DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
441 G Street, NW
Washington, DC 20314-1000

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Regulation
No. 1110-3-12

25 March 2021

Military Engineering and Design
QUALITY MANAGEMENT

Purpose. This engineer regulation (ER) provides policy, guidance, principles, practices, and tools for delivering quality products and services to stakeholders of the U.S. Army Corps of Engineers (USACE).

1. Applicability. This regulation applies to USACE commands responsible for providing products and services in all military program areas. Refer to ER 5-1-11 USACE Business Process. For additional guidance on construction projects refer to ER 1180-1-6: Construction Quality Management.

2. Distribution Statement. Approved for public release; distribution is unlimited.

FOR THE COMMANDER:

LLOYD.JOHN.PHILLIP.1021070595 Digitally signed by LLOYD.JOHN.PHILLIP.1021070595 Date: 2021.06.07 15:04:38 -04'00'

Eight Appendixes
(See Table of Contents)

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*This regulation supersedes ER 1110-1-12 dated 21 July 2006.

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Chapter 1
Introduction

1-1. Purpose. This ER provides policy, guidance, principles, practices, and tools for delivering quality products and services to stakeholders of the USACE.

1-2. Applicability. This regulation applies to USACE commands responsible for providing products and services in all military program areas. Refer to USACE Memorandum April 02, 2013: "Quality Imperatives for Engineering and Construction Products and Services." For additional guidance on construction projects refer to ER 1180-1-6: Construction Quality Management.

1-3. Distribution Statement. Approved for public release; distribution is unlimited.

1-4. References. Refer to Appendix A for a list of referenced documents.

1-5. Records Management (Recordkeeping) Requirements. The records management requirement for all record numbers, associated forms, and reports required by this regulation are addressed in the Army's Records Retention Schedule—Army (RRS-A). Detailed information for all related record numbers are located in the Army Records Information Management System (ARIMS)/RRS-A at https://www.arims.army.mil. If any record numbers, forms, and reports are not current, addressed, and/or published correctly in ARIMS/RRS-A, see Department of the Army Pamphlet 25-403: Guide to Recordkeeping in the Army.

1-6. Definitions. Refer to Appendix B for a glossary of definitions.

1-7. What Is Quality? The USACE Project Delivery Business Process (PDBP) defines "quality" as "the totality of features and characteristics of a product or service that bear on its ability to meet the stated or implied needs and expectations of the customer as well as address applicable laws, regulations, and professional standards." ER 1180-1-6: Construction Quality Management defines "quality" as "conformance to properly developed requirements." ER 5-1-11: USACE Business Process defines "quality" as "the degree to which a set of inherent characteristics fulfills requirements. Based on these definitions, "quality" is understood as an objective characteristic that can be measured, managed, and improved.

1-8. Quality Management Concepts. Quality Management is based on two fundamental concepts: the Second Set of Eyes principle and the use of a formalized, measurable quality process.

a. Second Set of Eyes Principle. Technical quality (see Glossary) of engineering products can only be ensured through the use of a Second Set of Eyes. While everyone on a PDT both individually and collectively is responsible for quality, every project deliverable and internal milestone document must pass before a Second Set of Eyes. There must be a Paragraph 1.6.2 here because there is a Paragraph 1.6.1.

b. Formalized, Measurable Process. Effective Quality Management is both formalized and measurable. The PDBP requires a formal Quality Management process, documented in the PMP. The process must be tailored to the risk, complexity, and scope of the project. Quality Management processes must also be measurable. Measurability is fundamental for accountability and continual process improvement.

c. Prepared By/Reviewed By/Approved By Signatures. Every engineering product that is delivered to a stakeholder, external reviewer, contractor, consultant, or other District must have three individual signatures or initials: the person who prepared the individual document, the person who reviewed the document (or was responsible for the review), and the person in engineering leadership who approved the document. This requirement applies to all deliverables, whether prepared in-house, by outside consultants, or by another geographic District. The PDT must determine the format and means of recording the required signatures for each deliverable.

1-9. Quality Management System. All USACE organizations and functional areas must regularly employ effective, documented quality management systems per Army Regulation (AR) 702-11: Army Quality Program and ER 5-1-11: USACE Business Process.

