation 37-1	Financial and Accounting Policy Implementation
ER 5-1-11	U.S. Army Corps of Engineers Business Process
ER 500-1-1	Civil Emergency Management Plan
ER 11-1-321	Army Programs Value Engineering
ER 1110-1-12	Quality Management
ER 1110-1-263	Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities
ER 1110-1-8100	Laboratory Investigations and Testing
ER 1110-1-8155	Engineering and Design Specifications
ER 1110-1-8156	Policies, Guidance & Requirements for Geospatial Data and Systems
ER 1110-1-8157	Geotechnical Data Quality Management for Hazardous Waste Remedial Activities
ER 1110-1-8158	Corps-wide Centers of Expertise Program
ER 1110-1-8159	Engineering and Design, DrChecks
ER 1110-2-109	Hydroelectric Design Center
ER 1110-2-1150	Engineering and Design for Civil Works Projects
ER 1110-2-1200	Plans and Specifications for Civil Works Projects
NPPR 10-1-3	Functional Statements
NWPR 111-12-7	Project Drawings
NWPR 1110-2	BCOE Review Procedures
NWPR 1-2-20	Visits by District Personnel to the Field

4.0 RESPONSIBILITIES

The Customer/Project Manager typically provides information on the requirements for the product including product phase, schedule, level of detail, desired costs or budget, and any other criteria deemed important by the Customer. Absent complete Customer requirements, the Customer shall be requested to clarify requirements relevant to the product sought. In accordance with the USACE Project Management Business Process (PMBP), the PM is responsible for preparing the Project Management Plan (PMP) which defines the project requirements and once approved, guides the project execution.

The Chief, Engineering and Construction (EC) is responsible for overall management and quality of engineering products.

Branch Chiefs are responsible for selecting Technical Leads (TLs) and Independent Technical Review (ITR) Team Leaders, providing members and resources for product teams, and assuring that this procedure is followed by all personnel involved in product development.

Section Chiefs are responsible for recommending TLs and ITR Leaders, Team Members, and resources for product teams.

The TL is responsible for coordinating with the Project Manager, receiving SSB input fromn the individual PDT members, providing a consolidated project scope, schedule and budget (SSB) to the PM along with other information the PM request for preparation of the Project Management Plan (PMP), overall coordination and management of the activities identified for product development, leadership of the Project Development Team (PDT), and ensuring requirements are met.

Each PDT member is responsible for providing SSB information to the TL reflecting requirements and activities to be performed by their respective disciplines, and completing the activities contained in the PMP meeting the established requirements.

5.0 KEYWORDS (see Glossary for definitions)

Charrette Process
Customer
Customer Request
Independent Technical Review Team (ITR)
Management Representative
Product Development Team (PDT)
Project Manager (PM)
Project Management Plan (PMP)
Project Management Business Process (PMBP)
QMS Branch Chiefs
Technical Lead (TL)
Work Scope
Electronic Transfer Data System (EDTS)
Scope, Schedule and Budget (SSB)

6.0 PROCEDURE

6.1 Customer Request

Customer requests shall be submitted to the Management Representative for coordination through the QMS Branch Chiefs for assignment of a technical lead.

6.2 Assign Responsibilities

Upon receipt of a work request, the QMS Branch Chiefs identify and assign the work to a TL as the PDT Leader, giving due consideration to the technical disciplines, and the phase and funding level of the work. The TL Leader shall be notified of their assignment via memo detailing responsibilities and signed by the Management Representative. Upon assignment as the TL, the TL shall coordinate with the PM and respective Section Chiefs to recommend an individual for assignment as the ITR Leader via the Management Representative to the QMS Branch Chiefs. The selected ITR Leader shall be documented in the SSB and PMP.

The assigned TL in coordination with the Division, Branch and Section Chiefs assigns and/or confirms team members to the PDT. For plans and specifications work, the PDT shall include representatives from Contracting Division. Operations Division staff, including field personnel,

shall be contacted on work that affects their project(s) and offered the opportunity to participate as a PDT member if they so desire. The ITR Leader shall perform similar coordination to identify/assign ITR Team members. The assigned TL shall provide the scope, schedule and budget to the Project Manager (PM) along with other information the PM requests for completion of the PMP. The PM provides all pertinent information related to the work request to the TL to ensure all requirements are appropriately identified and incorporated in the scope. Specific guidance shall be provided to the TL by the Chief, EC-TG for products or services that appear to be appropriate for enterprise geographical information systems (eGIS) to be used as the data management system. The TL shall include the Electronic Technical Data System (ETDS) Manager on the PDT to communicate ETDS requirements and to establish the address for storage of product documentation.

6.3 Requirements Review

The TL shall coordinate and communicate with PDT members and the PM to discuss all aspects of the proposed work. The requirements review shall involve all interested parties, including the customer, to develop a description of work activities needed to respond to the customer request and technical requirements. The customer may ask that work be completed according to a certain schedule or within certain budgetary amounts. Multiple meetings may be necessary to define the project requirements for all but small scale and easily defined products. Requirements reviews include consideration of previous experiences for incorporation into technical criteria. The Project Manager, Customer, TL, PDT, and Section Chiefs shall work closely throughout the scope, schedule and budget development.

Under this step, the TL shall meet with the PDT, ITR Lead, ETDS Manager, and eGIS manager at an Initial Team Meeting. At this meeting, team members resolve issues so that they are able to develop their individuals SSB requirements.

6.4 Develop Scope, Schedule and Budget

6.4.1 Brief Description of Project

All EC products require a Scope, Schedule and Budget (SSB). Templates are available in the EC Tool Kit. (Note: Construction products require a Quality Assurance Plan and Supplement, which is covered by Procedure 005, Procedure for Execution of Construction Contract Work.) Description of technical complexity, or specialized/non-typical design processes as well as the use of in-house resources or consultant services shall be included in the scope.

6.4.2 Scoping and Control

The PDT shall evaluate and/or define product requirements and identify specific standards that will be used to determine if the resultant product meets these requirements. Product requirements and standards are reflected through the following:

- Product Scopes: Products can be expressed in terms of specific activities which describe the manageable action items needed to accomplish the work. Activities shall be defined, scheduled, and resources identified such that measurement of activity accomplishment depicts quality progress. The TL will coordinate acquisition planning with the respective section chiefs. The description of activities shall provide details about:

- What is to be done
- When it will be done
- Who will do it (including consultant services)
- How much it will cost
- Acquisition plan

A standard form/format is used for consistency. All information listed on the form/format may not be required for each product as levels of information must be tailored to fit the needs of the work being considered. The team must determine the appropriate level of detail in response to customer needs.

- Schedules and Milestones: In conjunction with the PM, the team shall develop a schedule of activities required to accomplish the work in accordance with the specific requirements. The schedule will include specific checkpoints and deadlines for activity accomplishment and will be used to measure progress. The TLs shall develop and maintain detailed schedules for products and shall check them periodically against actual progress to assure tasks occur as planned. Typical milestones for design reports, and plans and specifications are outlined in paragraphs 6.7 and 6.8.

- Budget: PDT and ITR team members shall develop budgets for accomplishing their work. Cost estimates for all labor, travel, materials, supplies, equipment, consultant services, CADD, GIS reproduction, indirect, administrative, etc. expenses needed to complete the work in accordance with specific requirements, standards, and schedules shall be included. They shall provide these budgets to the TL who will summarize them and provide them to the PM as a part of the scope, schedule and budget. Product funding needs shall be identified from the budgets, combined with scheduled activities, and monitored to assure tasks occur within estimated costs.

- Prerequisites: Items or actions needed in advance of or addition to other work activities shall be identified. This could include equipment, resources, data, previous experience, utilization of GIS where appropriate, identification of CADD requirements, specific archiving needs, etc. Field trips shall be included as part of product development as appropriate. Acquisition or accomplishment of prerequisites shall be measured as a component of overall progress.

- Value Engineering (VE): ER 11-1-321, Value Engineering, sets out guidance regarding the requirement for and execution of VE studies. Unless a waiver has been secured VE studies are required on all projects meeting project cost thresholds as defined in the ER. VE studies are required during both planning and design phases of project development. Scopes, schedules and budgets for a VE study shall be prepared in conjunction with the PM as a part of the Value Management Plan for the PMP. VE studies shall be conducted in accordance to the Value Management Plan/PMP.

- Charrette Process. Product development may involve utilization of and/or participation in the Charrette process.

- Project LAN Directories: All Project LAN Directories will be assigned by the ETDS Manager in consultation with the TL and/or PM. The ETDS address provides for storing and maintaining all product drawings, data, and documentation.

- GIS Address: The TL shall consult with the Chief, EC-TG to receive an assigned GIS technical expert to determine if the product or service is appropriate for GIS and to establish how

the scoping process will integrate the technical functions into the GIS. A GIS expert assigned by the Chief, EC-TG shall work with the TL and PDT to assure all appropriate technical function work scopes are compatible with the GIS.

- Architect Engineer Contractor (A/E) Work: When A/E resources are used to support product development, the TL retains responsibility and accountability for the final product. The TL performs a Quality Assurance role with the A/E assuring that a qualified A/E is selected, that they have a PMP for the work they perform, that they accomplish an independent technical review, and that the product they produce complies with the contract and meets customer requirements. The A/E firm shall deliver complete products within the scope of their contract. Language requiring that the A/E have a QMP and perform independent technical review in accordance with regulatory guidance shall be placed in all A/E contract actions.

- Government Cost Estimates: The Construction and Cost Engineering Section Chief shall be consulted for guidance on Government cost estimates. Cost estimates for plans and specifications work shall be provided at interim product stages, e.g., the 60% and/or 90% completion stage as identified in the schedule. Independent Government Estimates (IGE) are prepared as completed plans and specifications packages proceed through construction contract solicitation and acquisition. The IGE shall be completed under the direction of the Chief, EC-RC, and signed by the Chief, EC.

- Reviews: Production and review elements bring all personal and institutional knowledge, experience, and expertise to bear on the work process in order to develop the product according to requirements. Review groups will vary by product and, in addition to ITR review, may include management, supervisors, peers, PDT, and customers. Management review (Branch and Section chiefs) shall be a component of significant in-progress review milestones. Specific reviews and review strategies (e.g. in-progress, draft, BCOE, technical, policy, etc.) will be identified and set to assure compliance with expected accomplishments and progress towards other specific quality standards. All engineering products shall receive a Product Review. Decision and Implementation documents, as defined by regulatory guidance require an Independent Technical Review and may also require a policy review. The scope, schedule and budget shall include scheduled times for all reviews, identify review team members, ITR Lead, and budget estimates to conduct the reviews. All the review plans will be developed in accordance with Procedure 004, Procedure for Product Reviews.

6.4.3 Measurement

The SSB shall identify quality, budget, and schedule measurements used to gauge product progress. Milestones, reviews, and checklists help determine progress towards quality standards. The comparison of actual progress to planned activities provides information about the accuracy of planning effort, and provides product and review team members a work progress status check. The TL shall monitor and report expenditures to the customer through the budgeting process, and reports schedules progress and evaluates schedule variances from initial estimates. In response to any changes identified during product development, the SSB shall be revised as necessary to assure appropriate follow-up actions have been taken.

6.5 Review and Approve Scope, Schedule, and Budget, and Project Management Plan

The TL is responsible to for routing the completed SSB to EC Section Chiefs and Branch Chiefs for review and approval. Approval is obtained upon approval by each of the QMS Branch Chiefs of the SSB. SSB routing and approval may be via hard copy or using electronic formatting. Upon approval of the SSB the TL will forward the SSB to the PM for inclusion in the PMP. In accordance with the PMBP, the PM is responsible for routing the PMP to the appropriate offices and customer to obtain approval. Within EC routing will include the PDT and ITR teams, appropriate Section Chiefs, QMS Branch Chiefs, and the QMS Management Representative. The TL and PM in conjunction with the PDT and ITR team members shall revise the SSB and PMP in accordance with review comments.

6.6 Implement Project Management Plan

Following PMP approval and funding confirmation, the work shall be accomplished in accordance with the PMP.

6.7 Design and Study Reports Development

6.7.1 Initiate Design/Study Reports Activities

After EC management approval is obtained on the SSB and funds are provided by the PM to work on the project, the TL initiates the design or study activities and manages completion of the required product as described in the PMP.

6.7.2 Initial Team Meeting

The TL shall meet with the PM, PDT, ETDS Manager and ITR Lead for the Initial Team Meeting. At this meeting, the team shall review the Customer request and PMP. Specific technical requirements for each of the design elements shall be identified at this meeting and a general understanding for each of the design requirements and technical approaches will be agreed upon. The team shall proceed with the activities and in the manner identified in the approved PMP.

6.7.3 Reviews

The following are typical review milestones for Design/Study Reports. Depending on the complexity and duration of the project, design and study reports may have less or require additional review milestones. At each milestone, all individuals identified in the Distribution List for Review of Engineering Products in the EC Toolkit (under Product Development) shall be provided the document for review. The E-Mail Templates for Review (also in the EC Toolkit under Product Development) shall be used for requesting their review. In addition, other individuals deemed appropriate and as required by the PMP shall be included in the review. Review, change, approval, and documentation will follow the requirements as outlined in Procedure 003, Procedure for Revising Work Scope, and Procedure 004, Procedure for Product Review.

6.7.3.1 Design or Study Concept Review:

The Design or Study Concept Review is also often known as the 30% Completion Review. At this stage, all team members shall review completed activities shall be reviewed to ensure all organizations are proceeding with appropriate and compatible design activities and assumptions, have a compatible understanding of product requirements; agree on the technical approaches, criteria, assumptions; and identify conflicts in the design activities. Preliminary layouts shall be available, site conditions determined by actual visits, and differences resolved and requirements met

6.7.3.2 In-Progress Reviews

In- Progress Reviews may be referred to as 60% and/or 90% Completion Reviews. During these reviews, the draft report shall be prepared; base plates updated (may not be final); and engineering studies, investigations, and design shall be complete to the level identified in the PMP.

6.7.3.3 Final Review

The Final Review may also be referred to as the 100% Review. It is performed to verify that all technical and quality requirements have been met, all issues and conflicts in the design have been identified and resolved, engineering investigations and designs are documented, and the documents are complete. 6.7.4 ITR Certification and Approval

Upon completion of the Final Independent Technical Review, the ITR lead will complete, sign and forward to the Chief, EC, for signature, a Design/Study Reports Independent Technical Review Certification. This document is located in the took kit under Product Development, Checklists.

6.7.5 Deliver to Customer

The TL will distribute the final report in accordance with the Distribution list of Final Products for Design/Study Reports. This is included in the Distribution List for Review of Engineering Products, in the Toolkit under Product Development.

6.8 Plans and Specifications

6.8.1 Initiate Design Activities

After EC management approval is obtained on the SSB and funds are provided by the PM to work on the product, the TL initiates the design activities and manages completion of the required product as described in the PMP.

6.8.2 Initial Team Meeting

The TL shall meet with the PDT, ETDS Manager and ITR Lead for the Initial Team Meeting. At this meeting, the team shall review the Customer request and PMP. Specific technical requirements for each of the design elements shall be identified at this meeting and a general understanding for each of the design requirements and technical approaches will be agreed upon. The team shall proceed with the activities and in the manner identified in the approved PMP.

6.8.3 Reviews

The following are typical review milestones for Plans and Specifications (P&S). Depending on the complexity and duration of the project the P&Ss may have less or require additional review milestones. At each milestone, all individuals identified in the Distribution List for Review of Engineering Products in the Toolkit (under Product Development) shall be provided the document for review (electronically or by hardcopy as noted in that List). The Email Templates for Review (also in the Toolkit under Product Development) shall be used for requesting their review. In addition, other individuals deemed appropriate and as required by the PMP shall be included in the review. Review, change, approval, and documentation will follow the requirements as outlined in Procedure 003, Procedure for Revising Work Scope, and Procedure 004, Procedure for Product Review

6.8.3.1 30% Plan Review

The 30% Plan Review is also often known as the 30% Completion Review. At this stage, completed activities shall be reviewed to ensure all organizations are proceeding with appropriate and compatible design activities and assumptions, have compatible understanding of product requirements; agree on the technical approaches, criteria, assumptions; and identify conflicts in the design activities. Preliminary plans and specifications shall be made available, including an outline of the specifications; site conditions determined by the actual visit, and differences resolved

6.8.3.2 In-Progress Review (s)

The In-Progress Review is often known as the 60 and/or 90% Completion Review. The PMP shall outline the level of completion at this stage(s). Generally, the team shall continue with the design in conjunction with various In-Progress Reviews. The Procurement Strategy shall be evaluated to confirm applicability or need to change. Government cost estimates shall be prepared at the 60% and/or 90% plans and specifications phases as identified in the PMP.

6.8.3.3 Final PDT Review

The Final Review is often known as the 100% Review. This review will verify that all technical and quality requirements have been met, all issues and conflicts in the design have been identified and resolved, engineering investigations and designs are documented, design calculations checked, and documents are complete.

6.8.3.4 Final ITR Review

This review may be a separate review or be concurrent with either the Final PDT Review or BCOE Review. The TL shall submit the documents to the ITR leader for distribution to the ITR Team. Concept and in-progress independent technical reviews may occur at earlier reviews throughout product development depending on the complexity of the work as identified in the PMP. Independent technical review and certification shall occur in accordance Procedure 004, Procedure for Product Reviews.

6.8.4 Biddability/Constructibility/Operability/Environmental (BCOE) Review

The TL shall coordinate with the Specifications Unit in EC-RC for submittal of documents for BCOE Review, including review dates and schedules to provide both sufficient budget and time for printing and distribution for all reviewers. If hard copies are required, printing of documents, specifications text, and drawings, and distributions shall be coordinated by EC-RC.

6.8.5 Approval

Unless otherwise notified, the Advanced Notice for a contract to notify prospective bidders shall be initiated by CT at the start of the BCOE review. Upon completion of the Plans and Specifications and resolution of all BCOE and ITR comments, the TL routes the Plans and Specs Job Approval, Independent Technical Review and BCOE Certification and Pre-Solicitation Checklist (a template is located in the toolkit under Product Development, Checklists) for signature. Along with the Job Approval Checklist, the TL should print and route the DrChecks comment resolution certification. Signature on the Job Approval Checklist Certification by the offices listed certifies that all appropriate BCOE review comments have been incorporated and the contract is ready for advertisement. Signature of the Certification of Independent Technical Review by the ITR Lead certifies that all technical review comments are resolved in accordance with regulatory guidance. When the form has been signed by all required personnel, the TL provides the original to EC-RC, Specifications Unit, and the Specifications Unit forwards it to CT.

The TL routes the drawings for approval through the required offices and submits for final approval by the District Commander.

6.8.6 Delivery to Contracting Division (CT)

The TL has the signed drawing cover sheet scanned and provides an electronic file of the coversheet and final drawings, along with a hardcopy to the ETDS Manager. EC-RC provides the Acrobat file of the specifications to the ETDS Manager. The ETDS Manager combines these into an executable file and forwards it to CT for advertisement. EC-RC shall prepare a memorandum for signature by the Chief, EC for transmittal for the plans and specifications to CT for advertisement. EC-RC also provides the Job Approval Checklist Certification sheet and Justification for Liquidated Damages to be sent with the memorandum.

6.8.7 Contract, Solicitation, Amendments, and Independent Government Estimate (IGE)

The contract solicitation package issued to contractors by CT includes the plans and specifications. CT shall provide the number of the hard copies of the contract solicitation requested by the TL, the TL will distribute them as appropriate.

All amendments that change scope or design shall be submitted to EC-RC, Specifications Unit after receiving a brief review to assure concurrence from all organizational elements. They shall be delivered to CT following the same process as the original specifications and drawings, the DL provides an electronic file and a hard copy of approved revised drawings to the ETDS Manager, EC-RC, Specifications Unit, provides an Acrobat file of the specifications to the ETDS Manager, the ETDS Manager combines these files into an executable file and forward it to CT.

To certify adequacy, assure completeness, maintain integrity and retain independence, the Independent Government Estimate (IGE) shall be prepared during the advertisement period and signed by the Chief, EC-RC, and the Chief, EC. Government cost estimates prepared by A/E shall be reviewed by the PDT Cost Engineer and another qualified reviewer identified by the Chief, EC-RC prior to final approval.

6.8.8 Prepare Engineering Considerations and Instructions

The TL shall prepare the Engineering Considerations and Instructions (ECI) documents to aid construction field personnel in the completion of work (a guide for the format and content for ECI is included in the QMS Tool Kit). The ECI shall typically be completed prior to bid opening. The ECI shall identify components and/or portions of the plans and specifications thatwere prepared by Architect-Engineer consultants. Upon approval by the Chief, EC, the TL shall provide the ECI to the Resident Engineer

6.9 Deliver to Customer, Product/Project Closeout

The Product/Project will be closed out in accordance with the Project Closeout guide in the EC Toolkit. Paragraph 7.1 in that guidance provides a checklist of required closeout actions.

7.0 RECORDS

Documents provide a record of the actions taken throughout the PMP development process. The TL is responsible for establishing a PMP file at the ETDS address in which the following are typically recorded:

- Scope, Schedule and Budget
- Activities needed to accomplish work
- Review Plans
- Checklists developed
- Cost estimates, funding, and budget
- Coordination documentation including correspondence, meeting minutes, conversation logs, etc.