1-10. Roles and Responsibilities. Roles and responsibilities for quality management activities are stated in ER 5-1-11 and EM 5-1-11 Project Delivery Business Practice. Quality management activities are overseen by the Chief of Engineering Function, the Project Manager (PM), the Technical Lead (TL), the Contracting Officer's Representative (COR), and the review teams: DQC review team, ITR team, and QA review team. See Table 1-1.

Table 1-1
List of Members in Various Teams

Project Delivery Team	DQC Review Team (Refer to Chapter 3)	ITR Team (Refer to Chapter 3)	QA Review Team (Refer to Chapter 4)
In-House Designers	Branch/Section Chiefs	Regional Technical Specialists	Project Manager
A-E Designers	Technical Lead/ Review Lead	Subject Matter Experts (SMEs)	Contracting Officer's Representative
	USACE "Home" District Reviewers	Center of Expertise	Technical Lead/ Review Lead
		Other USACE District Reviewers	
		Stakeholders/Sponsors	

a. Chief of Engineering Function. The Chief of Engineering Function in a command is responsible for the technical content and sufficiency of all engineering deliverables produced by the command. This includes overall responsibility for technical management of architect-engineer (A-E) service contracts. In some offices, the Chief of Engineering Function may be a General Services (GS)-15 division-level supervisor, while in others it may be at the GS-13 or GS-14 branch level. Because of this difference, the Chief of Engineering Function is used throughout this guidance to refer the role of the Engineering Chief regardless of the specific position held. USACE employees should refer to their chain of command if there are any questions.

b. Project Manager (PM). Refer to ER 5-1-11.

c. Technical Lead (TL). The TL is a technically qualified PDT member. Typically, the TL has discipline-specific PDT duties, or on the determination of local Engineering, acts only as TL without additional PDT responsibilities. The TL confirms that all design deliverables include the authorized project scope and addresses compliance with all applicable code, policy, and criteria. The TL has specific, individual responsibility to ensure that each deliverable is prepared and reviewed according to the PMP and USACE standards and guidance. The TL roles do not overlap those of the PM, and a clear delineation should be established at the beginning of each project to avoid duplicate efforts.

d. Contracting Officer's Representative (COR).

(1) Refer to Engineer Pamphlet EP 715-1-7 that describes specific qualifications and responsibilities of the Contracting Officer's Representative (COR) with regard to oversight of A-E services contracts. The TL and the COR may be the same person for a project. These requirements include that the COR serving on A-E services contracts must be a professional architect, engineer, or similar technical discipline with an active state-issued license unless special approvals are obtained from the Chief of Engineering Function. In special cases when the Chief of Engineering Function determines that the A-E services do not require oversight by a licensed professional, an acquisition-trained, non-licensed engineer or architect may be nominated as a COR.

(2) In all cases, the A-E services will be managed by a graduate professional under the direct supervision of a licensed professional. Additionally, the responsibilities of the COR are an engineering function, and therefore, must be executed by personnel under the Chief of Engineering Function chain of command. For the purpose of this regulation, the COR has a vital role in ensuring the quality assurance of professional engineering services both in D-B and Design-Bid-Build procurement strategies.

e. Project Delivery Team. The PDT consists of everyone necessary for successful development and execution of all phases of the project. The PM is responsible for ensuring that the necessary disciplines and perspectives are represented within the PDT. Each member of the PDT is responsible for delivering quality products and must remain knowledgeable about critical project requirements. This includes but is not limited to the requirements of their PDT counterparts in order to understand how their own requirements are related (e.g., the mechanical engineer is responsible for the project's heating, ventilation, and air conditioning (HVAC) system, but should also be aware of its impact/compatibility with the project's architectural and structural features). Each PDT member must conduct and/or facilitate project reviews to ensure consistency and effective coordination across all project disciplines.

1-11. Management of Technical Products.

a. Technical Division Chiefs, Branch Chiefs, and Section Chiefs within a District's engineering organization are responsible for guiding and ensuring that all technical documents are developed to produce high-quality work that meets the professional and project-specific criteria and standards. Effective management procedures including personnel staffing, training, systems support, performance standards, and supervision of organizations and personnel must be established to ensure engineering and design products are high quality and consistent with applicable technical policies and professional practices. District managers and leaders will ensure that the PDT and/or review team identify and properly use appropriate professional standards for legal, environmental, economic, building code, life safety, and health criteria when producing all engineering and design products.

b. The technical branch chiefs and PMs are responsible for deciding, and agreeing on, how engineering and design work will be accomplished using options such as in-house capability, A-Es, design-build contracts, other Districts, or other Government agencies. Districts and Regions need to ensure that the mix of methods for delivery of engineering and design work to achieve a balance that supports the overall effectiveness and efficiency of USACE. Regardless of the specific method of delivery chosen for a project, the District and Region remain responsible and accountable for the quality of engineering and design aspects of their project.

1-12. Technical Lead Qualifications.

a. The Chief of Engineering Function will consider the qualification requirements below and assign the TL for each project that generates Engineering and Construction (E&C) deliverables. When a project contains work performed by multiple E&C disciplines, the TL determination is based on the most appropriate skill set needed to execute the full scope of the project within the parameters of the project budget and schedule. Include this assignment as part of the PDT list in the PMP.

b. For projects with deliverables that require professional engineering services (per Federal Acquisition Regulations [FAR] Part 36), the TL must have an active professional registration, for example: Professional Engineer (PE), Registered Architect (RA), Professional Landscape Architect (PLA), National Council for Interior Design Qualifications (NCIDQ).

c. For projects with deliverables that do not require professional engineering services (per FAR Part 36), the TL is not required to have an active professional registration. The size, scope, risk and complexity of each project must be considered when determining the minimum qualifications for the TL assignment in these circumstances.

d. Assignment of non-licensed personnel must be waived in a written memorandum by the Chief of Engineering Function.

e. For projects in which the "Home" District has partnered with another district (e.g., reachback work, regional projects), the "Home" District's Chief of Engineering Function will determine where the TL designation will reside (i.e., at the "Home" District or "Partnered" District).

1-13. Plan-Do-Check-Act Cycle. The PDCA cycle is the guiding quality management procedure for USACE business processes. The quality management policies and procedures of this regulation are organized and presented by their associated PDCA phase. The PDCA cycle is illustrated in Figure 1-1 with each PDCA step summarized below.

a. Plan: Design the Quality Management Plan (QMP) to document and achieve stakeholder requirements and provide for high quality products and services.

b. Do: Implement the QMP Quality Control procedures.

c. Check: Implement the QMP QA procedures and evaluate the project results.

d. Act: Identify and implement process changes for continual, real-time improvement.

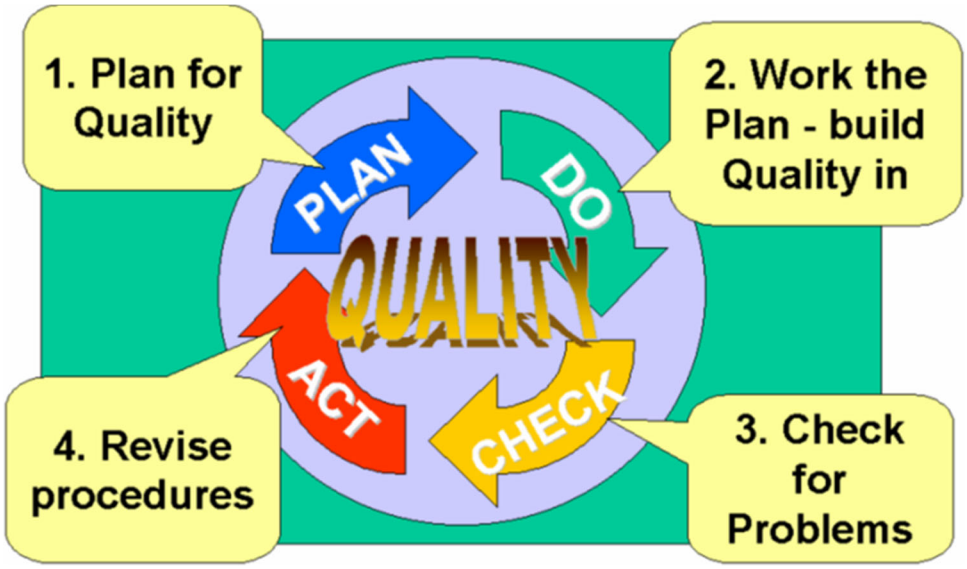

Figure 1-1. Plan-Do-Check-Act (PDCA) Cycle

1-14. Nested Plan-Do-Check-Act Cycle. There is a PDCA cycle for the project as a whole, but there are also "nested" PDCA cycles that apply to each project phase and each major deliverable. Figure 1-2 shows that the QMP is applied at each phase or deliverable of the project, it is ongoing, and the results at each step inform the Engineering and Design process going forward in real time.