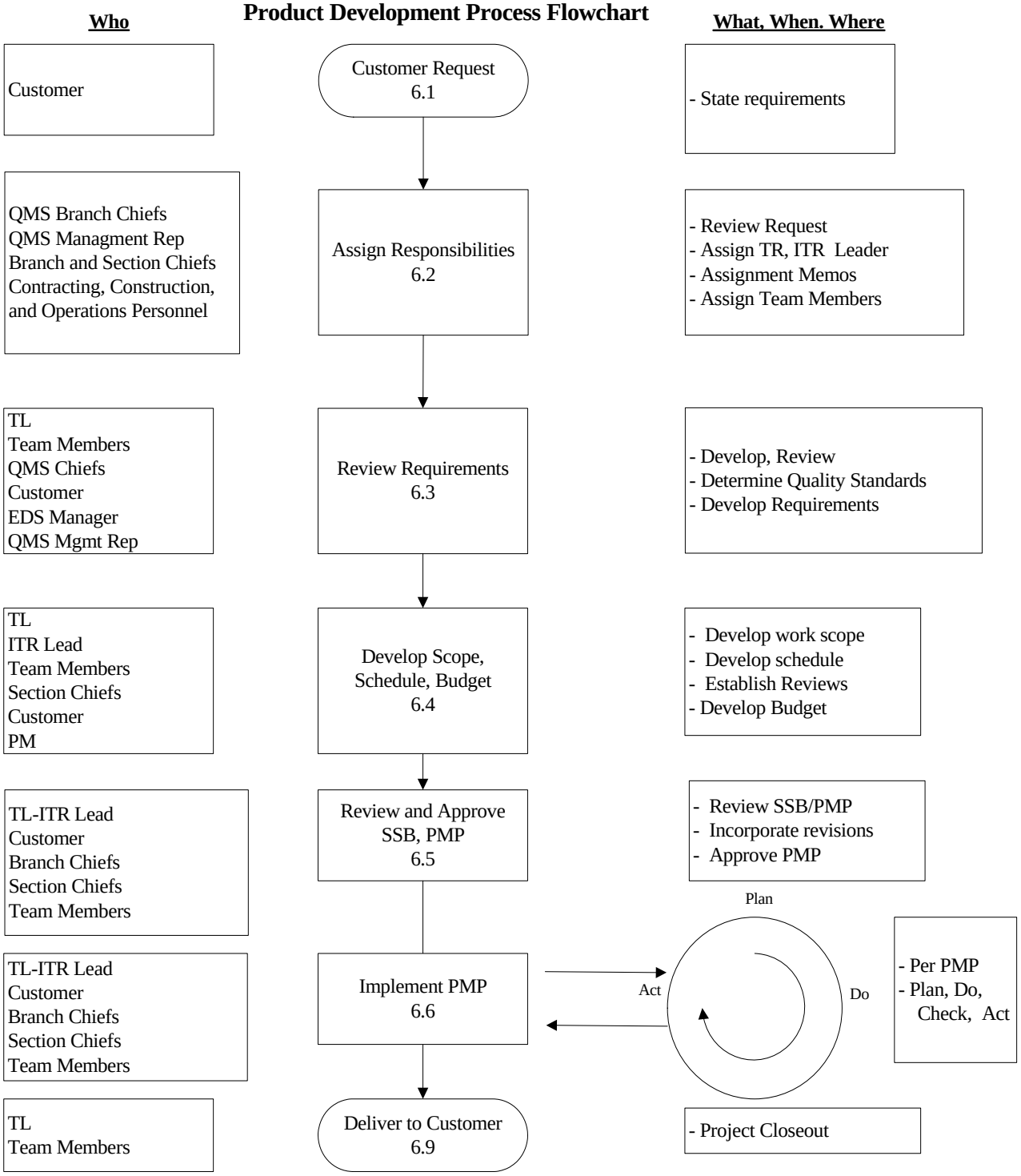
The detail and magnitude of records is discretionary (probably larger for more complex work), but should help achieve the objective of chronicling actions and events of product development and acceptance. Individual members of the PDT and PRT may keep informal documentation, but duplicate copies of official records are not necessary. Files and documents are maintained and retained consistent for the life of the product. Disposition of documents at the project/product completion shall be in accordance with the Project Closeout Procedure in the EC Toolkit.

8.0 ATTACHMENTS

1. Product Development Process Flowchart
2. Scoping Work Procedure Flowchart
3. Design Reports Flowchart
4. Flowchart for the Plans and Specifications Process
5. EC Tool Kit

Procedure for Scoping Work and Product Development Engineering and Construction Division Portland District	Procedure No.: **002**
	Issue/Revision No.: **I1-R0**
	Issue/Revision Date: **25 Oct 06**

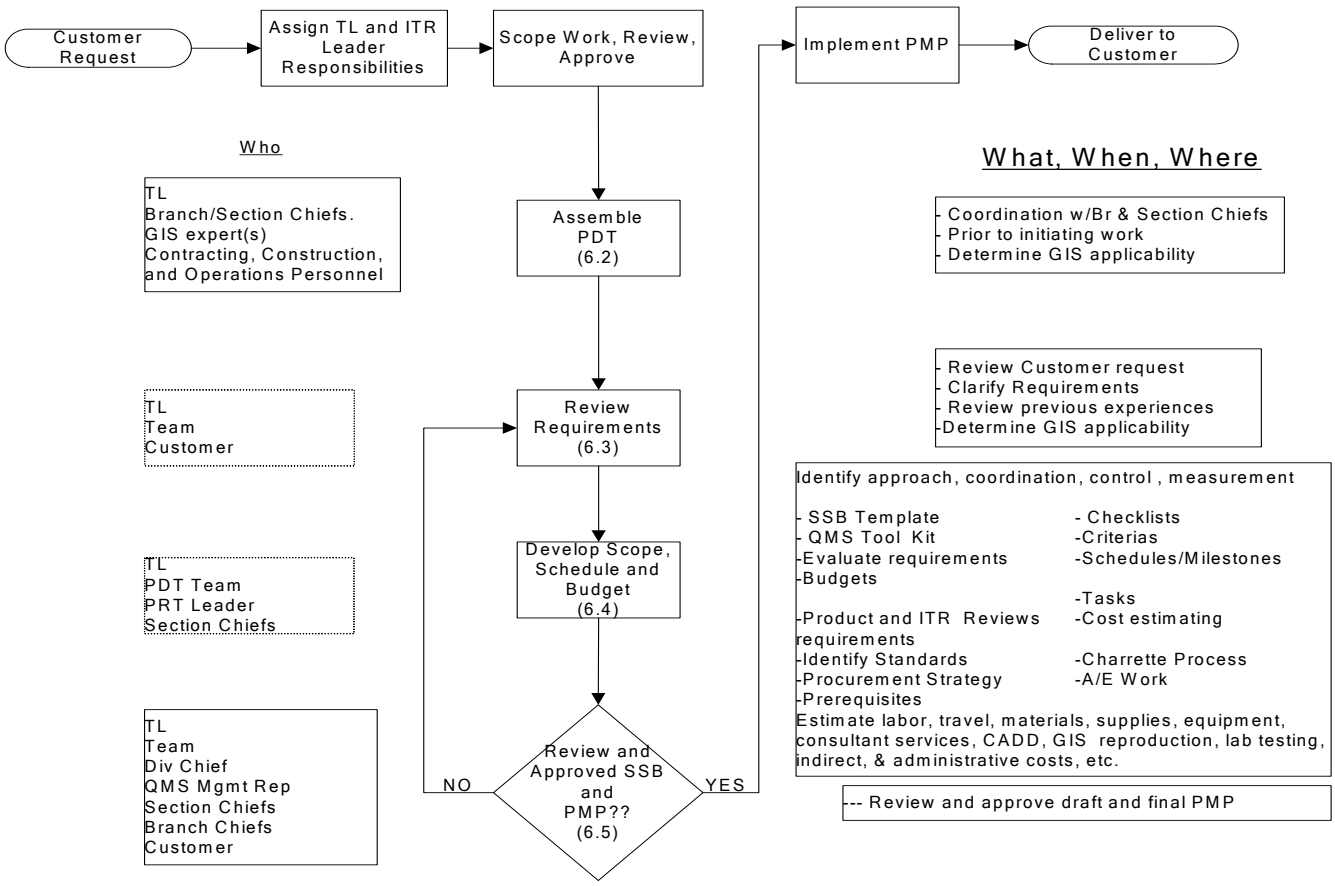
Product Development Process Flowchart



ATTACHMENT #1

Procedure for Scoping Work and Product Development Engineering and Construction Division Portland District	Procedure No.: **002**
	Issue/Revision No.: **I1-R0**
	Issue/Revision Date: **25 Oct 06**

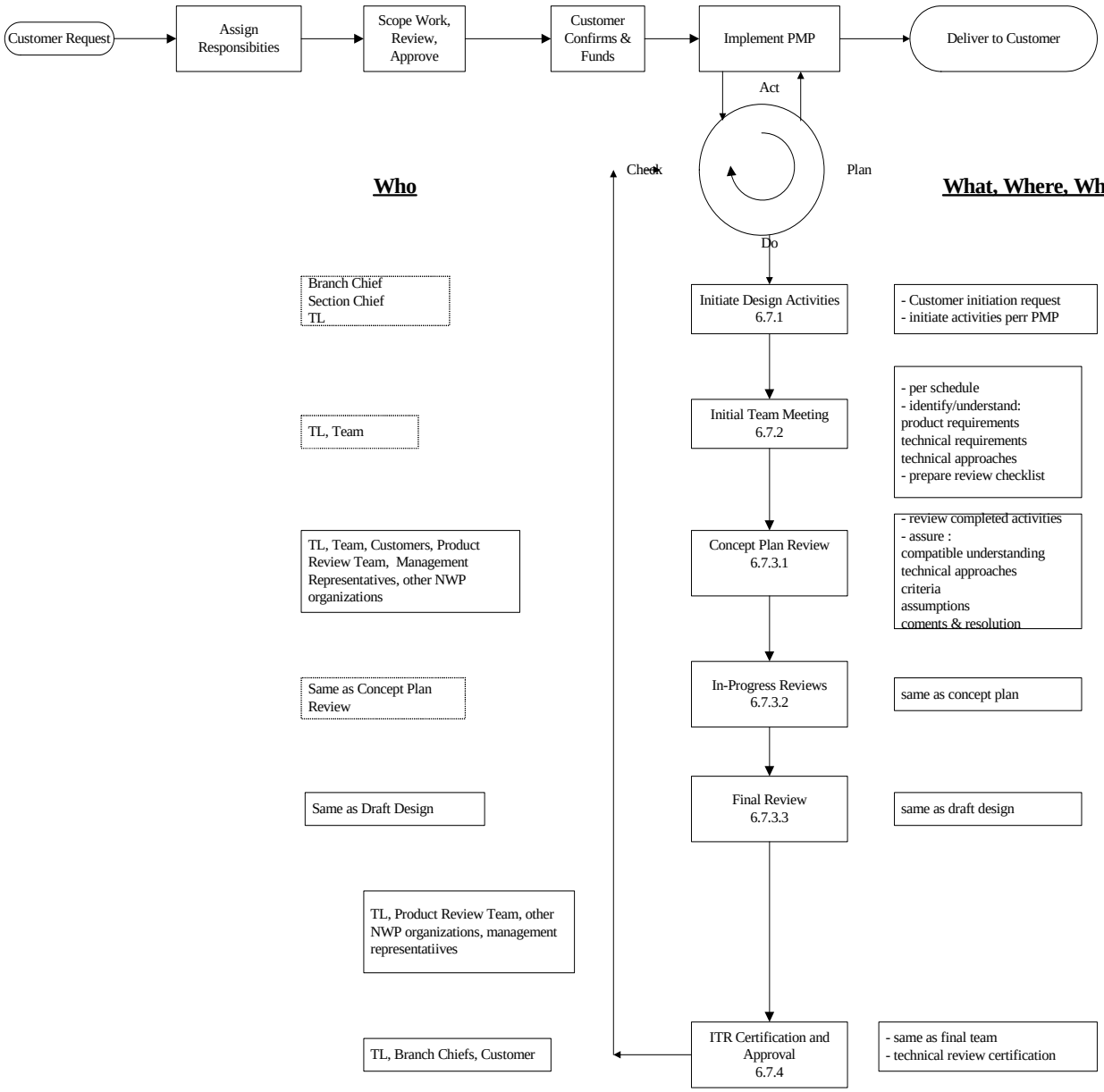
Scoping Work Procedure



ATTACHMENT #2

Development Engineering and Construction Division Portland District	
	Issue/Revision No.: **I1-R0**
	Issue/Revision Date: **25 Oct 06**

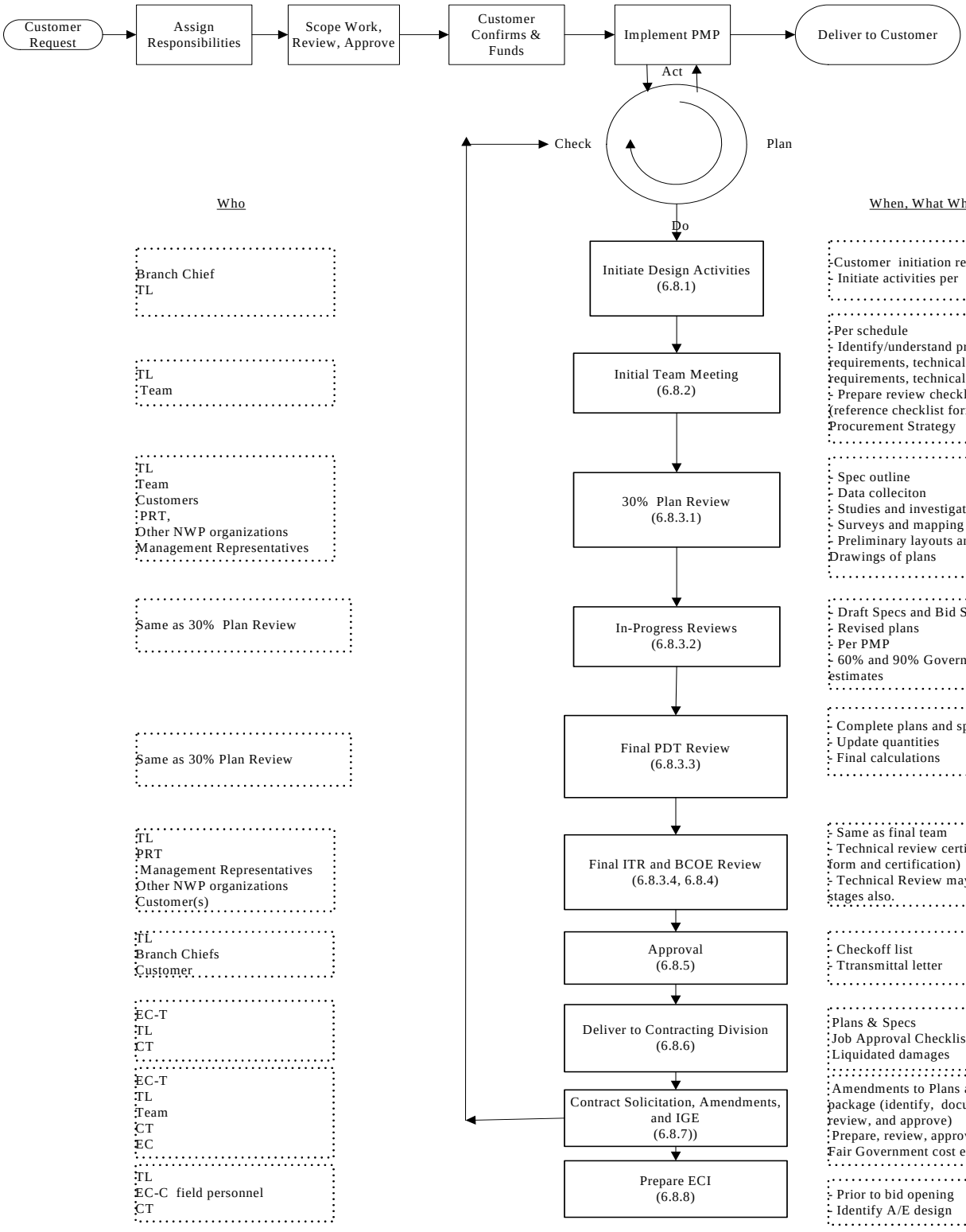
Design and Study Reports Flowchart



ATTACHMENT #3

Procedure for Scoping Work and Product Development Engineering and Construction Division Portland District	Procedure No.: **002** Issue/Revision No.: **I1-R0** Issue/Revision Date: **25 Oct 06**

Flowchart of the Plans and Specifications Process



ATTACHMENT #4

EC TOOL KIT

Engineering and Construction Division provides a link to an Intranet website known as the EC Toolkit. The EC Toolkit provides numerous tools to aid the PDT throughout product scoping and development until it is completed. The PMP template included in the EC Toolkit provides an outline for a typical PMP. The EC Toolkit is available at:

https://w3.nwp.usace.army.mil/ec/toolkit/home.asp

PMPs developed for specific products will vary in size and complexity. Complex products will likely have extensive PMPs. Smaller products will likely have less detailed PMPs. PMP size can generally be based on the following:

a. Small PMPs directly involve only 1 to 3 EC offices, have an estimated labor cost in the thousands of dollars, and/or have a construction cost in the tens-of-thousands of dollars.

b. Medium-size PMPs involve most EC offices, have an estimated labor cost in the tens-of-thousands of dollars, and/or have a construction cost in the hundreds-of-thousands of dollars.

c. Complex PMPs involve all EC offices, have an estimated labor cost in the hundreds-of-thousands of dollars, and/or have a construction cost in the millions-of dollars. This type of work typically involves aspects of multi year design and construction programs.

Other tools provided in the EC Toolkit include a link to the Policy and Procedure Manual, Product Development Tool, After Action Reports, the Project Closeout Procedure and some “quick links.”

PROCEDURE FOR REVISING WORK SCOPE

Proponent Office: Design Branch, Mechanical Design Section

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the general steps, requirements, roles, and responsibilities for revising work scopes for engineering and construction products. TLs and PDT members following these guidelines will ensure the document meets all requirements.

2.0 SCOPE

This procedure applies to all engineering and construction product work undertaken, with the exception of emergency rehabilitation work and work involving centers of expertise. Emergency rehabilitation work shall be revised in accordance with specific requirements of ER 500-1-1, Civil Emergency Management Program, and the guidance/requirements of Operations Division. Work involving centers of expertise shall be revised in accordance with specific regulatory guidance associated with the particular center.

3.0 REFERENCES

ER 5-1-11	U.S. Army Corps of Engineers Business Practices
ER 500-1-1	Civil Emergency Management Program
ER 1110-1-12	Quality Management
ER 1110-1-8158	Corps-Wide Centers of Expertise Program
ER 1110-2-109	Hydroelectric Design Center

4.0 RESPONSIBILITIES

Chief, EC is responsible for revisions to the management of engineering products.

Branch Chiefs are responsible for providing review, guidance, and manpower necessary for developing products in accordance with PMP and work scope revisions.

Section chiefs are responsible for recommending new TLs, ITR leaders, team members, and resources for product teams in accordance with PMP and work scope revisions.

The TL is responsible for implementing, coordinating, and managing work scope revisions in conjunction with the PMP identified for a product. The TL provides leadership to the team and assures coordination and interaction of team members. The TL must evaluate progress, monitor budget and schedule, identify and resolve conflicts, provide reports on product progress, document revisions, and ensure product requirements are met.

Each Team Member is responsible for completing activities identified in the PMP within the work scope, budget and schedule requirements as revised. They must inform the TL of the status of activities to support reporting and product completion. They must also prepare background information required for revisions.

5.0 KEYWORDS (see Glossary for definitions)

Product Development Team (PDT)
Product Review Team (PRT)
Project Manager (PM)
Project Management Plan (PMP)
Schedule and Cost Change Request (SACCR)
Technical Lead (TL)

6.0 PROCEDURE

6.1 Needs for Change to Scope, Schedule or Budget Is Identified

Changes to work scopes, schedules, or budgets may be generated by the customer, an outside agency, or from within the PDT or PRT. The changes may increase or decrease the amount of work required.

(Note: The toolkit contains a Checklist for Schedule and Cost Change Requests (SACCRs). This form gives more details about when a SACCR is required, information the SACCR should contain, and routing.)

6.2 Team Discussion and Recommendation

The TL considers the potential change with team members and the customer to ensure the scope is understood. The team reaches consensus as to whether the change should be made, after weighing impacts to, and having discussions with, the customer. If it is decided that no revision is necessary the TL documents that decision for the file, and provides copies to the team and customer. If a change is appropriate, the team members develop backup justification, including impacts to scope, schedule, and budget.

6.3 Scope, Review, and Approve Change

6.3.1 Utilizing the backup justification provided by the team members, the TL develops a SACCR to document the change using the template available in the QMS Tool Kit. The SACCR shall document scope, schedule, and budget changes to the PMP and the justification for those changes. The SACCR is routed by the TL for review and approval through their Section Chief, Branch Chief, and the Customer. As appropriate the SACCR shall be routed through others. Review and approval may be accomplished via hard copy or electronically. Following approval of the SACCR, the approved SACCR shall be electronically stored in the PMP/SACCR central location on the LAN.

6.3.2 Some products may not require a SACCR to implement changes. In these cases, the TL shall document any scope, schedule, or budget changes and coordinate with the PM, customer, and others as appropriate for approval.

6.4 Implement Changes

Upon approval of the SACCR, the TL shall inform all impacted parties of the change and implement the changes. Any additional funding required to implement revisions is provided by the PM.