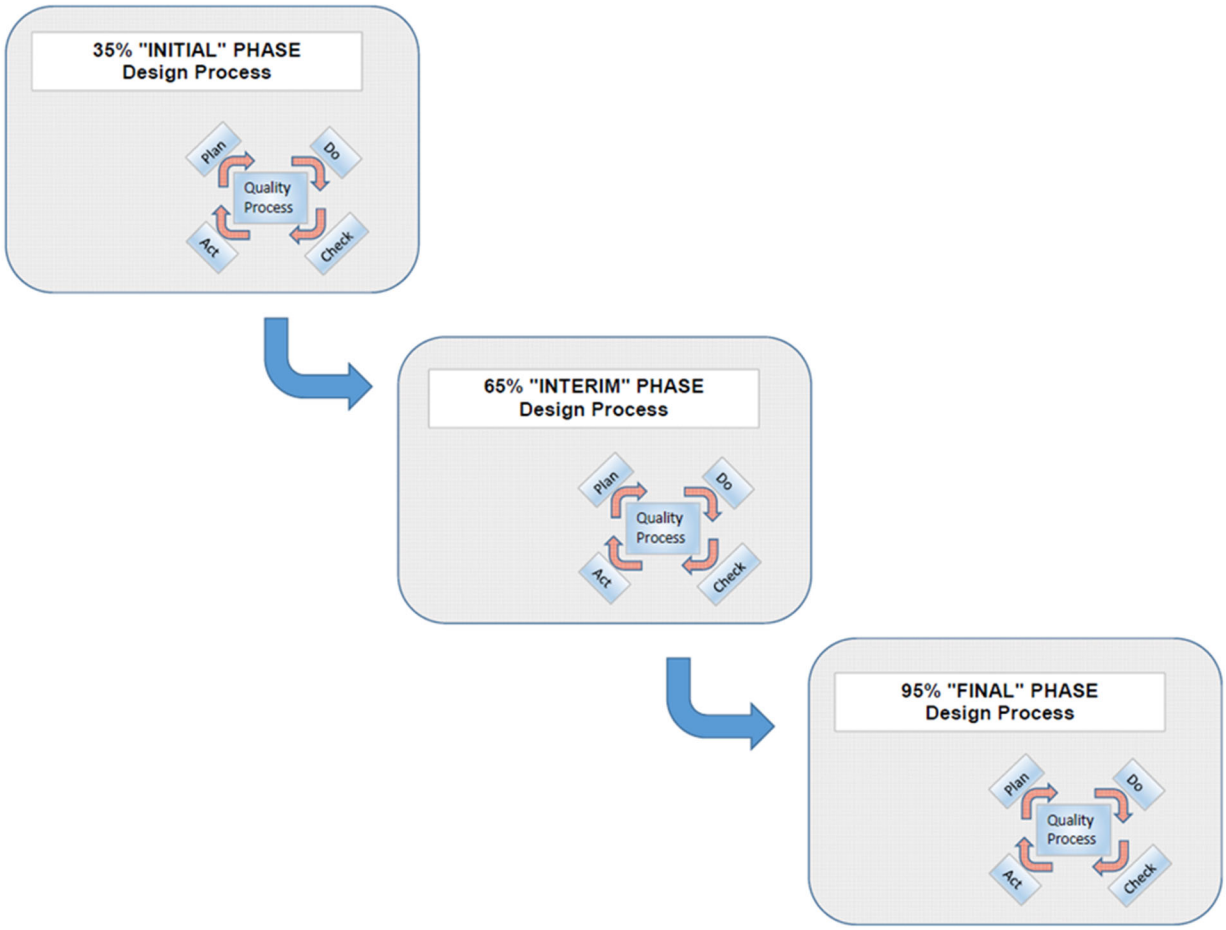

Figure 1-2. "Nested" PDCA Cycles

Chapter 2
Plan Phase: Quality Plans

2-1. General. PMP is the primary document to guide the delivery of a high-quality project. The QMP is an integral part of the PMP. Quality is planned for and managed according to the QMP. During the project planning phase, the PM will lead the PDT in the development of an effective PMP that complies with the PDBP and ER 5-1-11: USACE Business Process, including but not limited to, the following processes:

PROC2000: PMP Development

PROC2010: Scope

PROC2050: Acquisition Strategy

PROC2070: PMP Approval

PROC3010: Change Management

REF8006G: Communications

REF8008G: Quality Management Plan

REF8023G: Value Management

2-2. Quality Management: REF8008G. The QMP lays out project-specific processes for quality control and quality assurance. Also refer to the Quality Management Plan Guide in Appendix H.

a. The TL, in concert with the PM and PDT, is responsible for determining the procedures necessary to achieve the level of quality required by the project and documented in the PMP. The TL will address compliance with all applicable code, policy, and criteria and ensure that the stakeholder's quality objectives are effectively defined and clearly articulated in the PMP.

b. Any proposed change to the overall project scope, budget, or schedule that may affect the technical quality of deliverables, or the execution of quality procedures in PMP must be coordinated with the TL. The TL will provide input to update the PMP and its components; the PM will adjust the budget and schedule accordingly. No decision affecting quality management procedures may be made unilaterally.

c. Conflicts concerning technical quality between the PM and TL must be elevated through the chain of command. Any changes must be approved and documented according to the approved Change Management process (see Paragraph 2-5.d) established for the project within the PMP.

2-3. Quality Control Plan. The QCP is a component of the QMP. The QCP defines how Quality Control will be executed for products. The QCP is prepared by the TL and is implemented during the project execution phase and may be updated as required during project execution. Chapter 3 describes Quality Control activities typically addressed in the PMP.

a. At a minimum, the Quality Control Plan will be project-specific (with the exception of Paragraph 2-4.b. below) and will describe how DQC Reviews and ITRs will be performed. Other relevant information such as PDT and ITR team members and their review responsibilities, risks inherent to the project, and special considerations or crucial design features that must be addressed must be included in other appropriate sections within the PMP.

b. A minimal treatment or generic Quality Control Plan may be used for small scope or repetitive products. Professional judgment, including risk-informed decision making, will guide the decision to use a generic Quality Control Process. The PM and the TL will decide whether a project warrants a generic Quality Control Process. Risk factors to consider when making this decision may include but not be limited to potential for loss of life, health and safety, potential for significant property damage, complexity of the project, construction costs, costs of design and potential redesign, and environmental impacts.

c. The TL will be the lead preparer for all in-house Quality Control Plans and will involve other PDT and DQC review team members as required. This includes processes written to address quality control for in-house design work, in-house generated requests for proposal (RFPs), or scopes of work for A-E services. The PDT will review the Quality Control Plan before it is finalized and incorporated into the PMP by the PM.

d. For projects executed by A-E services, contract requirements must dictate that the Designer of Record (DOR) prepare a project-specific Quality Control Plan according to the PDBP included in the Design Analysis (DA)/Design Documentation Report (DDR) that is reviewed by the DQC review team and the PM, and accepted by the COR.

2-4. Quality Assurance Plan. The QAP is a component of the QMP and is prepared by the TL in concert with the PDT during the project planning phase. The Quality Assurance Plan defines how quality assurance will be executed on products that are completed in-house, with another District, government agency, or A-E resources. The Quality Assurance Plan is implemented during the project execution phase. Chapter 4 describes quality assurance activities typically addressed in the PMP.

a. The Quality Assurance Plan defines an approach to ensure that the in-house, A-E's, or supporting District's quality control process is being undertaken properly. Every project must have a Quality Assurance Plan.

b. At a minimum, the Quality Assurance Plan must describe how quality assurance will be performed. Other relevant information (e.g., team members responsible for QA review and QA review schedule) must be included in other appropriate sections within the PMP.

c. The TL will be the lead preparer of the Quality Assurance Plan, involving other PDT members as required. For in-house or supporting District design work, the Quality Assurance Plan will be reviewed by the PDT's engineering Section Chiefs, or for A-E design work, the Quality Assurance Plan will be reviewed by the DOR.

2-5. Other Quality-Related Project Management Plan Components. The PM, the DQC review team and the PDT will ensure that the following key PMP components are structured to optimize project quality:

a. Production Schedule: PROC2030. All projects and associated technical documents will have a formal production schedule according to Activity/Schedule Development: PROC2030. This schedule will identify individual tasks to be accomplished, time duration for each task, responsible offices, PDT members, DQC review team members, and ITR team members for the tasks, and primary milestone dates. The PM and TL will ensure that all critical QMP activities are accounted for in the schedule. The PM, in concert with the TL, will maintain/revise the schedule periodically to reflect ongoing actions.

b. Risk Analysis: REF8007G. Risk Analysis is a required subsidiary of the PMP and identifies project risks and documents strategies to mitigate and manage those risks. Those risks and opportunities determined to have an effect on overall project quality will also be included as part of the PMP.

c. Change Management: PROC3010.

(1) The change management process is a required subsidiary of the PMP and identifies how project changes will be managed and implemented. This process also includes any approach to transitioning individuals, teams, and organizations using methods intended to re-direct the use of resources, business process, budget allocations, or other modes of operation that significantly reshape a project or program, directions on using change request forms, the establishment of review boards, and other processes and features to control impacts to project quality, cost, and schedule.

(2) This process will stipulate performance metrics for project scope, schedule, cost, quality, and risk. PM, DQC review team, and ITR members will evaluate all proposed project changes and report potential impacts to the performance metrics per the project Communications: REF8006G. The goal for the change management process is to determine if actual project performance meets or exceeds the project's baseline performance thresholds throughout the project lifecycle.

d. PMP Approval: PROC2070. PROC2070 provides guidance for approval of the PMP.

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Chapter 3
Do Phase: Quality Control

3-1. General. Quality Control (QC) is that part of quality management focused on ensuring performance meets agreed upon stakeholder requirements that are consistent with law, regulations, policies, sound technical criteria, schedules, and budget. QC focuses on the PRODUCT. QC is the process of ensuring technical quality. Technical quality means that the project or product meets applicable criteria, policies, and guidance; that analyses and calculations are accurate, complete, and appropriate for the project phase; and that the documents are consistent, complete, coordinated, and comply with documentation standards. Basic quality control tools include DQC Reviews, DQA Reviews, ITRs, and Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Reviews.

3-2. Products. Districts produce a broad variety of products including, but not limited to:

a. Civil Works Program: Studies, engineering technical appendices for planning reports, design documentation reports, design analyses, and plans and specifications.

b. Military Program: Full spectrum of military planning documents, studies, programming estimates, and design documents.

c. Environmental Program: Various environmental studies, remedial investigations, and remedial designs.

3-3. Quality Control Plan Implementation. The QCP, prepared by the TL during the Plan Phase, will be implemented during project execution. The TL will update the QCP as required for changing project conditions and incorporating Lessons Learned. The TL may also prepare additional QCPs for different phases and products, depending on nature of the associated work.

3-4. Project Coordination. Regular coordination among the PM, the TL, PDT members, other Districts, government agencies, A-E contractors (if applicable), ITR members, and stakeholder or sponsor representatives is essential for a quality project. The PM, TL, and remaining PDT members must also maintain coordination with both Centers of Standardization and Mandatory Technical Centers of Expertise throughout a project, where applicable.

3-5. District Quality Control Review.

a. DQC reviews are technical checks and reviews occurring during the Engineering and Design process on in-house designs. DQC reviews are also known as “Peer Reviews.” DQC reviews are discipline-by-discipline, comprehensive, “over-the-shoulder” reviews conducted as project work continues. DQC reviews include, but are not limited to, comprehensive evaluation of correct application of methods, validity of assumptions, adequacy of basic data, correctness of calculations (error-free), completeness of documentation, and compliance with guidance, required formats and standards.

b. DQC reviews must be performed by designated individuals not involved in the day-to-day production of the project/product, and from the senior staff or other qualified personnel identified by the responsible supervisor. DQC reviews are performed at every stage of the design and must be performed prior to the submission of the deliverables for the ITR. The TL will coordinate with appropriate personnel to provide necessary documents for all reviews.