7.0 RECORDS

Documents provide a record of the changes made throughout the product development process. The TL is responsible for establishing a product development file in which the following are typically recorded:

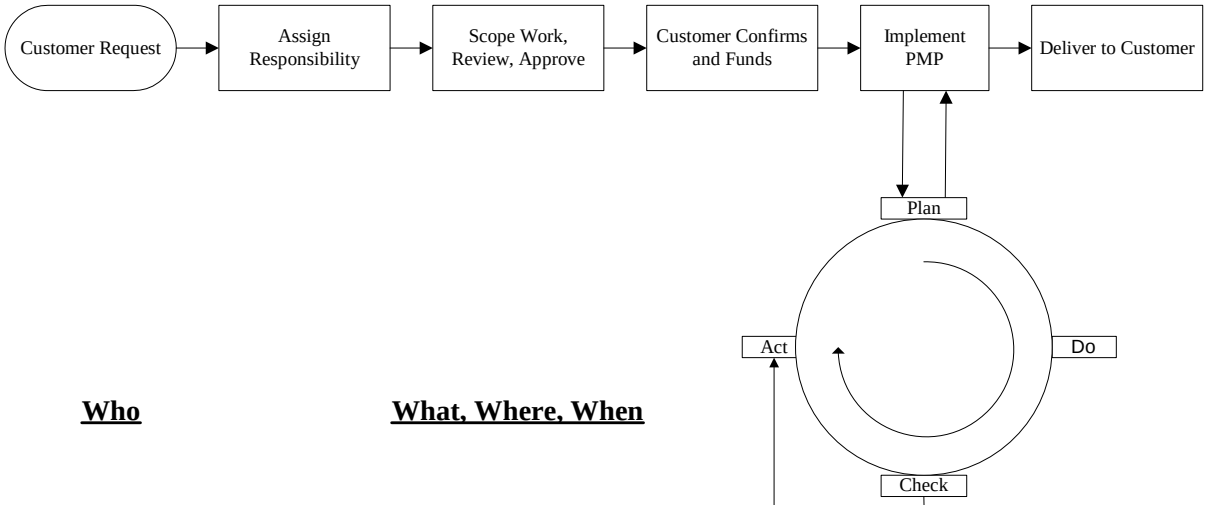
- Original Project Management Plan
- Project Scope
- Schedule and Budget
- SACCRs, including all revisions to Scope,
- Documentation of Impact to Scope, Schedule, and Budget if not documented on SACCR
- Other Communications (phone logs, e-mails, etc.)

The detail and magnitude of records is discretionary (probably larger for more complex work), but should help achieve the objective of chronicling actions and events of product development and acceptance. Individual members of the PDT and PRT may keep informal documentation, but duplicate copies of official records are not necessary. Files and documents are maintained and retained for the life of the product.

8.0 ATTACHMENTS

1. Flow Chart

FLOWCHART FOR REVISING WORK SCOPE



Who	What, Where, When	
Customer Outside Agency Product Development/Review Teams PM	Change in budget, schedule, or scope of work including amendments	Identify Need for Change to Scope, Schedule, or Budget 6.1
PM Customer Technical Lead Product Development Team	- Discuss change in scope - Develop backup justification including impacts to schedule and budget Develop concensus on proposed change	Team Discussion and Recommendation 6.2
Technical Lead Section Chiefs Branch Chiefs Division Chiefs Project Manager or Customer	- Prepare SACCR, the request for change - Include impacts to Scope - Route change request through for approval	Approve Change(s) 6.3
Project Manager Technical Lead	- Action taken - Inform all parties of the action - Additional funding provided if required	Implement Change(s) 6.4

ATTACHMENT #1

PROCEDURE FOR PERFORMING PRODUCT REVIEWS

Proponent Office: Construction and Cost Engineering Section

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the general steps, requirements, roles, and responsibilities for performing Product Reviews of an engineering product. The types of Product Reviews are the Product Development Team Review, Independent Technical Review (ITR) , and Quality Checks and Reviews. This procedure shall be observed by all individuals, including AE's (consultants), involved in the development of engineering products.

2.0 SCOPE

This procedure applies to all engineering products, as well as the preparation of maintenance dredging contract plans and specifications. All engineering products require a Product Development Team Review and Quality Checks and Reviews, and all decision and implementation documents require an Independent Technical Review in accordance with regulatory guidance. All reviews shall be undertaken to suit the specific phase and complexity of the engineering product being developed.

3.0 REFERENCES

ER-5-1-11	Management - USACE Business Process
ER 415-1-11	Construction - Biddability, Constructibility, Operability, and Environmental Review
ER 1110-1-12	Quality Management
ER 1110-2-1150	Engineering and Design for Civil Works Projects (note also CECW-EP memo dated 31 May 95, Subject: Engineering Design and Dam Safety Guidance)
ER 1110-1-8159	DrChecks
NPD Supplement to ER 415-1-11	Biddability, Constructibility and Operability
NPDR 1110-2-100	Continuing Evaluation of CW Structures
NPPR 415-2-11	Quality Assurance Management

4.0 RESPONSIBILITIES

4.1 EC Division Chief

Chief, EC is responsible for the overall technical management and the technical adequacy of engineering products.

4.2 EC Branch Chiefs

The EC Branch Chiefs are responsible for the overall product quality, including the PDT review, Independent Technical Review, and the Quality Check and Review of engineering products. Branch Chiefs review and recommend approval of the Product Management Plan (PMP), and monitor all of the review status throughout product development. The selection of the Technical Leader and the ITR Team Leader will be made at the Branch Chief level and documented in accordance with Procedure 002, PROCEDURE FOR PRODUCT DEVELOPMENT AND SCOPING WORK.

4.3 EC Resource Providers

EC Resource Providers (Branch and Section Chiefs) will provide team members and resources for all reviews. Resource Providers will assure that both PDT and ITR team members are familiar with, understand, and execute all review requirements, as established within the PMP. Resource Providers are responsible for insuring that the personnel performing the product reviews have sufficient technical expertise to perform the type of review they have been assigned. Expertise of ITR team members shall always be equal or greater than that of the Product Development Team (PDT) members. The ITR team may include personnel from NWP, other Districts, AE's, and independent consultants.

4.4 Product Review Personnel

4.4.1 Product Development Team

The PDT assigned to a product is responsible for completing review of that product in accordance with ER 1110-1-12, Paragraph 3-7. The PDT will perform the required review activities within the budget and schedule requirements established in the PMP. The PDT team will interact, as necessary, with other members of the Product Development Team to assure mutual understanding of product development and related criteria, and mitigate/prevent the occurrence of oversights, omissions, misunderstandings, miscommunication, and other product nonconformance.

4.4.2 Independent Technical Review Team

The ITR team assigned to a product is responsible for completing the Independent Technical Review on that product in accordance with ER 1110-1-12, Chapter 4. ITR team members will be completely independent of the PDT and therefore not engaged in any design responsibilities for the assigned product. The ITR team will perform the required review activities, within the budget and schedule requirements established in the PMP. The ITR team will interact, as necessary, with the Product Development Team to assure mutual understanding of product development and related criteria, and mitigate/prevent the occurrence of oversights, omissions, misunderstandings, miscommunication, and other product nonconformances. The ITR team will independently verify the PDT course(s) of action and product conformance with requirements, and validates the product if no deficiencies are found or when ITR comments are adequately resolved.

4.4.3 Product Development Team Technical Leader

The PDT Technical Leader (TL) is responsible for the successful completion of the Product Quality Review of the product. The TL establishes and maintains records of the Product Quality Review and provides periodic review status reporting to EC Branch Chiefs. All budgeting, scheduling, scoping, team selection, resource administration, coordination, and documentation associated with PDT product review activities are managed by the TL. The TL is responsible for the coordination of review comment responses and their resolution.

4.4.4 Independent Technical Review Team Leader

The ITR Team Leader is responsible for the successful completion of the Independent Technical Review of the product. The ITR Team Leader will coordinate all Independent Technical Review activities with the PDT's Technical Lead. The ITR Team Leader establishes and maintains

records of Independent Technical Review and provides, as required, periodic ITR status reporting to EC Branch Chiefs. All budgeting, scheduling, scoping, team selection, resource administration, coordination, and documentation associated with ITR activities are managed by the ITR Team Leader. The ITR Team Leader will be completely independent of the PDT and therefore not engaged in any design responsibilities for the assigned product. The ITR Team Leader documents technical review actions, and certifies that the ITR has been accomplished in accordance with all requirements and guidance (EMs, ERs, Codes, Policy, HQ Guidance, etc.).

4.4.5 Quality Checks and Reviews Staff

In accordance with ER 1110-1-12, Paragraph 3-7, quality checks and reviews must be carried out as a routine management practice. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from senior staff, or other qualified personnel. Members of the PDT cannot perform quality checks and review on their own work. The Branch or Section Chiefs will assign the staff for the quality checks and reviews at a time appropriate to complete these actions and this timing will not necessarily coincide with product milestones. The staff for these checks and reviews is not normally listed in the PMP. Quality checks and reviews are technical checks and reviews occurring during the product development process. This can include peer reviews, detailed checks of calculations, assumptions, proper drawing layout and detail, etcetera. While quality check and review activities may or may not coincide with review milestones identified in the PMP, all of the checks and reviews are normally completed prior to Final ITR of the product.

5.0 KEYWORDS (See GLOSSARY for definitions)

Branch Chiefs
Certification
Independent Technical Review (ITR)
DrChecks
Project Management Plan (PMP)
Product Development Team (PDT)
Technical Leader (TL)
Resource Provider

6.0 PROCEDURE

6.1 Product Review

6.1.1 General

In conjunction with the PM, the TL, PDT, and ITR Leader are responsible for developing a Quality Management Plan (QMP) as an integral part of the project PMP. Per ER 1110-1-12, the QMP is comprised of a Quality Control Plan (QCP) and a Quality Assurance Plan (QAP) and defines how the quality control and quality assurance will be executed for the project. The QMP shall be developed during preparation of the scope, schedule, and budget formulation period of the project. As a minimum, the QMP will address the type and frequency of the reviews for the project and identify all review team members and their associated budget requirements. Requirements of the QMP will be incorporated into the PMP. Adequate time shall be allowed in the project schedule to perform effective reviews and to complete comment resolution.

6.1.2 Work Performed by Architectural/Engineering (A/E) Firm

When an A/E firm is responsible for delivering completed products within the scope of a contract or task order, the A/E shall have a QMP requiring an ITR prior to delivery of the product. Performance of this ITR by the A/E shall not be accomplished by the same element that developed the product. The A/E shall adhere to the same technical review regulatory requirements applicable to Portland District.

6.2 Quality Management Plan

The Quality Management Plan as detailed in the PMP shall be submitted as part of the PMP to EC Branch Chiefs and the Chief, EC for review and concurrence.

6.3 Product Review Team Orientation

The TL shall meet with the all participating product review teams prior to the start of scheduled product review activities to orient the team on the review process, the product, budgets, review schedule, and review of the approved PMP. The TL shall be responsible for coordinating/scheduling the orientation meeting. The review responsibilities of each of the review team members associated with the various product elements shall be discussed during this orientation meeting.

6.4 Product Review Actions

6.4.1 General

All engineering products require Product Quality checks and reviews and PDT reviews and are normally in-house Branch and Section level reviews performed to ensure products are technically correct, coordinated and meet customer requirements. PDT reviews will normally occur at scheduled milestones and may be participated in by Section chiefs and other non-PDT staff. Independent Technical reviews are performed on all Decision or Implementation Documents as defined by regulatory guidance. Product Reviews will be performed in compliance with the requirements stated in the approved PMP.

6.4.2 Product Review Comments Documentation

The Product Review teams will document their comments and recommendations, for all formal reviews, utilizing the DrChecks module in ProjNet in accordance with ER 1110-1-8159. Comments will be structured to give a clear statement of the concern, the basis of the concern and, when appropriate, the actions necessary to resolve the concern. Comments will cite appropriate references. The PDT will evaluate and respond to each comment in DrChecks. Responses will clearly state concurrence or non-concurrence with the comment. Concurrences shall include what the corrective action is and where and when it will be accomplished. Non-concurrences shall include an explanation or proposed alternative action. The Product review team should also use the Design Quality Lessons Learned (DQLL) module in ProjNet to document project lessons learned.

6.4.4 Back-Checking Product Review Comments

Once Product review comments have been addressed by the PDT, the review team member responsible for the comment shall review and back-check the comment to verify that it has been satisfactorily resolved. Back-check documentation shall be accomplished by utilizing DrChecks. If necessary, the PDT Technical Leader and/or the ITR Team Leader shall escalate unresolved comments through the supervisory chain for resolution.

6.5 ITR Certification

All EC products that require ITR certification shall have all review comments satisfactorily resolved and back-checked prior to the ITR certification by the ITR Team Leader.

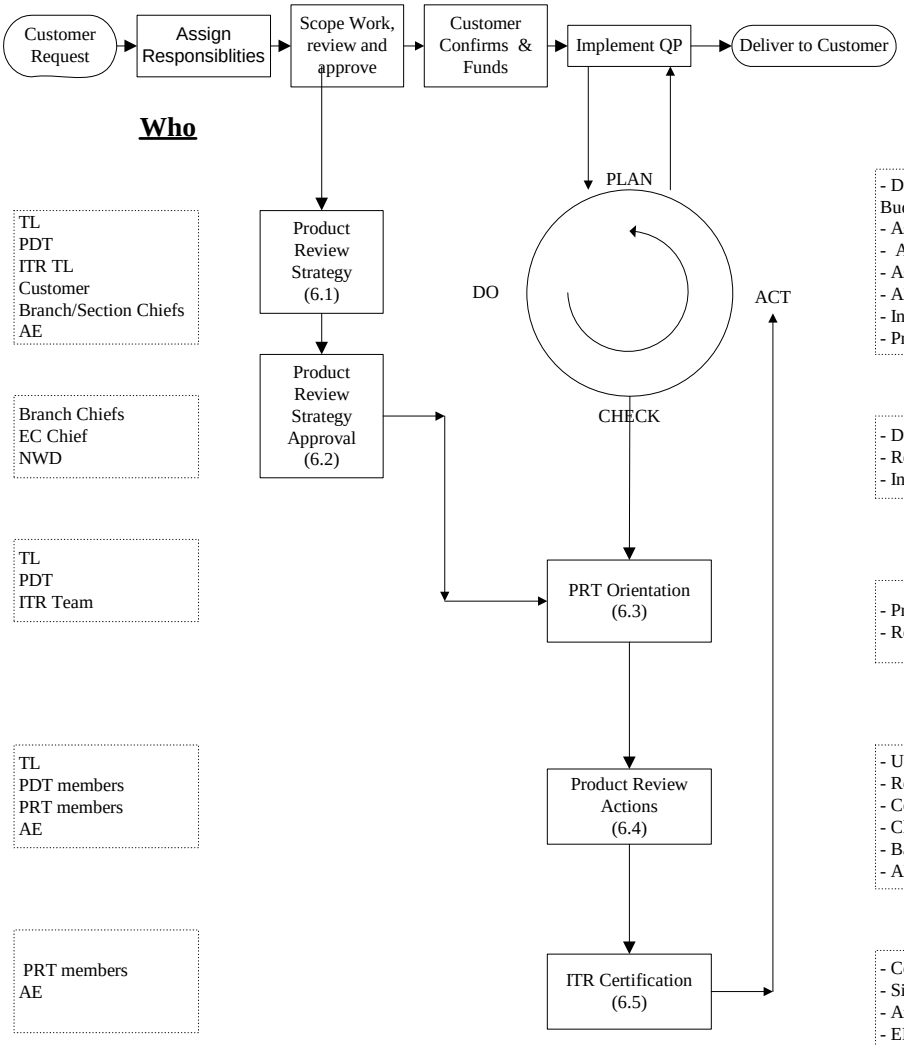
7.0 RECORDS

DrChecks shall be used as the primary method of documenting the Product Review process. In addition, meeting minutes, budget requests, ITR certification, and other miscellaneous documentation will be kept by the PDT Technical Leader.

8.0 ATTACHMENTS

1. Product Review Flow Chart

PRODUCT REVIEW FLOW CHART



ATTACHMENT #1

PROCEDURE FOR EXECUTION OF CONSTRUCTION CONTRACT WORK

Proponent Office: Resident Office

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the general steps, requirements, roles, and responsibilities for executing construction contracts in Portland District. Contract execution involves the planning for and implementation of a quality assurance plan, administration of the contract during construction, and delivery of the completed project to the customer.

2.0 SCOPE

This procedure applies to all construction contracts assigned to the Resident Office.

3.0 REFERENCES

FAR	Federal Acquisition Regulations
DFARS	Defense Federal Acquisition Regulations Supplement
AFARS	Army Federal Acquisition Regulations Supplement
EFARS	Engineering Federal Acquisition Regulations Supplement
NWPR 1110-2-7	Engineering And Design Project Drawings
ER 5-1-11	U.S. Army Corps of Engineers Business Process
ER 415-1-10	Contractor Submittal Procedures
ER 415-1-17	Contractor Performance Evaluations
ER 1110-1-261	Quality Assurance of Laboratory Testing Procedures
ER 1180-1-6	Construction Quality Management
IWR Pamphlet 98-ADR-P-7	Partnering Guide for Civil Missions
NW PM 1180-2-1	Construction Contract Administration Manual
	Resident Office Quality Assurance Plan

4.0 RESPONSIBILITIES

The Chief, EC is responsible for the overall management of products developed and constructed in Portland District.

The Resident Engineer, EC-R, is responsible for the overall management of construction contract work in Portland District including approval of revisions to the Contract Administration Manual and the Resident Office Quality Assurance Plan.

The Project Engineer is assigned responsibility by the Resident Engineer for the construction management, contract administration, quality assurance, safety, coordination with the PM, TL, and PDT, and other activities for construction contracts. The Project Engineer shall be the primary point of contact for the customer, PM, TL and product development team members for the assigned contracts.

The Construction Services Section (EC-RC) represents the Resident Office at the development phase of plans and specifications for construction contract products, performs technical and budgetary support functions leading to award of contracts and serves as liaison to the Resident Office on construction issues addressed at the District Office. Based on the contract scope and schedule, EC-RC develops the budget for contract supervision and administration activities. EC-RC recommends revisions to the Resident Engineer for the Contract Administration Manual and the Resident Office Quality Assurance Plan.

The Resident Office (EC-R) is responsible for administration of all construction contracts in Portland District. The Resident Engineer or one of his staff will normally be assigned as a Contracting Officer's Representative (COR) or Administrative Contracting Officer (ACO). The Resident Engineer is responsible for approving revisions to the Resident Office Quality Assurance Plan and for approving Quality Assurance Plan Supplements for work on each contract.

5.0 KEYWORDS (See Glossary for definitions)

Administrative Contracting Officer (ACO)
Beneficial Occupancy
Contract Administration (CA)
Contracting Officer (CO)
Contracting Officer's Representative (COR)
Contractor Quality Control (CQC)
Notice to Proceed (NTP)
Partnering
Project Engineer
Quality Assurance (QA)

6.0 PROCEDURE

6.1 Contract Award

After contractor bids are opened or proposals received for construction contract work, Contracting Division (CT) requests by memo that EC-RC perform a pre-award survey to determine if the successful contractor is capable of performing the contract work. If the contractor is determined to be responsible and capable of accomplishing the work the Resident Engineer recommends that the Contracting Officer award the contract. When the contract is awarded and the contractor submits acceptable performance and payment bonds CT prepares the Notice to Proceed (NTP) and sends it to the Contractor.

6.2 Develop a Quality Assurance Plan Supplement

The Resident Engineer assigns Quality Assurance (QA) and Contract Administration (CA) personnel to the contract. In accordance with the Resident Office Quality Assurance Plan and prior to the start of construction contract work, the Resident Office prepares a written Quality Assurance Plan Supplement for each contract to establish the specific QA and CA activities required for each contract.

6.3 Execute the Quality Assurance Plan

EC-R is responsible for accomplishing the construction work required by the contract in accordance with the Quality Assurance Plan. This process begins with the pre-construction conference with the Contractor and continues with QA and CA activities throughout the construction phase with a special emphasis toward safety. QA activities include participation in the three phase inspection system, Quality Assurance reporting, monitoring QC programs, enforcement of contract provisions, maintaining a deficiency tracking system and QA testing. CA activities include processing contract modifications, evaluating contractor claims for equitable adjustment, processing contractor payments, processing correspondence and performing construction management. Work instructions for the pre-construction conference, QA and CA activities are provided in the Resident Office Quality Assurance Plan, the Construction Contract Administration Manual and ER 1180-1-6. EC-R encourages implementation of Partnering between the Corps of Engineers, the Contractor, and the Customer during execution of the construction contract. Guidance for Partnering is provided in IWR Pamphlet 98-ADR-P-7.

6.4 Completing Construction

EC-R with support from the other EC Branches ensures that as-constructed drawings, Operations and Maintenance manuals and warranty documentation required by the contract are promptly provided to the customer at the end of construction. As-constructed drawings shall be managed in accordance with paragraph 8 of NWPR 1110-2-7. EC-R manages the final inspection process and encourages participation in turn-over inspections by the customer prior to taking beneficial occupancy. EC-R prepares contract close out documentation including the Final Completion Certificate. EC-R recommends to EC the Contractor Performance Evaluation ratings for Construction Contractor Appraisal System (CCASS) and recommends to EC-TB the after construction ratings for the A/E Contract Appraisal Support System (ACASS) when the design was prepared by an A/E. Guidance for contract closeout is found in Section IV of the Construction Contract Administration Manual.

7.0 RECORDS

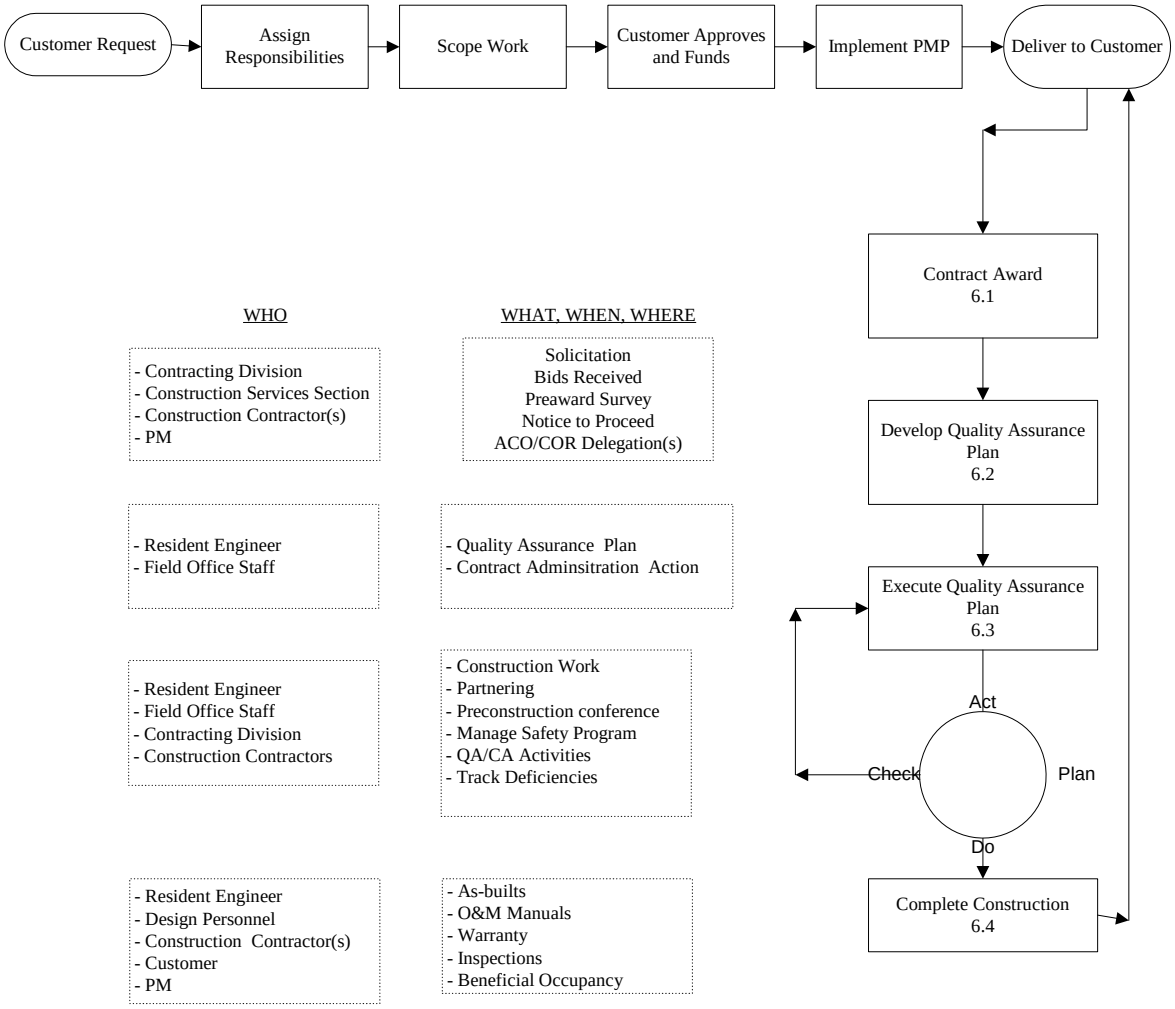
Documents provide a record of the actions taken throughout the construction process. The contract file shall contain the following in paper form to comply with the applicable contracting requirements:

- Pre-award survey memorandum
- Quality Assurance Plan
- Contractor's Quality Control Plan
- Pre-construction conference minutes
- Correspondence between the contractor and the Corps of Engineers
- Contract Documents (including plans, specifications and contract clauses)
- Contract modifications and supporting documentation.
- Daily Quality Assurance Reports
- Daily Quality Control Reports
- Deficiency Suspense Log
- Contractor Submittals

8.0 ATTACHMENTS

1. Flowchart

PROCESS FLOWCHART



ATTACHMENT #1

PROCEDURE FOR PERFORMING ENGINEERING DURING CONSTRUCTION (EDC)

Proponent Office: Design Branch, Structural Design Section

Authorized by: _____
Jeffery S. Seday, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the general steps, requirements, roles, and responsibilities for performing engineering during construction (EDC) support during the project construction phase.

2.0 SCOPE

This procedure applies to all EDC activities undertaken for engineering products and shall be observed by every member and organizational element involved in such activities.

3.0 REFERENCES

ER 415-1-10	Contractor Submittal Procedures
ER 1110-2-112	Required Visits to Construction Sites by Design Personnel
ER 1110-2-1150	Engineering and Design for Civil Works Projects
ER 1110-2-1200	Plans and Specifications for Civil Works Projects
ER 1110-2-1302	Civil Works Cost Engineering
NWPR 1-2-20	Visits by District Personnel to the Field

4.0 RESPONSIBILITIES

Chief, EC is responsible for overall management and quality of EDC services.

Branch and Section Chiefs are responsible for selecting TLs and ensuring proper resources and expertise is available for EDC.

The TL is responsible for monitoring, performing, and overall coordination and management of the EDC activities, and notifying the Project Engineer, PM, or other customer of non-conforming products identified during performance of EDC work. Coordination shall be conducted with the Project Engineer, other applicable members of EC, the PM or other customer, and Operations Division as needed. The TL provides leadership to the engineering product development team and assures coordination and interaction of team members as necessary. The TL evaluates progress, monitors budget and schedule, identifies and resolves conflicts, provides reports on EDC product progress, and ensures product requirements are met. Typical EDC activities include completion of design documentation reports, modification of plans and specifications, conduct site visits, preparation of engineering considerations, and instructions to field personnel, review contractor submittals and prepare construction foundation reports and concrete reports. Additional EDC activities are identified in ER 1110-2-1150, paragraph 15.0.

The Project Engineer is assigned responsibility by the Resident Engineer for the construction management; contract administration, quality assurance, safety and other activities for construction contracts. The Project Engineer shall be the primary point of contact for the PM, TL and product development team members for the assigned contracts.

Each team member within EC performing EDC activities is responsible for completing these activities within the work scope, budget, and schedule requirements established. They must inform the TL of the status of activities and related criteria to support reporting and product completion. They must also prepare background information and documentation required for producing the EDC products.

5.0 KEYWORDS (See Glossary for definitions)

Contracting Officer's Representative (COR)
Customer
Engineering During Construction (EDC)
Engineering During Construction (EDC) Documents
Project Engineer
Project Manager (PM)
Schedule and Cost Change Request (SACCR)

6.0 PROCEDURE

6.1 Determine Necessary Engineering during Construction

Upon notification of a required EDC activity the TL shall be selected and issued a TL assignment letter in accordance with Procedure 002, paragraph 6.2. The TL shall discuss the requirements with the PM or other customer to assure activities are clearly defined and understood. Field trips shall be included as part of EDC activities as appropriate.

6.2 Determine Budget and Scope of Work

The TL shall develop and review the work scope needed to perform the anticipated EDC activities for the assigned product. The TL shall then review the budget needed to perform the EDC work and compare it with the amount available. Differences between the current budget and the anticipated budget shall be worked out with the PM or other customer involved establishing an agreed amount. A SACCR shall be prepared as needed by the TL and submitted for approval to resolve budget issues and changes to the PMP. The proposed schedule for performing the EDC activity shall be reviewed. Concurrence between the TL and the PM or other customer on the time necessary to perform the EDC activity shall be obtained.

6.3 Perform Engineering during Construction

The TL shall perform the EDC activity in accordance with the agreed upon work scope and budget (including field trips if needed) and provide results to the Project Engineer, PM or other customer within the agreed upon time schedule. Team members involved in the EDC activity shall perform the necessary EDC work in accordance with the schedule and budget. When, during performance of EDC activities, an apparent non-conforming product is discovered, the TL shall be notified. The TL shall notify the Project Engineer, PM, or other customer, relevant PDT members and the COR (as necessary).

6.4 Resolve Conflicts

The TL shall undertake action to identify and resolve disagreements and/or conflicts regarding the performance of the EDC activity. In the event that resolution cannot be obtained, the TL shall promptly elevate the situation to the next level of supervision involved: Section, Branch, and Division Chiefs as required.

6.5 Document Engineering During Construction

The TL shall provide the PM or other customer with all documentation necessary to record the EDC activity that has occurred. All documentation will be provided in a timely manner such that decisions with respect to changes in cost, schedule and final product are fully coordinated. Team members performing EDC activities shall provide the TL with documents required to keep the TL fully informed on decisions with respect to the final product, schedule and budget commitments.

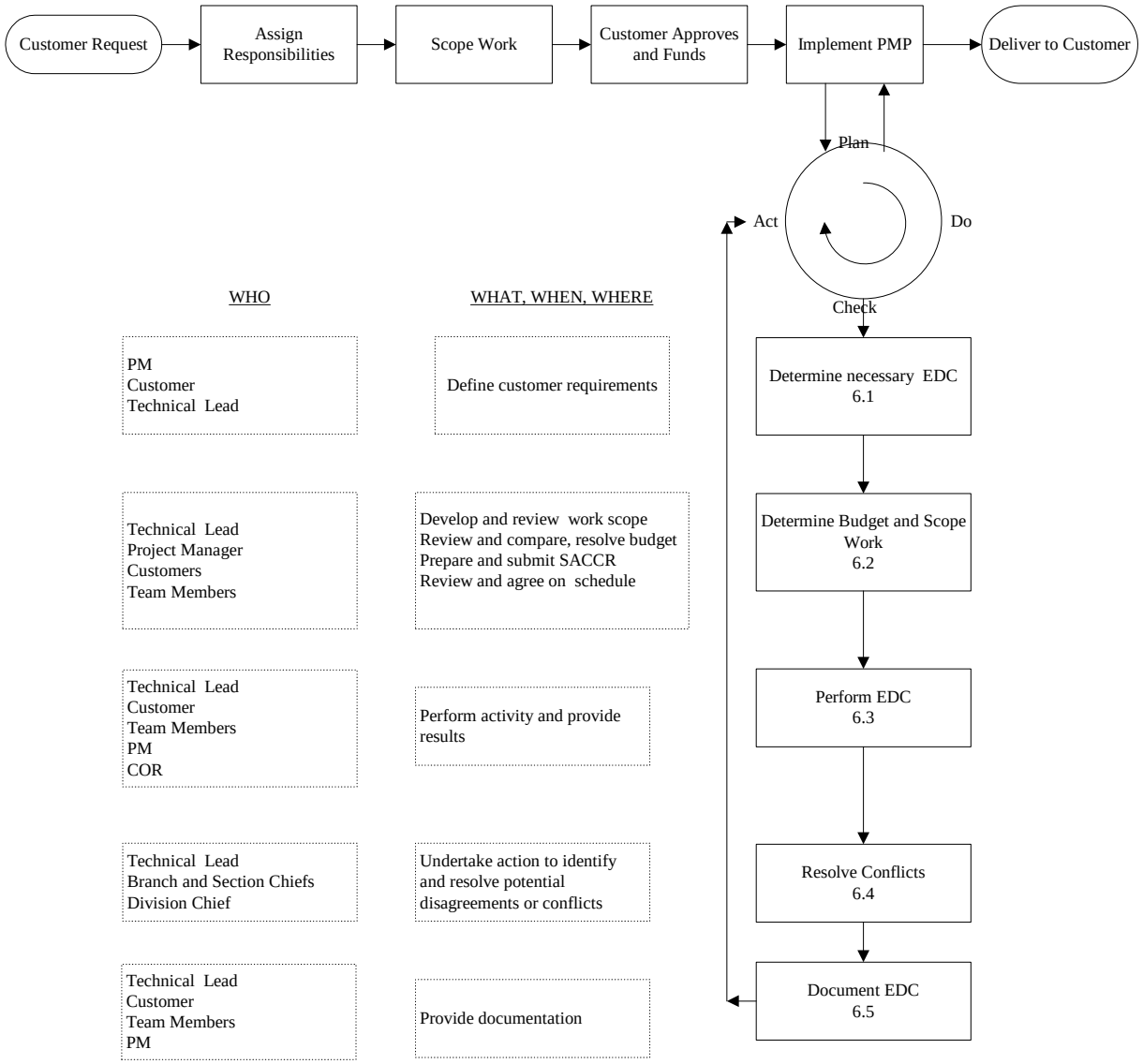
7.0 RECORDS

The TL shall maintain records which document the actions and events of performing engineering during construction.

8.0 ATTACHMENTS

1. EDC Flowchart

EDC PROCESS FLOWCHART



ATTACHMENT #1

PROCEDURE FOR PURCHASE OF ARCHITECT-ENGINEER AND PROFESSIONAL SERVICES

Proponent Office: Budget & Contract Coordination Section

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Donald R. Chambers, P.E.
Acting Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1
01 Feb 08	I1-R1	Correction of Proponent Office name and pages 3 of 7 through 6 of 7; Attachment #1

1.0 PURPOSE

This procedure describes the general steps, requirements, roles, and responsibilities for obtaining Architect-Engineer (A/E) or professional services contracts.

2.0 SCOPE

This procedure applies to the acquisition of all A/E and professional service contracts and data that relate to the requirements of the QMS and shall be observed by every member and organizational element involved in their acquisition.

3.0 REFERENCES

FAR	Federal Acquisition Regulation
DFARS	DOD Federal Acquisition Regulation Supplement
AFARS	Army Federal Acquisition Regulation Supplement
EFARS	U.S. Army Corps of Engineers Federal Acquisition Regulation – Supplement
EP 715-1-7	Architect-Engineer Contracting
ER 715-1-19	Service and Supply Contractor Performance Evaluations
ER 1180-1-9	Design-Build Contracting
NPPM 1180-2-1	Contract Administration Manual, Sections IV and V, April 1994, revised June 1999

4.0 RESPONSIBILITIES

The Branch and Section chiefs are responsible for providing adequate resources to PDTs, whether through staff assignments or by way of contracted services. Section chiefs shall consider the overall project schedule and availability of in-house resources to determine when contracting for AE or Professional Services is required to substitute for or assist in-house resources.

During project scoping the TL is responsible for coordinating the overall resource needs of the project with Section chiefs and members of the PDT to determine the availability of in-house resources versus utilization of AE or Professional Services. All resources, in-house, or AE, shall be considered during project scheduling, and acquisition of AE or Professional Service must be reflected in the Acquisition Plan for the PMP.

When utilizing AE or Professional Services the TL is responsible for coordinating with the AE Coordinators in (EC-TB) ensuring funds are in-place for the contract and in-house labor, and completing other requirements as noted in the flowcharts for the various types of contracts.

The A/E Coordinators provide management of the procurement of most A/E, professional service, and GSA contracts for EC.

5.0 KEYWORDS (see GLOSSARY for definitions.)

Architect/Engineer Responsibility Management Program (AERMP)
Architect/Engineer Responsibility Coordinator (AERC)
Architect/Engineer Responsibility Review Board (AERRB)
Architect/Engineer (A/E) Services
Contractor Performance Assessment Reporting System (CPARS)
Design-Build
Indefinite Delivery Contract (IDC)
Indefinite Quantity Contract (IDIQ)
Lump Sum Contract
Professional Services
Purchase Order (PO)
Request for Proposal (RFP)
Requirements Contract
SF254/255 Forms
Synopsis
Task Order (TO)

6.0 PROCEDURE

6.1 Decide to Purchase Services.

Once a decision has been made to purchase services, the decision tree (Attachment #1) is used to identify options to help determine the method of purchase. All dollar estimates represent contract costs. A brief discussion of the various contract types follows.

6.1.1 Determine If Work is A/E Services.

A/E Services are performed under the direction of an architect or engineer and are subject to the Brooks Act. Price is not a consideration. Services performed by a professional (i.e., scientist or economist), excluding architects and engineers, are not subject to the Brooks Act. Selection is based on best value to the Government considering price, technical qualifications, and other factors.

6.1.2 Determine if Visa Process Can Be Used.

If the estimated cost for the work is less than $3,000, a VISA card may be used.

6.1.3 Determine if the Services Can be Performed by Purchase Order.

If the estimated cost for the required services is less than $100,000 then a purchase order may be used.

a. If only one firm is capable of performing the services, implement the SOLE SOURCE PURCHASE ORDER process.

b. If the work is A/E, implement the A/E PURCHASE ORDER process.

c. If the work is not A/E and the lowest price is the only selection criteria, implement the LOWEST PRICE PURCHASE ORDER process.

d. If the work is not A/E and price is NOT the only selection criteria, implement the SOURCE SELECTION PURCHASE ORDER process.

6.1.4 Determine if Services Can be Performed Under an Existing Indefinite Delivery Indefinite Quantity (IDIQ) Contract.

a. If the work is A/E and can be performed under an existing IDIQ, implement the A/E TASK ORDER process.

b. If the work is professional services and can be performed under an existing IDIQ, implement the PROFESSIONAL SERVICES TASK ORDER PROCESS.

c. If the work is professional services and can be performed under an existing GSA contract, implement the GSA TASK ORDER process.

6.1.5 Determine if a Lump Sum Contract is Required.

a. If only one firm is capable of performing the services, implement the SOLE SOURCE CONTRACT process.

b. If the work is A/E services, implement the A/E CONTRACT process.

c. If the work is professional services, and price is the only factor, implement the LOWEST PRICE CONTRACT process.

d. If the work is professional services, and price is not the only factor, implement the SOURCE SELECTION CONTRACT process.

6.2 Procedure for Purchasing Services

There are a large number of potential processes for obtaining A/E, professional and GSA contract services. Technical staff should work with the A/E Coordinator in EC-TB to determine the best method for meeting the needs of the project. All processes contain the following general steps:

6.2.1 Prepare Statement of Work (SOW)

For most contracts, task orders, and purchase orders, the TL prepares a draft SOW. The A/E Coordinator can provide samples. The A/E Coordinator reviews and finalizes the SOW, and prepares the Request for Proposal package. Requirements for product reviews, including independent technical review, by the A/E shall be included in the SOW for contracts, task orders, and purchase orders.

6.2.2 Prepare Independent Government Estimate (IGE)

For IDCs, the A/E Coordinator prepares the IGE. For lump sum contracts, purchase orders and task orders, the TL and/or other knowledgeable team members prepare the IGE with input from the A/E Coordinator. A/E Coordinator reviews the final IGE. Per regulatory guidance, Government estimates are required for all actions expected to exceed $100,000, and shall identify the preparer, reviewer, and approver. The IGE shall be approved by the Section and/or Branch Chief. Informal or working estimates are recommended for actions less than $100,000. The A/E Coordinator can provide samples and rates.

6.2.3 Select Contractor

Contractor selection is based either upon price proposal, qualifications, technical proposal, or a combination of these criteria. This may involve negotiation and various associated processes, or it may involve only analysis and acceptance of a proposed price. Contracting Division, the TL, A/E Coordinator, Selection Board members and Contractor(s) may be involved in this phase.

6.2.4 Award Contract/Purchase Order/Task Order

Once a firm is selected and price is accepted or negotiated, Contracting Division awards a contract, purchase order, or task order.

6.2.5 Perform Services

The Contractor performs the services and the TL oversees performance to ensure compliance with the SOW. Modifications may be required. Payments and accruals are processed in coordination with the A/E Coordinator, TL, Budget Analysts from EC-TB, and the Contracting Officer's Representative (COR).

6.2.6 Prepare Performance Evaluation

Performance evaluations are required by regulatory guidance for all contract actions greater than $25,000. If a performance evaluation is required, the A/E Coordinator initiates the evaluation, and oversees its processing. The TL completes the evaluation form, the COR reviews it, and the Chief, EC approves it. Special actions are required if the rating is lower than average. The Contractor Performance Assessment Reporting System (CPARS) is used to accomplish this task.

6.3 A/E Liability Identification and Resolution

6.3.1 Identifying A/E Liability

a. When contracting for A/E services, the Government is entitled to results that meet the standards expected of the profession. When drawings, specifications, or other A/E services contain deficiencies caused by negligence, the A/E is held liable for the appropriate changes. Normally, a deficiency will be detected during the review of the study, professional services work, or the design. However, a deficiency in design may be found after construction has commenced.

b. When A/E liability is suspected, the TL in consultation with the COR shall make the preliminary investigation and coordinate with the AERC. The AERC shall coordinate with the TL, the COR, A/E Coordinator and the A/E contractor. A plan shall be developed to obtain a correction that minimizes costs and delays. The TL may be required to provide factual data, field sketches, change specifics, Government estimates, photos, and any other applicable information to allow the AERC to understand the events, physical changes, and delay damages incurred as a result of the deficiency. Backup documentation shall be maintained until the case is resolved.

6.3.2. Resolving A/E Deficiencies

a. When a deficiency is found, the A/E shall be given the opportunity to correct the deficiency. For the deficiencies found during product review, the A/E firm will normally only be liable for correction of the deficiencies at no cost to the Government. If a deficiency is found after construction has commenced, the A/E may be financially liable for repair or replacement costs, damages for delay, acceleration and impact costs, and added supervision and inspection costs in addition to required redesign and engineering costs.

b. The AERC and AECC shall review for potential action against the A/E. If a potential liability is found, the case shall be sent by the AERC to the AERRB comprised of the Chief, EC, Chief OP, and Office of Counsel. The AERRB shall determine if all conditions for pursing A/E liability are satisfied, if so, will make a recommendation whether the A/E liability should be pursued.

6.3.3 Reporting A/E Liability Status

During construction, EC-CS shall provide input to the quarterly reports on A/E liability status on ENG Form 4858 and forward to the AERC. The AERC will then complete the forms and transmit to Northwestern Division.

7.0 RECORDS

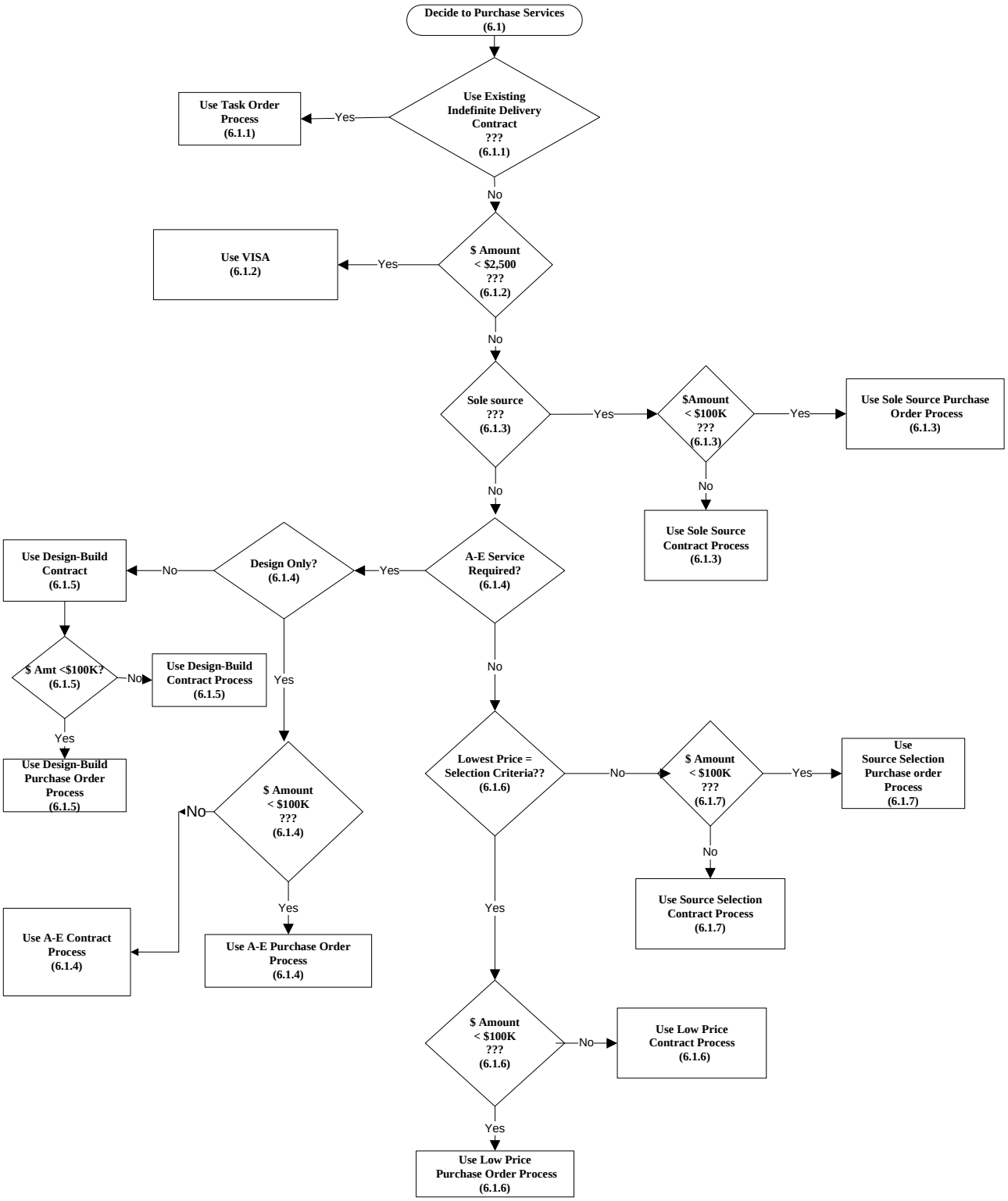
The official contract files for all purchases reside in Contracting Division.

The TL shall maintain project files of coordination, review, and product development.

8.0 ATTACHMENTS

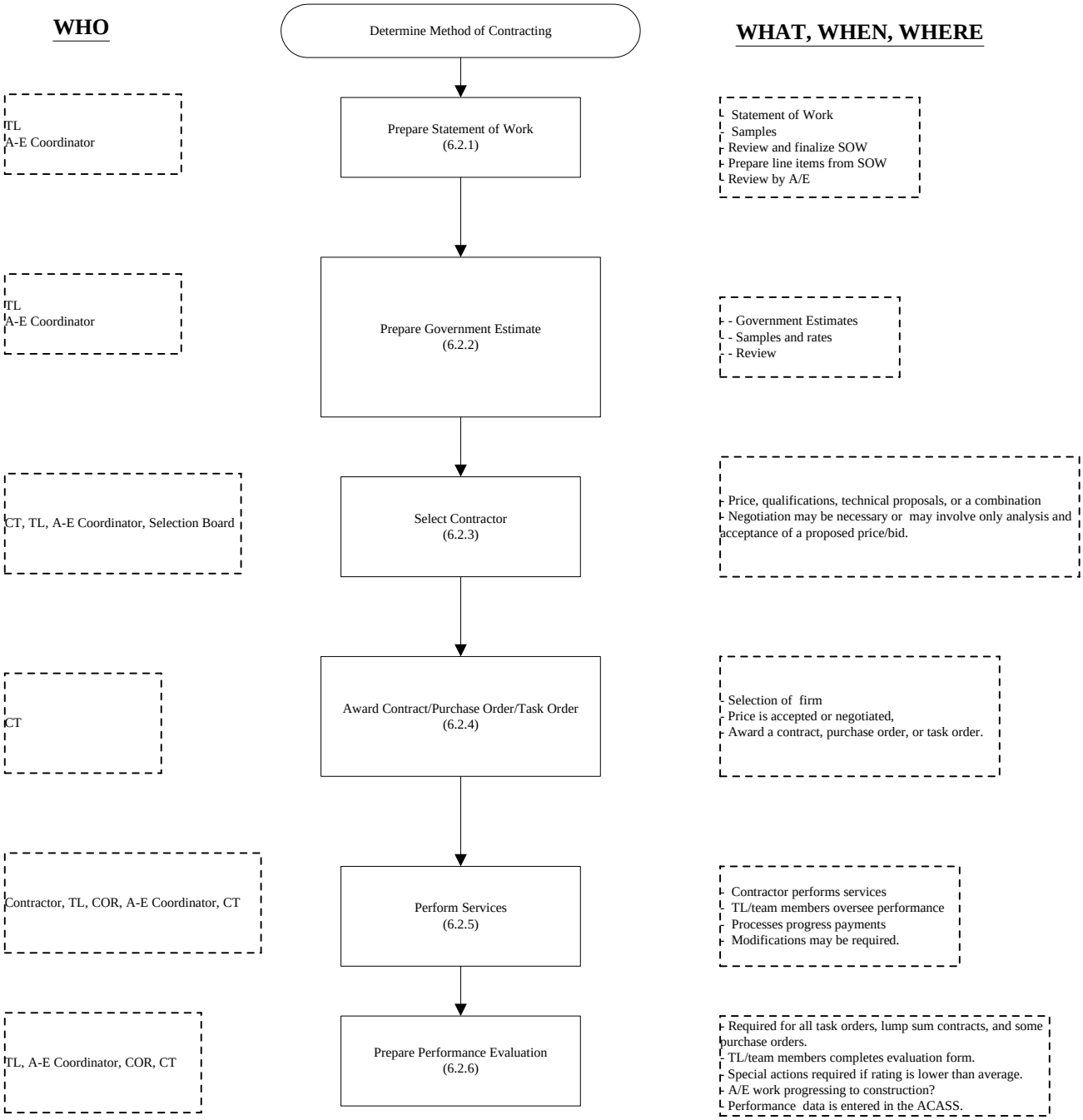
1. Method of Purchasing, Decision Tree
2. Purchasing Services Flowchart
3. A/E Liability Identification and Resolution Flowchart

METHOD OF PURCHASING DECISION TREE
(See the Contract Coordination Unit for guidance on specific processes)



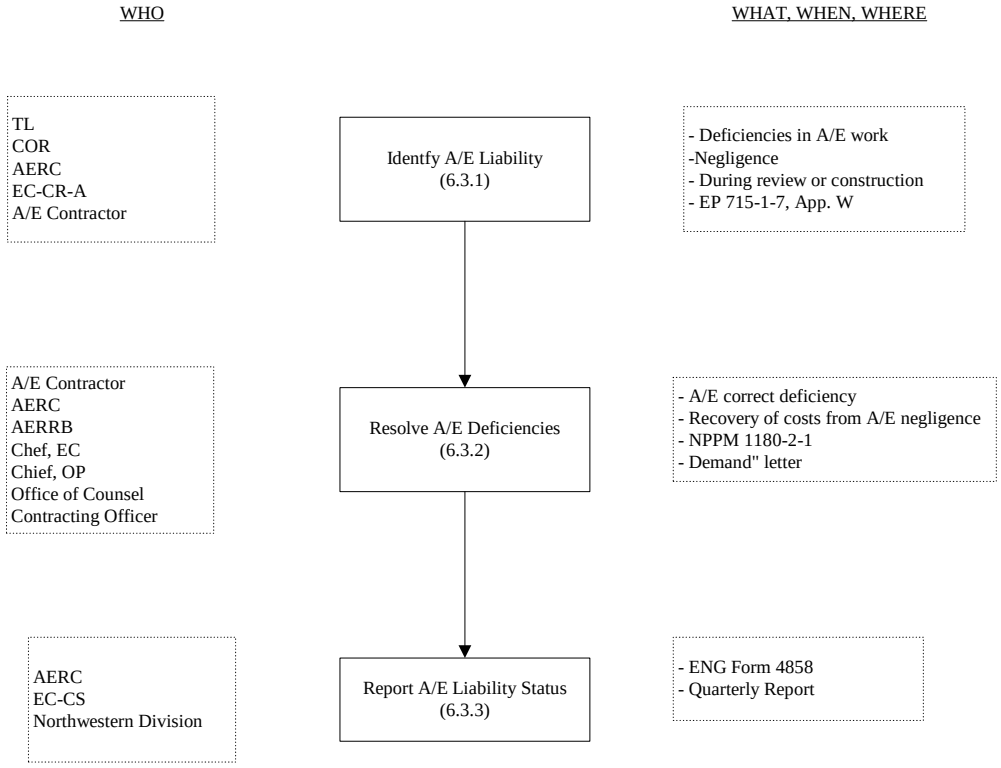
ATTACHMENT #1

PURCHASING SERVICES FLOWCHART



ATTACHMENT #2

A/E LIABILITY IDENTIFICATION AND RESOLUTION FLOWCHART



ATTACHMENT #3

PROCEDURE FOR INTERNAL AUDITS

Proponent Office: Technical Resources Branch

Authorized By: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Donald R. Chambers, P.E.
Acting Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1
01 Feb 08	I1-R1	Correction of name of Proponent Office and pages 4 of 7 thru 7 of 7

1.0 PURPOSE

This procedure defines responsibilities for controlling and implementing policy for Internal Audits.

2.0 SCOPE

This procedure applies to all elements of the documented QMS.

3.0 REFERENCES

ISO A8402-1994	(Quality Management and Quality Assurance – Vocabulary)
ISO 10011-1	(Guidelines for Auditing Quality Systems – Auditing)
Road to Engineering Excellence, ISO9000 Blueprint to Success	(Logistics Management Institute, April 1995)

4.0 RESPONSIBILITIES

The EC Chief is responsible for assuring effective and prompt responses from all staff to any non-conformance, corrective actions identified during audits are completed, and conformance to established quality procedures and processes.

The Management Representative is responsible for ensuring that this procedure is followed by all Internal Audit staff; promptly reporting audit findings to the manager of the area audited; and ensuring that any corrective actions are pursued and closed out as quickly as possible. The Management Representative prepares audit summary reports for the Management Review meeting at appropriate intervals. Also, the Management Representative ensures that Internal Auditors appointed to conduct audits are independent of the activities being audited, are properly trained in accordance with the requirements of this procedure, and that no other potential conflicts of interest exist.

Branch and Section Chiefs provide all resources necessary for auditors to conduct an efficient and effective audit. These Chiefs also inform employees about the timing, objectives, and scope of the audit; review audit summary reports at regular intervals; cooperate in scheduling and attending internal audits; respond promptly to audit findings; and take steps to resolve any corrective actions reported in an effective and prompt fashion.

All other EC Personnel are required to cooperate fully in the Internal Audit process and enable it to drive continuous improvement of the management system.

The Lead Auditor (Audit Team Leader) is responsible for accomplishing audits in accordance with schedules, coordinating findings with the Management Representative and the Branch/Section Chiefs of the area audited, and preparing the audit report.

The Internal Auditors are to record audit findings in the required format, coordinate findings with Lead Auditor for consolidation in audit report, and perform re-audits resulting from Corrective Actions.

All personnel conducting Internal Audits shall undergo a minimum of two days formal audit training from an approved training provider and sufficient on-the-job training with the Management Representative to meet minimal proficiency requirements. Approved training is either an International Register of Certificated Auditors (IRCA) or RABQSA International (RABSQSA) registered Internal Auditor training course, or ANSI-ASQ National Accreditation Board (ANAB) or RABSQA approved Lead Auditor training course. Successful completion of approved Internal Auditor training is followed by a minimum of two audits accompanied by a trained auditor. This requirement may be waived when the training undertaken has been the Lead Auditor training program.

5.0 KEYWORDS (See Glossary for definitions)

ANSI-ASQ National Accreditation Board (ANAB)
Corrective Action
Internal Audit
International Register of Certificated Auditors (IRCA)
RABQSA International, Inc. (RABQSA)
QMS Tool Kit
Quality Management System

6.0 PROCEDURE

6.1 Schedule Audit

Internal audits are conducted every 6 to 12 months. Audits will be scheduled such that all elements of and all offices involved in this QMS as determined by the QMS Branch chiefs, and approved by the Chief, EC are audited every 18 months. Audits can be scheduled and performed at anytime based on areas needing improvement identified by employees, customer input, nonconforming products, and other specific circumstances.

The Management Representative and Branch and Section Chiefs shall develop, coordinate, and distribute an Internal Audit schedule every 18 months for all involved staff. The development of the internal audit schedule takes into account previous audit results and the impact of the area audited on the quality of a final product. The schedule typically contains the Branch and Section (or unit) to be audited and the time period in which the audit is to take place.

The Internal Auditors shall be notified of their audit tasks in sufficient time prior to the scheduled date of the audit. The information provided to them shall include the name of the Branch/Section Chief of the area to be audited, scope of the audit, details of the activities and/or procedures to be reviewed, any outstanding audit issues awaiting resolution, and the summary report from the most previous audit when appropriate.

The Lead Auditor shall prepare an audit plan that outlines the approach for conducting the audit. The Lead Auditor shall contact the other team members to allocate tasks and provide them with the relevant information they require to perform the audit in accordance with the audit plan and methods described during the training process.

The Lead Auditor shall contact the Branch Chief of the area to be audited and make appropriate arrangements for the timing of the audit including any required opening and closing meetings. Prior to any scheduled audit, the Branch and Section Chiefs are sent a reminder by the Lead

Auditor. Any conflicts with the time/date of the scheduled audit are resolved. If necessary, the audit is rescheduled.

6.2 Audit Preparation

Auditors shall review available data and information, develop and organize appropriate questions from the information reviewed for the intended area/function to be audited, and determine note taking methods to be used during the audit. All available sources of data and information are used to plan and conduct the audit. This may include (but not be limited to):

a. Policy and Procedure Manual
b. Organization Charts
c. Functional Statements
d. ISO 9001 standard
e. Previous Audit Records
f. Training Records
g. Corrective Action Reports
h. Checklist(s) per "Road to Engineering Excellence"

6.3 Audit Process

6.3.1 Conduct Audit Interview. Each audit shall start with an entrance meeting with the Branch and/or Section Chiefs of the area being audited. Auditors shall document the content and result of the entrance meeting in the audit report. The Branch and/or Section Chief(s) may accompany the auditor or appoint someone to act as guide in order to observe during the audit process. Auditors shall conduct audit interviews at the auditee's workstation, and shall limit interview time to approximately 1 hour whenever possible.

6.3.2 Record Audit Findings. Audit findings shall be recorded on the appropriate audit report forms and any checklists specifically prepared. Identify any positive audit findings as well as non-conformances. Any non-conformances discovered shall be noted and brought to the immediate attention of the auditee by referencing guidance (i.e. policy/procedure) and the ISO 9001 standard not being followed. Upon completion of the interview, the auditor(s) shall conduct an exit interview with the Branch and/or Section Chiefs. Content of this meeting shall be included in the audit report. All audit findings shall be reviewed and discussed, giving particular attention to properly operating processes, opportunities for improvement, and nonconformance's. Once nonconformance validity is established, the Branch or Section Chief shall initiate corrective action.

6.3.3 Initiate Corrective Action. The Branch or Section Chief shall develop and document a corrective action plan on the appropriate portion of the audit report. The plan shall include the nonconformance to be corrected/eliminated, the intended action to correct/eliminate the nonconformance, and a completion date for the intended action. The Branch or Section Chief shall develop the corrective action plan within 30 working days of the audit and notify the auditor(s) that the corrective action plan is ready for review.

6.3.4 Review Corrective Action. The auditor(s) and Branch or Section Chief shall review the intended corrective action plan for reasonableness and timely execution. Most corrective action plans will typically be completed within 30 working days. However, due to the nature of specific issues and/or non-conformances the time frame of a specific corrective action plan may

be extended as recommended by the Branch Chief. Upon mutual agreement of the corrective action plan and its completion time frame, the original agreed upon version of the plan shall be provided to the Management Representative within 2 working days. In the event of disagreement between the auditor(s) and the Branch Chief, the dispute shall be elevated to the Management Representative. Resolution of such disagreements/disputes shall be documented in the audit report.

6.3.5 Corrective Action Plan Verification. The auditor(s) shall verify corrective action plans by conducting a follow-up audit of the area in which the original nonconformance was found with the Branch and Section Chiefs. Corrective action plan verification follow-up shall take place within 14 working days of the scheduled corrective action plan completion. The auditor(s) shall verify that each nonconformance has been corrected/eliminated. The auditor(s) shall document evidence of conformance found during the course of the follow-up, sign and date the appropriate report form. If corrective action is not completed satisfactorily, the auditor and Branch Chief shall discuss what further effort is required, document the reason(s) for additional corrective action effort, set a new target date for completion, and re-file the audit report. Disagreements concerning follow-up audit findings shall be discussed with the Management Representative and elevated to the Chief, EC for resolution, if necessary.

6.4 Audit Report

The audit report format is divided into four basic areas:

- Part 1 contains interview notes and findings;
- Part 2 contains the opportunities for improvement and/or nonconformances;
- Part 2a contains a correction action plan (if necessary);
- Part 3 contains the findings of the follow-up audit (verification).

The auditor(s) shall furnish all original versions of the audit report to the Management Representative or designee as portions of the audit process is completed within the time periods stipulated. Auditor(s) shall provide the Management Representative or designee the completed audit interview notes, parts 1 and 2, within 2 working days of conducting the audit interview. Audit findings indicating opportunities for improvement and/or nonconformances shall be provided in the appropriate portion of the audit report with reference to the policy/procedure in variance. If any portion of the audit report cannot be produced within the specified time, the auditor(s) shall notify the Management Representative or designee with a written explanation for the delay and furnish a revised date for report completion.

6.5 Audit Process Review

The Management Representative monitors overall audit progress and status of Corrective Action Plans scheduled for completion. The Management Representative or designee shall review completed corrective action plans and verification reports for completeness and conformance to this procedure. In the event attempts to execute this procedure result in repeated variances of the procedure, the Management Representative shall review and discuss circumstances surrounding the variances and any potential changes to the procedure with internal audit personnel.

6.6 Tracking Audit Progress

The Management Representative or designee shall monitor Internal Audit progress throughout the audit cycle. A Summary Report tracking progress shall be prepared by the Management

Representative and shall identify as a minimum: audits performed versus those scheduled, conformances noted, nonconformances identified, and corrective actions prepared/completed.

6.7 Close Audit File

Once all corrective actions have been verified and appropriately documented, the Management Representative shall close the current internal audit report with entry into the records file. The Management Representative shall prepare a summary report of current audit cycle findings and submit the summary report for Management Review.

7.0 RECORDS/OBJECTIVE EVIDENCE

The effective implementation of this procedure produces the following records:

a. An audit schedule and statement of scope for each audit cycle.
b. Audit findings.
c. Corrective action plans, audit follow-up and audit close-out records.
d. Summary audit reports and minutes of management review meetings.
e. Training records for individual auditors.

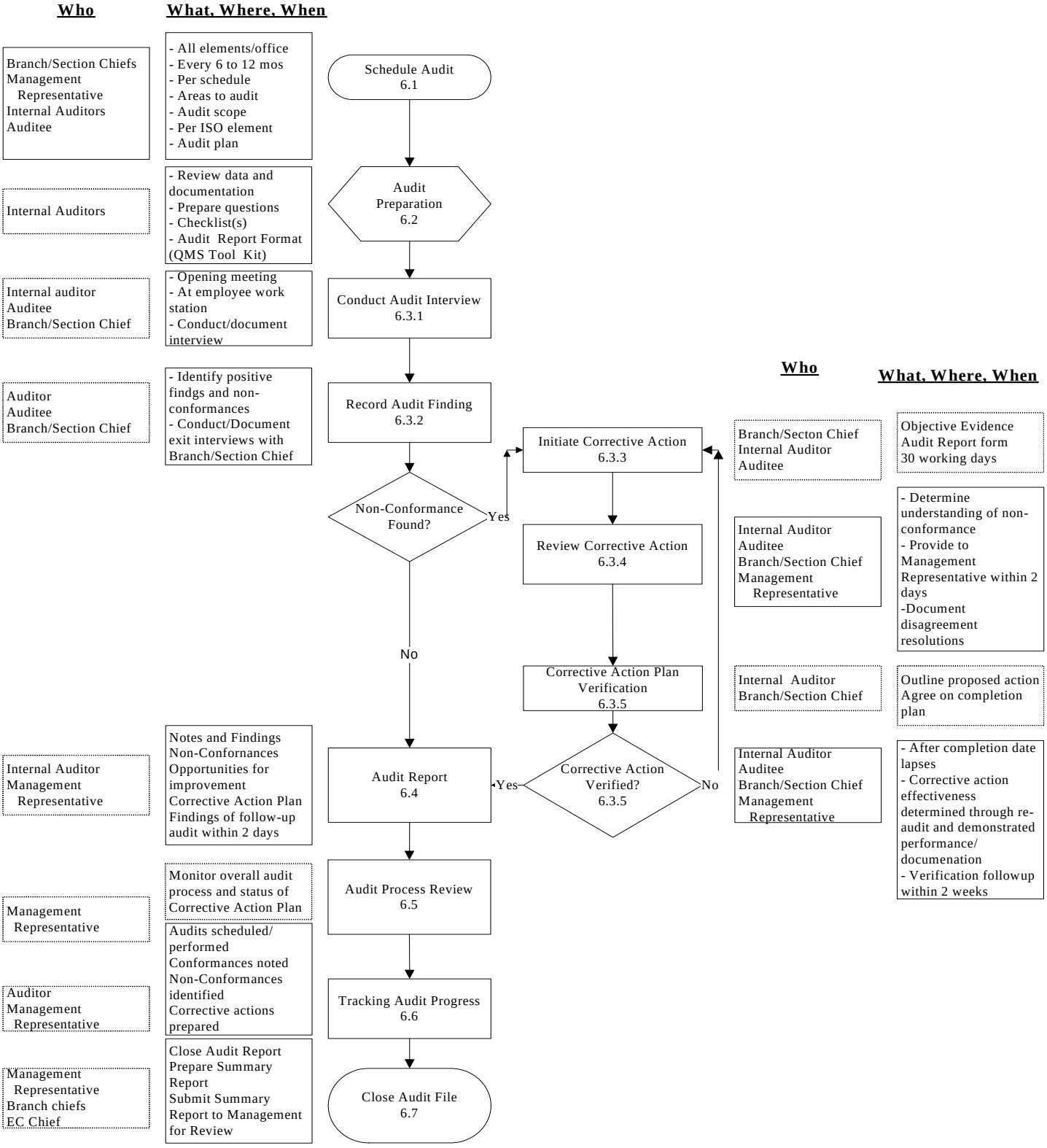
The Management Representative is responsible for maintaining records in an accessible and readily retrievable fashion. Items a, b, and c above are, as a minimum, retained until the next audit of the same area has been conducted and closed. Item d is maintained for a minimum of three years to enable long term reviews of the effectiveness of corrective action to be performed when appropriate. Item e shall be maintained by the Management Representative for four years.

8.0 ATTACHMENTS

1. Flow Chart

Procedure for Internal Audits Engineering and Construction Division Portland District	Procedure No.: **008** Issue/Revision No.: **I1-R0** Issue/Revision Date: **25 Oct06**

INTERNAL AUDIT FLOWCHART



ATTACHMENT #1

PROCEDURE FOR CONTROL OF QUALITY RECORDS

Proponent Office: Technical Resources Branch

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the procedure for managing records associated with this QMS.

2.0 SCOPE

This procedure covers all records generated in support of our QMS which includes, but is not limited to specifications, designs (in-house designs and A/E design), preparation of as-built drawings, reconnaissance studies, feasibility studies, design reports, CADD/GIS data base, and survey records such as quad sheets, horizontal and vertical control, maps, and aerial photography.

3.0 REFERENCES

AR 25-400-2	Army Records Information Management System (ARIMS)
ER 1110-1-8156	Geospatial Data and Systems
ER 1110-345-700	Design Analysis, Drawings, and Specifications
EM 1110-1-1000	Photogrammetric Mapping
EM 1110-1-1002	Survey Markers and Monumentation
EM 1110-1-1003	NAVSTAR Global Positioning System Surveying
EM 1110-1-1004	Geodetic and Control Surveying
EM 1110-1-1005	Topographic Surveying
EM 1110-1-2909	Geospatial Data and Systems
NPPR/NPDOM 25-1-3	Records Management
NPPR 1110-2-7	Project Drawings
NWPM 1180-2-1	Construction Contract Administration Manual

4.0 RESPONSIBILITIES

4.1 Organizations and Individuals

Branch and Section Chiefs are responsible for assuring all employees are familiar with and are maintaining records in accordance with this procedure, and are reviewing the records requirements of this and all procedures to ensure appropriate records are being kept. When recommendations of additional record requirements are made, Branch and Section Chiefs shall review the recommendation and define the guidelines for creation, maintaining and storage of records.

The TL is responsible for creating paper document working files in accordance with regulatory requirements and for assuring correct and proper information is included in the hard copy files until completion. The TL will also clearly identify all reports, data, and other information required by a particular procedure. They will also ensure that electronic records are stored on the ETDS system in the assigned project location. The TL will also create hard copy project folders as defined in regulatory requirements and determine when folders are released to the Central Map Files office for archiving.

The A/E unit (EC-TB) is responsible for the acquisition and administration of consultant services. The A/E Unit maintains active contract/working files in the A/E Unit.

The Portland Resident Office is Responsible for maintaining construction contract files after award of a contract.

Central Map Files (EC-TG) is responsible for storage and security of all records forwarded; records control; controlling information access to and from the records holding area; maintaining and storing all project files upon receipt of information from the TL; archiving paper copies of as-built drawings; and preparing of SF 135 (Records Transmittal and Receipt) for Civil Works projects.

Central Map Files also maintains a current file plan that will be used as basis for an annual review of files to determine whether retirement through Records Management is appropriate.

Central Map Files is responsible for archiving hard copy documents; maintaining a Central Map Files area; and forwarding completed project documents to Information Management for disposition in accordance with regulatory requirements.

All EC secretaries are responsible for assisting in the preparation of all records, maintaining a list of records (current file plan) retained within their purview and for assuring compliance with regulatory requirements.

GIS, CADD, and Mapping (EC-TG) staff are responsible for geo-referenced data generation and updating, imagery indexing and geospatial analysis and database construction.

The CADD/ETDS Manager is responsible for maintaining the ETDS system, creating, maintaining, backing-up, transferring, archiving and securing electronic files. The CADD/ETDS Manager (EC-TG) is also responsible for coordination of efforts for storing electronic files in the ETDS, establishing a project folder within the ETDS system for maintaining product drawings, data, and documentation providing proper backup of files in a secure holding area and notifying staff when a project should be archived or secured. The CADD/ETDS Manager with the assistance of the TL, is responsible for maintaining the original drawings until those drawings are transferred to Central Map Files.

For CADD designs, the TL shall notify the CADD/ETDS Manager when a project is complete and files are to be archived or secured. When as-builts are prepared by a construction contractor, the TL shall be responsible for reviewing the submitted red-line and as-built documents from the contractor, and for providing draft red-line and draft as-builts to the CADD/ETDS Manager for review, scanning and archiving.

The CADD/ETDS Manager receives completed red-line and as-built drawings and designated contract submittals from a construction contractor via the Resident Office, as appropriate, and provides drawings to the TL and Central Map Files for distribution and archiving.

Team members are responsible for maintaining their own records in accordance with regulatory requirements and providing all pertinent documents for inclusion into the project folders.

4.2 Files and Documents

The CADD/ETDS Manager shall maintain CADD files and all other product data and documentation using a data base of all project drawings, data, and documentation stored within the ETDS system and maintaining backup files. Currently the ETDS is backed up automatically twice-daily on the ETDS servers and data is transferred off-site regularly GIS data sets are maintained on the ETDS server and controlled by the CADD/ETDS Manager in conjunction with a GIS Specialist in EC-TG. GIS sub-data sets may be maintained and controlled by other EC offices when warranted, but ultimate GIS data set storage and archives reside in the ETDS.

GIS data sets are maintained on the ETDS server and controlled by the ETDS Manager in conjunction with GIS Specialists in EC-TG. GIS sub-data sets may be maintained and controlled by other EC offices when warranted, but ultimate GIS data set storage and archives reside in the ETDS.

Central Map Files maintains copies of U.S. Geological Survey Quad Sheets on file. A listing of all sheets is maintained. Historic quad sheets are maintained on microfilm, or hard copies kept of major projects at time of construction. Horizontal and vertical controls are maintained in a log book which could be hard copy or electronic. A control sheet of data is created from the log book. Copies are maintained by project location in EC-TG. Updates are made upon request.

Historic maps have been archived; however, microfiche is available for review and printing in Central Map Files. A log is maintained.

Aerial photography film and photos are maintained in Central Map Files and a log is kept by project name. At the discretion of EC-H Branch or Section Chief, new film and photographs are provided to Central Map Files to be used as reference data by Corps employees, other government agencies and the general public.

Metadata documents are electronically created for all geospatial data files in accordance with regulatory guidance by the file originators and maintained by the CADD/ETDS Manager in conjunction with the originating office.

Other product development-related documentation and data (.e.g. design notebooks, calculations, survey field books, studies, etc.) is maintained by the office responsible for the work.

5.0 KEYWORDS (See GLOSSARY for Definitions)

Aerial Photography
Architect/Engineer (A/E) Unit
As-Built Drawings
As-Constructed Drawings
Central Map Files
Close-out Checklist
Current File Plan
Geographic Information System (GIS)
Geospatial data
Horizontal and Vertical Control
Mapping
Metadata
Army Record Information Management System (ARIMS)
Project Files
Quad Sheets
Records
Engineering Technical Data Services (ETDS)
Records Coordinator
Records Management
Working Files

6.0 PROCEDURE

6.1 Create Records

The creation of records occurs any time an action is undertaken by an employee in performing work in accordance with our QMS. As records are created, a file folder is prepared in accordance with ARIMS where information can be identified and accessed whenever needed. Each branch shal maintain a list (current file plan) of current records under their purview, identify and maintain an area for storage of records, and ensure all records are correctly labeled, current and controlled.

6.2 Maintain Records

Control of records shall be consistent with ARIMS requirements. For reference and tracking purposes, a charge-out record shall be substituted for documents removed from a file. Typical charge-out actions are recorded on optional forms 23 or 24.

During the course of product development, the product file is maintained by the TL. The TL assures the product file is complete and orderly. Electronic storage (archiving) of permanent records has not yet been approved; therefore, when procedures call for forwarding records to Central Map Files for storage, the TL and Branch/Section secretary review the files and provide the completed hard copy file to Central Map Files. Until retirement through Information Management, Central Map Files shall record the storage location of product files and track the checking out of product files.

Electronic files shall be managed by the CADD/ETDS Manager in accordance with current regulatory guidance. When the as-built process on a product is complete, an electronic copy of the directory with the as-built modifications shall be forwarded to the Project/Customer.

For as-builts prepared by a construction contractor, the Resident Office and TL shall be responsible for reviewing the submitted red-line and as-built documents. The TL shall include the CADD/ETDS Manager in all red-line and as-built reviews. When the as-builts are approved the Resident Office shall provide the completed as-builts and red-lines to the CADD/ETDS Manager for scanning and archiving. The CADD/ETDS Manager shall forward copies of the documents to the TL and Central Map Files for distribution and archival.

If as-built drawings are to be prepared by an A/E firm, the CADD/ETDS Manager will receive all originals (red-line and final). The CADD/ETDS Manager shall make electronic copies of the drawings available prior to forwarding the drawings to the TL for review. Upon receipt of the completed as-built drawings from the A/E, the CADD/ETDS Manager shall forward copies of the documents to the TL and Central Map Files for distribution and archival.

6.3 Archive Records

6.3.1 General

When records are retired, the responsible branch shall submit a completed SF 135 (Records Transmittal and Receipt) through the EC Records Manager to Information Management for approval by the National Archives and Records Administration. Each Branch shall also maintain a copy of the SF 135 showing storage location and retrieval information for each product file. Hard: copy as-built drawings are provided to the user for long term storage. The final disposition varies based on the type of project and the actual end user. Central Map Files shall maintain the SF 135s, showing storage location and retrieval information for all retired records and a project/map Index. For construction contract records, the Resident Office shall complete the SF 135 and submit through the EC Records Manager to Information Management.

6.3.2 Archiving ETDS Files

Upon completion of the Close-out Checklist (in the EC Toolkit), Central Map Files and the CADD/ETDS Manager shall archive the ETDS files at the following times.

(a) At the appropriate plans and specifications development milestones identified in the PMP.

(b) At the time an amendment is issued.

(c) When design and construction contract is 100% complete. This may also occur if the actual contract documents are fully prepared and construction contract award is not scheduled for a reasonable time prior to beginning as-built drawing revisions.

(d) At completion of all as-built drawings.

(e) At the completion of design reports.

The TL and Central Map Files shall notify the CADD/ETDS Manager to ensure this archiving has been appropriately arranged and completed. An archive copy of product designs/drawings in electronic media is maintained by the CADD/ETDS Manager in accordance with regulatory requirements. Archive copies are to be kept indefinitely, with one copy maintained in a secure off site location.

6.4 Delivery to Customer, Product/Project Closeout

The project/project will be closed out in accordance with the Project Closeout Guide in the EC Toolkit. Paragraph 7.1 in that guidance provides a checklist of required closeout actions.

7.0 RECORDS

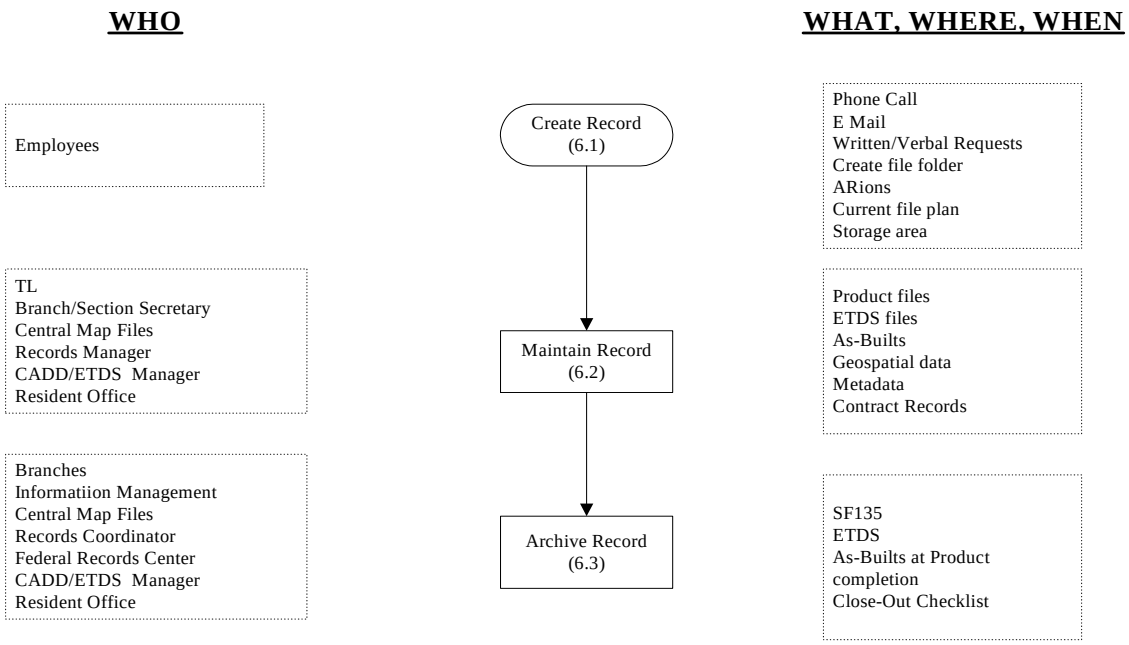
Information Management reviews and approves each office's "File Plan" and "Project Archiving Documents" list of official records. File copies that are created by each office and approved by Information Management will be considered the official list of records. QMS documents/records that demonstrate the effective operation of our Quality Management System shall be maintained in accordance with Records Management requirements. Disposition of documents at project/product completion shall be in accordance with the Project Closeout Procedure in the EC Toolkit. The following is an example of records:

- Administrative Files
- Budget Files
- Product review, comments, and certification
- Contract Files
- Maps
- Meeting notes/minutes
- Personnel Files
- Photographs
- Project Files
- Study Files
- QMS Files
- Design Notebooks and Calculations

8.0 ATTACHMENTS

1. Control of Quality Records flowchart

CONTROL OF QUALITY RECORDS



ATTACHMENT #1

PROCEDURE FOR CORRECTIVE ACTION

Proponent Office: Hydraulics and Hydrology Branch

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the general steps, requirements, roles and responsibilities for applying corrective action for assuring the integrity of QMS processes and products.

2.0 SCOPE

This procedure applies to all processes implemented and products developed within the QMS, and shall be followed whether work is performed in-house or by consultant/contract services.

3.0 REFERENCES

EP 715-1-7	Architect Engineer Contracting
ER 1110-1-12	Quality Management
ER 1180-1-6	Construction Quality Management

4.0 RESPONSIBILITIES

EC Chief is responsible for overall management of corrective action procedures related to engineering and construction products.

QMS Branch Chiefs are responsible for investigating, discussing, reviewing and acting on nonconformance(s), existing or potential, that impact on product development and processes as well as the QMS.

Branch, Section Chiefs, and Resident Engineer assure that all personnel involved in the development, checking, and/or review process for engineering and construction products and services adhere to the requirements of this procedure.

Personnel involved in QMS activities recognize the need for corrective action(s) and see that these are incorporated into the QMS.

5.0 KEYWORDS (see Glossary for definitions)

Construction Deficiency Tracking Record
Corrective Action
Nonconforming Product
Quality Assurance
QMS Branch Chiefs

6.0 PROCEDURES

6.1 Corrective Actions

The need for corrective action occurs whenever a deviation from product scope or a QMS process is detected. Corrective action requires eliminating the root cause(s) that negatively impact product realization or the QMS in order to prevent the recurrence of an existing nonconformity. Implementing corrective action is graphically shown as the Corrective Action Flowchart (Attachment #1).

6.2 Corrective Action Recognition and Disclosure

Deviation(s) from product work scope or QMS process may be detected and corrective action initiated through a number of different methods including:

a. Internal audits. Internal audits are used to surface nonconformance(s) for a product, a process/procedure, or a system such as the QMS. For nonconformances detected during an internal audit, subsequent corrective action requires a root cause analysis to eliminate the problem. The results are verified by follow-up audit to ensure that corrective action has taken place and is effective. See also the procedure for Internal Audit.

b. Construction site visits. Technical and construction QA staffs confer on developments during construction that result in changes to work-in-progress. The elimination of a construction problem or design error is resolved by redesign and ultimate construction via a contract change order (contract modification). Construction contractors may disclose nonconformances as well. The benefit of these actions result in a product not containing deficiencies, but meeting customer requirements.

c. Customer feedback. Internal customer feedback is typically obtained through surveys conducted at the completion of a product. External customer feedback typically is provided by the PM throughout product development in conjunction with project execution.

d. Solicitation amendments. An amendment is used to correct a contract solicitation deficiency that could otherwise result in a costly contract modification (post-award). Amendments are provided to planholders in the contract pre-award phase to clarify administrative and technical issues found in the solicitation. In this regard, the amendment is a corrective action to the plans and specifications following the formal design process, but also is a preventive action for the administration of the awarded contract during the construction management process.

e. Design checks. Required milestone reviews, as defined by PMP or other guidance, often disclose nonconformances during product development prior to delivery to the customer. Sources for deficiency are corrected/eliminated to prevent recurrence.

f. VE studies. Value engineering studies often surface other methods of construction and/or materials used in construction differing from original design that result in equivalent quality of end product coupled with cost and/or time savings and sometimes product lifecycle benefits. This methodology serves to provide another way to provide an end product without necessarily having a nonconformance present.

g. Scope and In-Progress Reviews. These reviews are used for all kinds of products in both the design and construction phases of product development. As nonconformances are discovered, immediate action is taken to find the root cause, eliminate the problem, and redirect efforts in product completion. This eliminates providing the customer with a deficient product and often provides a means for customer involvement in the product development process.

h. Quality Improvement Process (QIP). Nonconformances in the QMS and other business processes may be handled by a formalized QIP action entailing a documented request to change some aspect of a work process that hinders a worker from meeting required results. If necessary, a process action team (PAT) is assembled and works towards defining and resolving root causes of the perceived problem area.

i. Lessons Learned. Documented lessons learned may be recorded or found within the Design Review and Checking System (DrChecks). The use of this database will assist designers in future design efforts for similar work by noting how previous nonconformances were handled and resolved. Root causes may be discovered by analyzing past design efforts. Sharing experiences within EC as well as with design elements in other districts also surfaces problem areas.

j. Construction QA/CQC Inspections. Construction and supply contract provisions contain provisions for Government inspections and tests for contract work-in-progress. Construction deficiencies are disclosed by inspections and tests and corrective action to contractor processes and product are immediately applied. Operational tests also serve to verify and validate design of structural, electrical, and mechanical systems.

k. Regulatory. Implementation of policy changes or other guidance;

l. Situational awareness. The aspect of being aware of needed changes to work processes and immediately implementing the change to prevent potential conflict in product development, disruption of communication, or negative impacts to the work environment.

m. Clarification. Communicating and/or redefining roles and responsibilities among the elements involved in the work process (design or construction management) or within the QMS is essential for preventing confusion, misunderstanding, misinformation, misdirection, and ultimately a product that does not conform to defined requirements.

n. Contract modifications. See Construction site visits above. Contract modifications are a costly method in product funding and/or schedule to correct a design oversight (either in-house or AE design), an unforeseen field condition (for construction contracts), or other causes requiring a corrective action before the product is completed to defined requirements. Response to a contract nonconformance requires immediate resolution to preclude further negative impacts to contract work and associated resources used in the work.

6.3 Deviation in Product or QMS?

Upon recognition that a corrective action is needed, either some aspect of the product requires change or the process delivering the product requires change, or possibly both aspects of product delivery require change. In either situation, steps shall be taken to

determine the root cause of the deviation, eliminate the cause, verify that the action is effective, and perform appropriate documentation. In all respects, all actions shall be communicated to appropriate involved staff during and following the completed action.

7.0 RECORDS

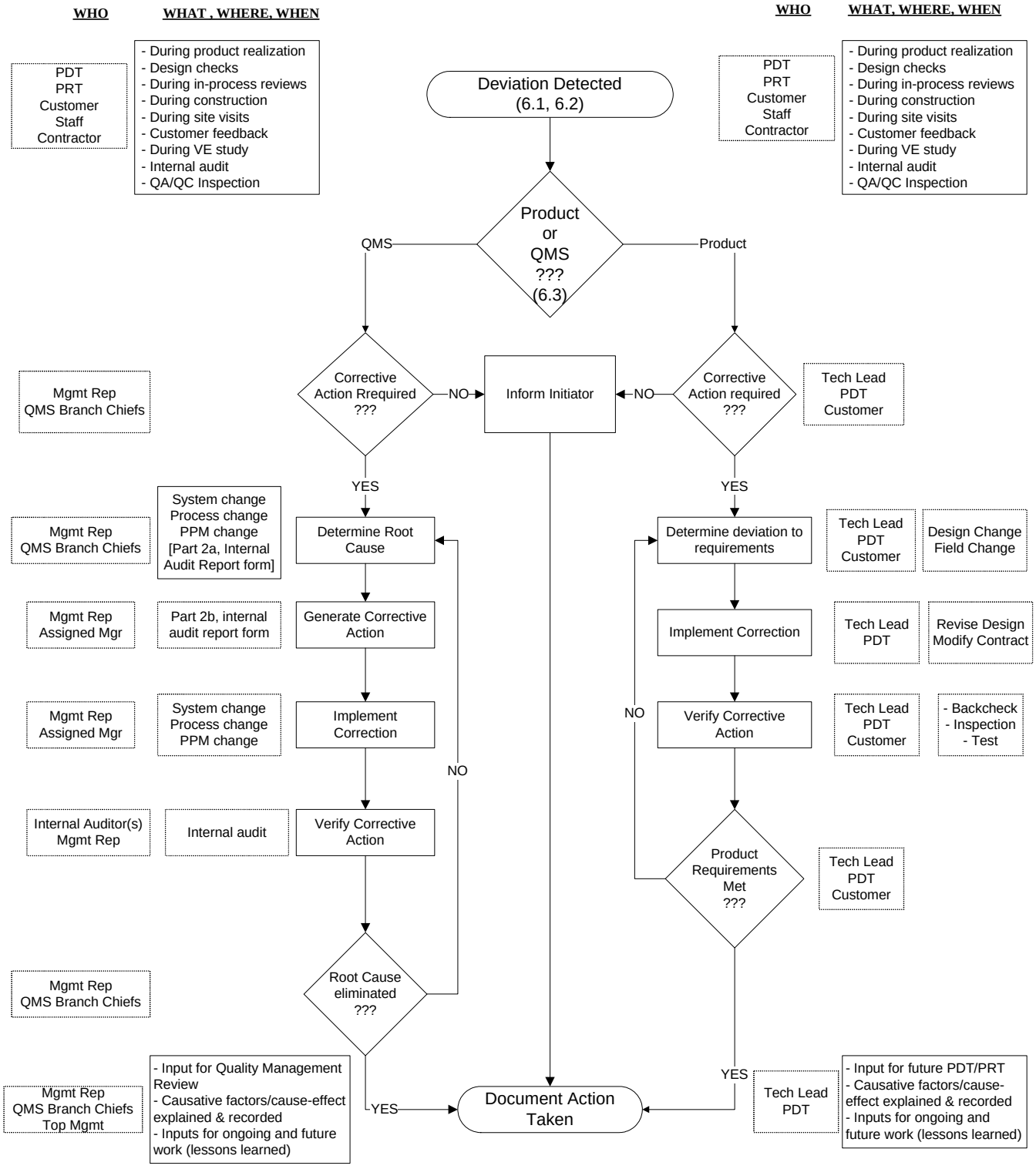
Corrective action records shall typically include:

- Project Management Plans (PMP)
- Any quality control/assurance plan required as part of contract requirements;
- Evaluation of quality assurance/quality control plans required by contract for consultant services;
- Architect-Engineer performance evaluation;
- Construction contractor performance evaluation
- Annotated comments by technical review staff;
- Customer feedback relative to completed work;
- Internal audits.
- Process Action Team reports
- CQC and QA daily reports
- Quality Improvement Process Suggestions
- Lessons Learned electronic database
- Construction deficiency tracking record

8.0 ATTACHMENTS

1. Corrective Action Flowchart

CORRECTIVE ACTION FLOWCHART



ATTACHMENT #1

PROCEDURE FOR PREVENTIVE ACTION

Proponent Office: Hydraulics and Hydrology Branch

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the general steps, requirements, roles and responsibilities for applying preventive actions for assuring the integrity of QMS processes and products.

2.0 SCOPE

This procedure applies to all processes implemented and products developed within the QMS, and shall be followed whether work is performed in-house or by consultant/contract services.

3.0 REFERENCES

EP 715-1-7	Architect Engineer Contracting
ER 1110-1-12	Quality Management
ER 1180-1-6	Construction Quality Management

4.0 RESPONSIBILITIES

EC Chief is responsible for overall management of preventive action procedures related to engineering and construction products.

QMS Branch Chiefs are responsible for investigating, discussing, reviewing and acting on nonconformance(s), existing or potential, that impact on product development and processes as well as the QMS.

Branch, Section Chiefs, and Resident Engineer assure that all personnel involved in the development, checking, and/or review process for engineering and construction products and services adhere to the requirements of this procedure.

Personnel involved in QMS activities recognize the need for preventive actions and see that these are incorporated into the QMS.

5.0 KEYWORDS (see Glossary for definitions)

Construction Deficiency Tracking Record
Nonconforming Product
Preventive Action
Quality Assurance
QMS Branch Chiefs

6.0 PROCEDURES

6.1 Preventive Action

The need to implement preventive action is determined whenever a potential deviation to product delivery or QMS process is detected or warranted. Preventive action requires identifying and eliminating potential root cause(s) that negatively impact product realization, work process, or the QMS. Implementing preventive action is graphically presented in the Preventive Action Flowchart (Attachment #1).

6.2 Preventive Action Measures

Recognition of a potential nonconformance in a product or the QMS may be initiated by a number of different methods including:

a. Internal audits. Internal audits are used to surface nonconformance(s) for a product, a process/procedure, or a system such as the QMS. For potential nonconformances detected during an internal audit, subsequent action requires a root cause analysis and implementation of a corrective fix to the problem. The results are verified by follow-up audit to ensure that the fix has taken place and are effective. See also the procedure for Internal Audit.

b. Construction site visits. Technical and construction QA staffs confer on developments during construction that result in changes to work-in-progress. The elimination of a construction problem or design error is resolved by redesign and ultimate construction via a contract change order (contract modification). Construction contractors may disclose nonconformances as well. The benefit of these actions results in a product not containing deficiencies, but meeting customer requirements.

c. Customer feedback. Internal customer feedback is typically obtained through surveys conducted at the completion of a product. External customer feedback typically is provided by the PM throughout product development in conjunction with project execution.

d. Solicitation amendments. An amendment is used to correct a contract solicitation deficiency that could otherwise result in a costly contract modification (post-award). Amendments are provided to planholders in the contract pre-award phase to clarify administrative and technical issues found in the solicitation. In this regard, the amendment is a corrective action to the plans and specifications following the formal design process, but also is a preventive action for the administration of the awarded contract during the construction management process.

e. Design checks. Required milestone reviews, as defined by PMP or other guidance, often disclose nonconformances during product development prior to delivery to the customer. Sources for deficiency are corrected/eliminated to prevent recurrence.

f. VE studies. Value engineering studies often surface other methods of construction and/or materials used in construction differing from original design that result in equivalent quality of end product coupled with cost and/or time savings and sometimes product lifecycle benefits. This methodology serves to provide another way to provide an end product without necessarily having a nonconformance present.

g. Scope and In-Progress Reviews. Significant preventive actions already integrated into our product development processes include periodic reviews by the product development team, the management team, value engineering, policy reviews, independent technical reviews, and engineering during construction. As nonconformances are discovered, immediate action is taken to find the root cause, eliminate the problem, and redirect efforts in product completion. This eliminates providing the customer with a deficient product and often provides a means for customer involvement in the product development process. Preventive action procedures shall be similar whether work is performed by in-house resources or consultant services.

h. Quality Improvement Process (QIP). Potential nonconformances in the QMS and other business processes may be handled by a formalized QIP action entailing a documented request to change some aspect of a work process that hinders a worker from meeting required results. If necessary, a process action team (PAT) is assembled and works towards defining and resolving root causes of the perceived problem area.

i. Lessons Learned/Dr. Checks. Documented lessons learned may be recorded or found within the Design Review and Checking System (DrChecks). The use of this database will assist designers in preventing future design nonconformances for like work by noting how previous nonconformances were handled and resolved. Root causes may be discovered by analyzing past design efforts. Sharing institutional knowledge and experiences internally as well as with design elements in other districts offer means to resolve potential problem areas.

j. Construction QA/CQC Inspections. Construction and supply contract provisions contain provisions for Government inspections and tests for contract work-in-progress. Construction deficiencies are disclosed by inspections and tests and preventive action to contractor processes and product are immediately applied. Operational tests also serve to verify and validate design of structural, electrical, and mechanical systems.

k. Regulatory. Knowledge of policy or other guidance.

l. Situational awareness. The aspect of being aware of needed changes to work processes and immediately implementing the change to prevent potential conflict in product development, disruption of communication, or negative impacts to the work environment.

m. Clarification. Communicating and/or redefining roles and responsibilities among the elements involved in the work process (design or construction management) or within the QMS are essential for preventing confusion, misunderstanding, misinformation, misdirection, and ultimately a product that does not conform to defined requirements.

6.3 Deviation in Product or QMS?

Upon recognition that a preventive action is acknowledged, either some aspect of the product requires change or the process delivering the product requires change, or possibly both aspects of product delivery require change. In either situation, steps shall be taken to determine the root cause of the deviation, eliminate the cause, verify that the action is effective, and perform appropriate documentation. In all respects, all actions shall be communicated to appropriate involved staff during and following the completed action.

7.0 RECORDS

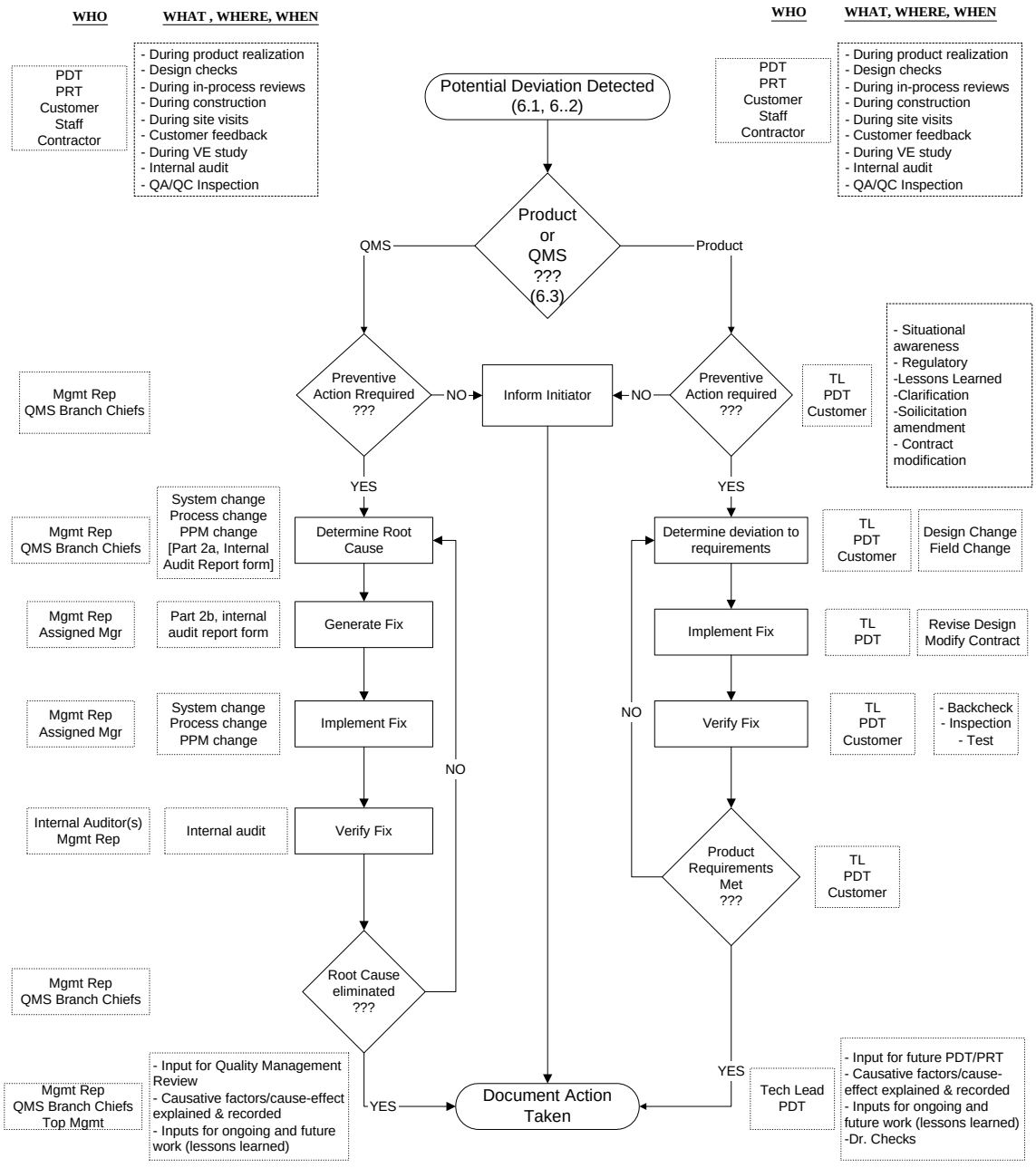
Preventive action records shall typically include:

- Project Management Plans (PMP)
- Any quality control/assurance plan required as part of contract requirements;
- Evaluation of quality assurance/quality control plans required by contract for consultant services;
- Architect-Engineer performance evaluation;
- Construction contractor performance evaluation
- Annotated comments by technical review staff;
- Customer feedback relative to completed work;
- Internal audits.
- Process Action Team reports
- CQC and QA daily reports
- Quality Improvement Process Suggestions
- Lessons Learned electronic database
- Construction deficiency tracking record

8.0 ATTACHMENTS

1. Preventive Action Flowchart

PREVENTIVE ACTION FLOWCHART



ATTACHMENT #1

CONTROL OF NONCONFORMING PRODUCT

Proponent Office: Technical Resources Branch

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the requirements and actions necessary to ensure that a product that does not conform to customer or product requirements is identified and controlled to prevent its unintended use or delivery.

2.0 SCOPE

This procedure applies to all aspects of product development and services provided by EC and shall be observed by every member and organizational element involved in EC product development and delivery. This procedure is applicable at all stages of engineering and construction product development at all working levels.

3.0 REFERENCES

EP 715-1-7	Architect Engineer Contracting
ER 1110-1-12	Quality Management
ER 1180-1-6	Construction Quality Management

4.0 RESPONSIBILITIES

The Division, Branch, and Section Chiefs are responsible for assuring and enforcing the provisions of this procedure. Approval authority for release of engineering and construction product(s) to the customer ultimately lies with the Chief, EC; unless otherwise delegated to the Chief of the Branch where the product(s) was/were developed.

All staff involved in engineering and construction product development are to ensure conformance to this procedure.

5.0 KEYWORDS (see GLOSSARY for definitions)

Correction
Corrective Action
Customer
Customer Complaint
Nonconformance
Nonconformity
Nonconforming Product

6.0 PROCEDURE

6.1 Recognition

Within EC, nonconforming products are generally limited to elements of the design and construction management processes. These can occur as design errors, incorrect data collection, erroneous assumptions, use of inappropriate criteria, or incorrect project scope. Other EC procedures provide means to identify, document, evaluate, and control such occurrences to ensure that faulty designs and other products never reach the customer. Documentation in the form of comments highlighting nonconformities shall be provided to all relevant parties. Any employee can identify a problem or receive a customer complaint.

6.2 Review and Disposition Of Nonconforming Products

In compliance with Project Management Business Process (PMBP) requirements and in support of EC policy for continual improvement, all EC products and services shall be reviewed to ensure that nonconforming products are identified and corrected before being allowed to proceed. If a decision is made to accept a nonconforming product, this decision shall be reported for customer consideration, and a description of the nonconformity shall be recorded to denote the actual condition. Nonconformities may be identified through

- Customer complaints (internal and external)
- QA/QC activities
- Internal or Surveillance Audits
- Designs reviews
- Warranty activities
- HQ or MSC Reviews
- Process control activities
- Daily operations
- Monitoring of commitments to PMBP

Involved employee(s) will resolve the problem immediately, if possible. Immediate resolution of the problem normally occurs. If the involved employee(s) cannot resolve the problem, it shall be referred to the appropriate supervisor for review. In the case of customer complaints, all shall be resolved immediately through any means appropriate. In most cases, external customer complaints will be referred to the appropriate PM.

6.3 Determination Of Nonconformance

6.3.1 Concurrently, involved employee(s), with other appropriate personnel, shall determine if the problem or complaint is a nonconformance.

6.3.2 If the alleged problem is determined to be a nonconformance associated with an EC product the employee, or supervisor, shall discuss the issue(s) with the Technical Lead (TL). The TL shall determine if the root cause of the nonconformance is related to design error or a QMS procedural problem. If the nonconformance is a design error, the TL shall resolve the error with the appropriate PDT member. If the problem is determined to be a nonconformance with the product development (design) process, the TL shall discuss the issue(s) with the Management Representative to determine if corrective action is warranted. If warranted, the Management Representative shall create a corrective action for completion by the appropriate element of EC to correct. If the alleged nonconformance is associated with the construction management process, the requirements of paragraph 6.5.7 below shall be used. Otherwise, correction shall be implemented by contract provision(s) (see Procedure 005).

6.3.3 If the alleged problem is determined not to be a nonconformance by either a design error or failure of the QMS, then no further action is needed beyond completion of step 6.3.1. The TL shall provide feedback to the reviewing party to close the review action.

6.3.4 If the alleged problem is determined to be a deficiency caused by some aspect of the quality management system, then a nonconformance shall be documented as part of a corrective action assigned by the Management Representative to the appropriate EC element to correct.

6.4 Product Deficiency

The EC manager associated with a QMS related product deficiency or complaint shall be responsible to determine how the nonconformance will be addressed, whether by operations within the associated office or changes needed within the QMS. External customer complaints, in the event they occur, shall be handled by the appropriate PM to determine disposition.

6.5 Corrective Action

6.5.1 In accordance with Procedure 010CA, the manager assigned to complete the corrective action shall document the intended actions and submit the corrective action plan to the Management Representative for review and acceptance. The action plan will include a description of how the nonconformance will be ultimately addressed.

6.5.2 Disposition of the nonconformance is determined from one or more of the following:

- Take immediate action to determine the root cause and eliminate the detected nonconformity
- Authorizing release or acceptance of nonconforming product or service, under concession by relevant authority and, where applicable, by the customer
- Taking action to preclude its original intended use or application

6.5.3 Where practical, nonconforming products shall be segregated at the time of identification until acted upon to preclude unintended use.

6.5.4 When a nonconformance is detected after delivery to the customer, the Management Representative, after consultation with necessary parties, shall determine what further action is needed. A plan for resolution of the nonconformance is prepared on an individual occurrence as needed.

6.5.5 When nonconforming product is corrected for use, it is re-verified to demonstrate conformity to the requirements. Following verification of conformity, either the PM, EC Manager or the Management Representative shall notify the customer of problem resolution.

6.5.6 If design deficiencies, errors and/or omissions are discovered during the solicitation preparation period, corrections shall be implemented by issuing formal amendments during advertisement to correct the solicitation documents. Such deficiencies shall be treated as a nonconformance because they were discovered after the QA/QC processes for the design (the QA/QC process failed.).

6.5.7 If design deficiencies, errors and/or omissions are discovered during construction, they will be corrected by:

- A contract modification and shall be treated as a nonconformance. The Resident Engineer shall be responsible for initiating a Nonconformance Report. In addition:

- All contract modifications designated as being caused by a design deficiency for designs produced by a contracted Architect/Engineer firm shall be subjected to the AE liability assessment under the A-E Responsibility Management Program.

6.6 Nonconformance Report Review

The Management Representative shall review the Nonconformance Report for acceptance.

- If acceptable, proceed to paragraph 7.
- If not acceptable, the Nonconformance Report is rejected with comments and returned to the appropriate manager for resolution and resubmission.

6.7 Nonconformance Report Acceptability

The Management Representative shall deal with acceptability of the Nonconformance Report in two possible ways:

- If the Assigned Manager does not recommend a Corrective Action and this is acceptable to the Management Representative, the Nonconformance Report is closed and no further action is necessary.
- If Corrective Action as recommended in the Nonconformance Report is accepted by the Management Representative, the Corrective Action is initiated .Further action is conducted in accordance with procedure for Corrective and Preventive Action, Procedure 012.

6.8 Recurring Nonconformances

Periodically the QMS Review Team will review all nonconformances. If there are recurring nonconformances in similar areas, indicating a systemic problem, the Management Representative will initiate a Corrective Action Request, as defined in procedures for Corrective and Preventive Action, Procedures 010CA and 010PA respectively.

7.0 RECORDS

Corrective/preventive action records shall typically include:

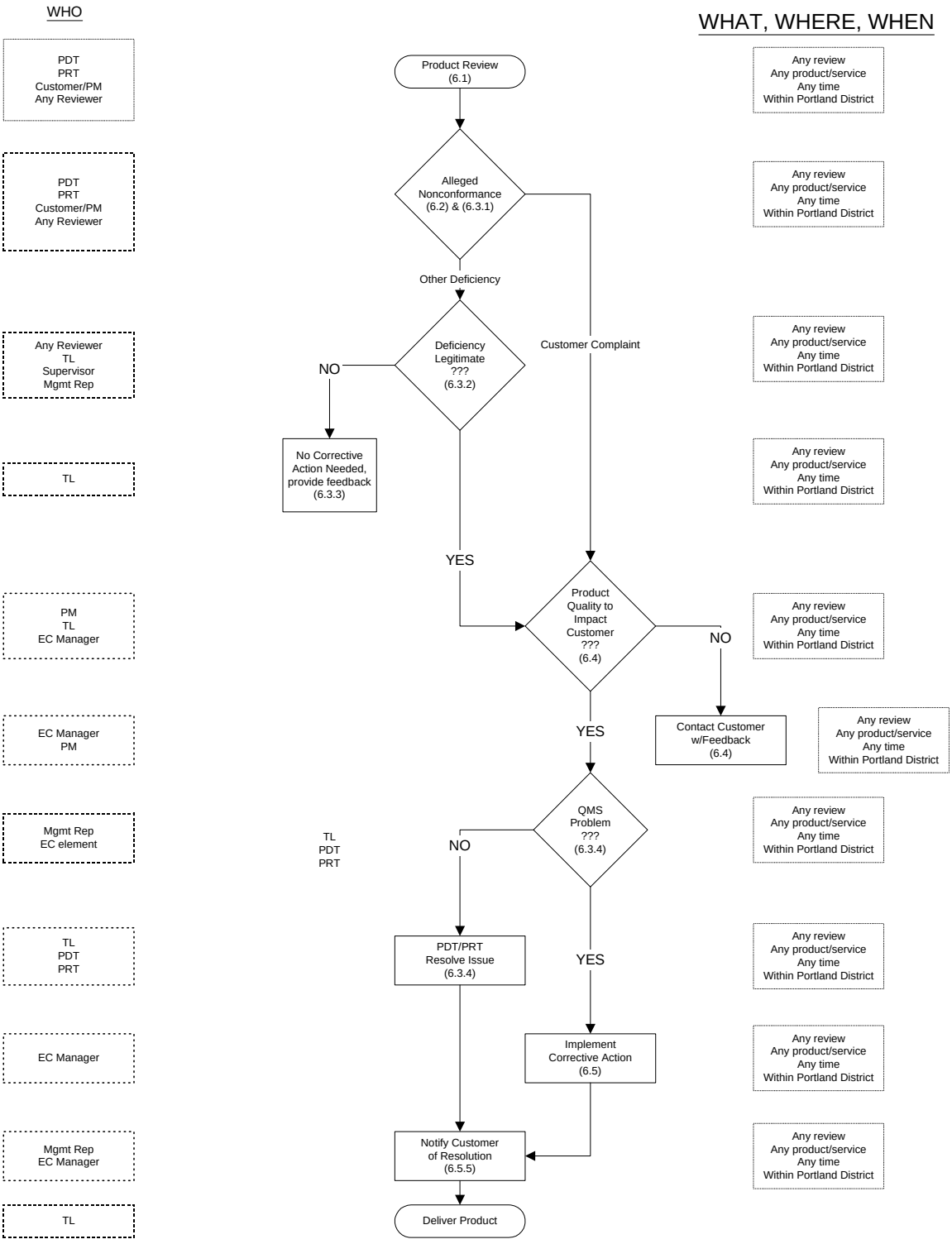
- Work scope, schedule and/or budget as required
- Any quality control/assurance plan required as part of contract requirements;
- Evaluation of quality assurance/quality control plans required by contract for consultant services;
- Architect-Engineer performance evaluation;
- Annotated comments by technical review staff;
- Customer feedback relative to completed work;
- Product review meeting minutes;
- Internal audits.

- Process Action Team reports
- CQC and QA daily reports
- Quality Improvement Process Suggestions
- Lessons Learned electronic database (DrChecks)
- Construction Deficiency tracking record

8.0 ATTACHMENTS

1. Flowchart for Control of Nonconforming Product

Control of Nonconforming Product



ATTACHMENT #1

PROCEDURE FOR TRAINING NEEDS

Proponent Office: Technical Resources Branch

Authorized by:
Jeffrey S. Sedey, P.E.
Management Representative

Approved By:
Donald R. Chambers, P.E.
Acting Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1
01 Feb 08	I1-R1	Correction of Proponent Office name

1.0 PURPOSE

This procedure describes a systemic approach for identifying training plans, individual development plans, registering for courses, and maintaining training records.

2.0 SCOPE

This procedure applies to all training of staff that work within the QMS.

3.0 REFERENCES

ER 350-1-416	Headquarters, US Army Corps of Engineers (HQUSACE) Centrally and Locally Sponsored Long Term Training
ER 350-1-420	5-Year IDP and Developmental Assignments
DA Pamphlet dated 18 Aug 89	"A Supervisor's Guide to Career Development and Counseling for Career program Employees"
HQ USACE Policy Memorandum	Implementation of 5-Year Individual Development Plan
Guide	Career Planning Guide for Engineers and Scientists (Career Program 18), January 1994
Handbook	Training Coordinators Handbook

4.0 RESPONSIBILITIES

The EC Division Chief, Branch Chiefs , and Section Chiefs are responsible for ensuring that their staff are qualified by appropriate training for all tasks affecting quality.

Each employee is responsible for reviewing their career development and identifying appropriate training opportunities to their supervisors.

5.0 KEYWORDS

Individual Development Plan (IDP)
Official Personnel File

6.0 PROCEDURE

6.1 Review Employee Profile

For any permanent employee they supervise, Branch and Section Chiefs shall periodically evaluate each employee's skill profile and capability. Employees evaluate training needed to enhance their career development. An IDP is developed annually for each permanent employee. The Branch/Section Chief and employee jointly develop the IDP. Both short-term and long-term objectives are addressed as well as required/recommended training or developmental assignments. Conference and workshop attendance may be included on IDPs as appropriate. The IDP is signed by the employee and the immediate supervisor. IDPs are maintained by each Branch, Section, or Resident Office

6.2 Assure Training Attendance

6.2.1 Scheduled Training

Branch Chiefs, Section Chiefs, and the Resident Engineer are to assure attendance at scheduled training. Employees are to assure scheduled training can be completed in conjunction with work and personal needs. A DD1556 shall be prepared to authorize acquired training to improve employee performance.

6.2.2 Internal Training

Some training sessions are arranged outside the formal IDP processes. Oftentimes these sessions deal with particular subjects or items of interest/focus that are relevant only to specific employees. When specialized, specific internal training is arranged for these employees (e.g. workshops, off-sites, etc.) attendance rosters shall be kept to document employee participation.

6.3 Document Completed Training

Training coordinates will enter appropriate completed training in Oracle Training Administrator (OTA). When scheduled training cannot be completed, the employee's IDP shall be noted with an explanation prior to the next annual review of the IDP.

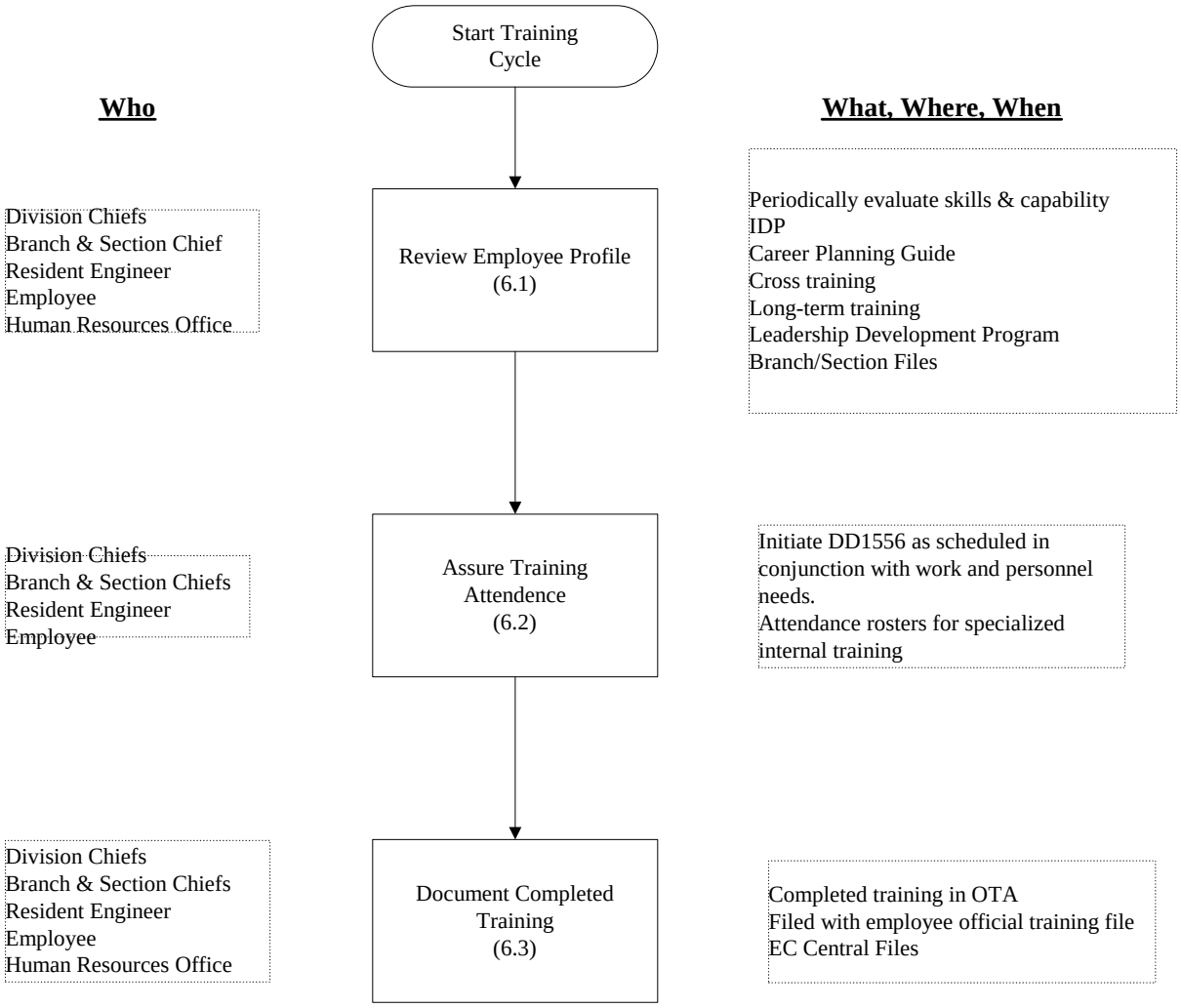
7.0 RECORDS

Official employee training files which include copies of IDPs, Training Requests (1556), and training evaluations are retained in Engineering and Construction's Central File Area. When available, a copy of the employee's training certificate will be placed in the official employee training file.

8.0 ATTACHMENTS

1. Flow Chart

TRAINING NEED PROCESS



ATTACHMENT #1

PROCEDURE FOR CERTIFICATION OF INSPECTION, MEASURING AND TEST EQUIPMENT

Proponent Office: Hydrologic, Coastal & River Engineering Section
Hydraulics and Hydrology Branch

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the requirements and guidance for ensuring the appropriate maintenance and calibration of measuring and test equipment used to develop engineering and construction products. Implementing this procedure is intended as a preventive action.

2.0 SCOPE

This procedure applies to equipment directly used to develop engineering, and construction products; whether owned by Portland District organizations or furnished by consultant services under contract.

3.0 REFERENCES

American National Standard, ANSI/ISO/ASQC Q9001-2000, Section 7.6. *Control of Monitoring and measuring devices.*

4.0 RESPONSIBILITIES

Each Branch, Section Chief, and Resident Engineer is responsible for developing applicable maintenance, precision, and calibration requirements for equipment owned and used for product development. The TL is responsible for verification of the adequacy of measuring and test equipment used during product development.

5.0 KEYWORDS (See Glossary for definitions)

Calibration
Calibration Equipment
Calibration Standards
Preventive Action
Product Development Team (PDT)
Technical Lead (TL)
Unique Identifier

6.0 PROCEDURE

6.1 Master List of Measuring and Test Equipment

A Master List of the measuring and test equipment inventory shall be maintained by the Section owning and using the equipment. The master list shall include equipment description, unique identifier, and calibration schedule. The list shall be reviewed annually by the appropriate Section Chief.

6.2 Identification

The measurements to be made and the accuracy and precision required for each type of equipment used shall be identified. Calibration standards shall be selected for the most exacting use for which the equipment may be used. Typically, this is based on the requirements set for product design development and may vary for different projects. Information required for each piece of measuring and test equipment includes the following:

Equipment type – This is a full description of the manufacturer, model, and version of the measuring and test equipment.

Unique identification – This is a serial number, or other marking method, which allows the equipment to be specifically selected among several units, which are otherwise identical. Some equipment may not have/need a unique identifier and shall be so stated in the Maintenance and Calibration Records.

Location – This is the place that the equipment is usually stored.

Frequency of calibration checks – The schedule or criteria for subjecting the equipment to an inspection of accuracy.

Method of calibration checks - A description of the steps to be taken to determine if the equipment falls within acceptable tolerances.

Acceptance criteria – Calibration standards describing the conditions that would allow the equipment to pass the calibration check. This may be a reference to a manufacturer or other standard calibration manual or as prescribed by the Section.

Actions required if results are unsatisfactory – A description of what will be done to ensure that the equipment is adjusted to meet acceptance criteria.

Responsible Individual for the equipment - The person responsible for doing the calibration and/or documenting the results.

6.3 Calibration and Certification

All equipment that can affect product quality shall be calibrated and adjusted at prescribed intervals, or prior to use. A description of the calibration frequency and method shall be developed and maintained. The equipment shall be compared against certified equipment having a known relationship to recognized standards. Equipment may be calibrated by Corps personnel or by the manufacturer or authorized service provider. Equipment calibrated in-house shall follow manufacturer's recommendations where appropriate. If in-house calibration methods are developed, these methods shall cover acceptable calibration equipment and environmental conditions for calibration procedures. The calibration equipment shall be certified as having a valid relationship to established measurement standards and accuracy requirements. This certification may be a document from an outside vendor or a statement approved by the Section Chief that the prescribed, scheduled calibration has taken place and the equipment meets accuracy requirements established by the Section and is functionally acceptable. An item not meeting calibration standards shall be removed from use until adjustment, repair, or replacement allows it to meet standards. For items not meeting calibration standards, the validity of previous results that used the nonconforming equipment shall be assessed and documented.

6.4 Handling of Equipment

All measuring and test equipment and calibration equipment shall be handled, stored, and preserved such that the accuracy and fitness for use are maintained. Periodic inspection or maintenance may be prescribed for regularly used equipment. Infrequently used equipment shall

be maintained on an "as-needed" basis. Procedures for completely and accurately documenting equipment maintenance shall be developed on a Section-by-Section basis.

6.5 Contractor Equipment

Technical Leads shall require certification that measuring and test equipment used by a contractor during the design process shall meet necessary accuracy and precision requirements set by the Section.

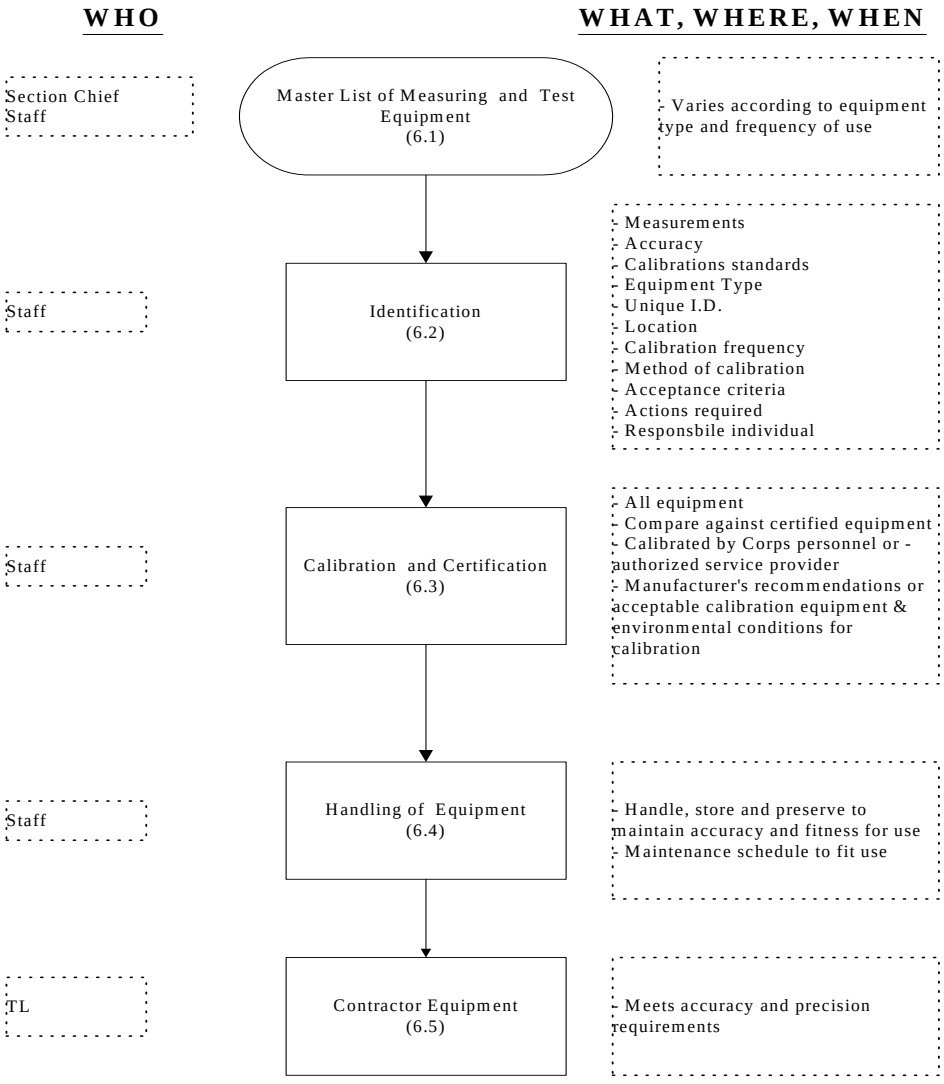
7.0 RECORDS

Records which document that measuring and test equipment conform to requirements shall be maintained. The calibration status of equipment shall be uniquely identified, except as noted, traceable to the calibration record. Records shall be readily available for verification that the measuring equipment is functionally adequate.

8.0 ATTACHMENTS

1. Certification of Inspection and Measuring Equipment Flowchart
2. Equipment Master List

CERTIFICATION OF MEASURING AND TEST EQUIPMENT



ATTACHMENT #1

MASTER EQUIPMENT LIST

Equipment Name (Type/I.D./Serial #)	Location	Date of Previous Calibration	Next Calibration Date

ATTACHMENT #2

PROCEDURE FOR VERIFICATION OF TEST SOFTWARE

Proponent Office: Hydraulics and Hydrology Branch

Authorized by: _____
Jeffrey S. Sedey, P.E.
Management Representative

Approved By: _____
Howard B. Jones, P.E.
Chief, Engineering and Construction Division

No changes to this document shall be made without concurrence of the Management Representative. Any change must be approved by the Chief, EC.

Date	Issue and Revision Number	Description
25 Oct 06	I1-R0	Issue No. 1

1.0 PURPOSE

This procedure describes the requirements and guidance for ensuring the appropriate certification of software used to develop engineering and construction products. Implementing this procedure is intended as a preventive action.

2.0 SCOPE

This procedure applies to software used to develop planning, engineering, and construction products including: proprietary software, commercial software, Corps of Engineers developed/approved software, in-house developed software, and software developed, furnished, or used by suppliers (contractors).

3.0 REFERENCES

American National Standard, ANSI/ISO/ASQC Q9001-2000, Section 7.6. *Control of Monitoring and measuring devices.*

4.0 RESPONSIBILITIES

Each Branch and Section Chief is responsible for developing, checking, verifying, and documenting requirements for the software used for product development. The TL is responsible for verification of the adequacy of software used throughout product development.

5.0 KEYWORDS (See GLOSSARY for definitions)

Preventive Action

6.0 PROCEDURE

6.1 Develop Master List of Software

Software applications used as an integral part of the design development process shall be inventoried. The software shall be identified by name, developer, version number, unique identification (e.g. serial number), and location. The list shall be reviewed annually.

6.2 Testing and Verification

Individual software verification procedures shall be developed. Software that is commonly available from commercial sources and is widely used for the intended purpose will not require verification. Software developed by or for engineering and construction product development shall be verified by experienced personnel concurrent with its first use. Version and serial numbers of these software applications, and the installed location shall be maintained. Software developers shall be contacted annually to ensure validity of the software application version that is in use. Software which has, as part of its distribution package, a series of sample and/or test data, shall be verified upon installation of the software application and when upgrades are obtained.

6.3 Remedies

Any software application not meeting acceptable standards shall be removed from use, modified, or upgraded as appropriate. Other existing versions of the software shall be checked to ensure that they meet acceptable standards.

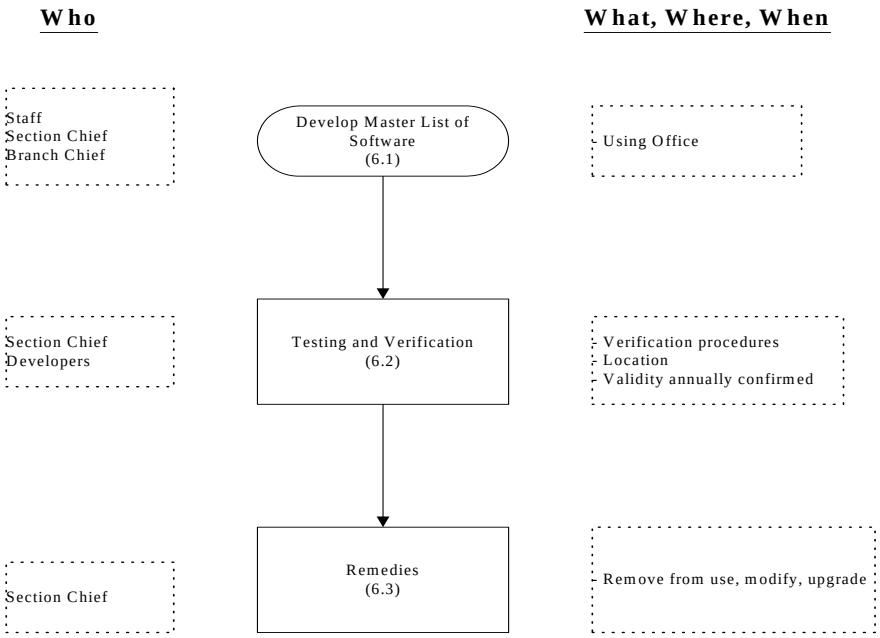
7.0 Records

All Section Chiefs and Branch Chiefs shall maintain records that document that test software conforms to the specified requirements.

8.0 Attachments

1. Flowchart for Verifying Software Calibration
2. Sample: Master Listing of Software Requiring Calibration Verification

VERIFICATION OF TEST SOFTWARE



ATTACHMENT #1

MASTER LIST

Software Name	Software Location	Date of Previous Calibration	Date of Next Calibration