3-6. Independent Technical Review.

a. ITR is a review by a qualified person or team, external to the PDT, optimally external to the "Home" District, and not involved in the day-to-day production of a project/product, for the purpose of confirming the proper application of clearly established criteria, regulations, laws, codes, principles, and professional practices. All products, including those prepared by other agencies and contractors, will be subjected to an ITR. ITR is a holistic, comprehensive review of the project. While ITR is a critical component of quality control, it will not replace DQC or other quality control processes.

b. Each ITR team member should review each product for consistency across the various disciplines of the project. ITR team members must also review his/her discipline's elements and how those elements impact and align with the project's functions. Comments will be limited to those that are required to ensure adequacy of the product; it will not be the reviewer's prerogative to dictate matters based solely on personal preferences. Minor issues (spelling, grammar, formatting, minor numerical errors that do not affect the validity of the results, and other issues that do not contribute toward a safer, more functional, or more economical project) must be resolved by the PDT during the DQC review process prior to ITR submittal.

3-7. ITR Objectives. The primary objectives of ITR are to ensure:

a. The project meets the stakeholder's scope, intent, and functional and technical objectives as defined in the PMP.

b. Formulation and evaluation of alternatives are consistent with applicable regulations and guidance.

c. Concepts and project costs are valid.

d. The recommended alternative is feasible and will be safe, functional, constructible, environmentally sustainable, within the federal interest, and economically justified according to policy.

e. All relevant engineering and scientific disciplines have been effectively integrated.

f. Appropriate computer models and methods of analysis were used, and basic assumptions are valid and used for the intended purpose.

g. The source, amount, and level of detail of the data used in the analysis are appropriate for the complexity of the project.

h. The project complies with accepted practice within USACE.

i. Content is sufficiently complete for the current phase of the project and provides an adequate basis for future development effort.

j. Project documentation is appropriate and adequate for the project phase.

3-8. Independent Technical Review and Project Risk. ITR should be commensurate with the scope, complexity, risk, and cost of the project. It is critical that appropriately experienced and technically expert personnel be assigned to the ITR team. The ITR team must be selected based upon factors such as the project scope, complexity, and size; sponsor/stakeholder expectations; public scrutiny; life safety; technical expertise required; overall knowledge of USACE business processes; and other appropriate guidelines.

3-9. Independent Technical Review Team Members. ITR team members will demonstrate senior-level competence in the type of work being reviewed. Junior-level staff cannot be members of ITR teams without appropriate senior-level technical monitoring. For most projects, ITR members should be sought from the following sources: regional technical specialists; appointed subject matter experts (SMEs) from other Districts; senior-level experts from other Districts; Center of Expertise staff; appointed SME or senior-level experts from the responsible District; experts from other USACE commands, contractors, academic, or other technical experts; or a combination of the above. ITR should be performed outside of the responsible command. All ITR teams should strive to include personnel who are registered in their field of expertise, as applicable.

3-10. Stakeholder Roles and Responsibilities Under Independent Technical Review. The ITR team will normally include a variety of stakeholders, each with his/her own important project requirements and a different, but interlocking review responsibility. The TL will coordinate with appropriate personnel to provide necessary documents for all reviews, facilitate and ensure resolution of technical issues and comments among PDT members, and involve the PM when required. Some typical reviewer roles include:

a. Major commands personnel review with a focus on space allocation provisions and compliance with project construction cost and delivery parameters (functional).

b. Directorate of Public Works and Base Civil Engineer review with a focus on effective and efficient operability and maintainability of the project by base personnel.

c. Using agency stakeholders and Civil Works sponsors review for compliance with the functional purpose of the project.

d. Specialized functional experts (e.g., Chief of Chaplains, Food Service, Health Facilities Office) ensure that their particular specialty is properly designed.

e. Centers of Standardization and Centers of Expertise review for compliance with standard design policies and procedures.

f. The Fire Marshall checks for compliance with locally established fire protection requirements that supplement standard fire protection criteria.

g. The Provost Marshall checks for security measures and requirements.

h. The PM reviews the project for progress according to the PMP (i.e., scope, schedule, and budget commitments).

i. Office of Counsel is responsible for legal sufficiency and identifying legal issues.

3-11. Independent Technical Review Team and Project Delivery Team Relationship.

a. Appropriate and separate PDT and ITR teams will be established during the initial PMP development. ITR reviews must be conducted as necessary to ensure that the product is consistent with the PMP and established criteria, guidance, procedures, and policy. ITR team members will be identified in the PMP, and any personnel changes are to be coordinated with the PM and reflected by updating the PMP. The ITR team must ensure independence from the PDT by not becoming involved in the routine day-to-day production decisions, including formulation, evaluation, analyses, design, or value engineering studies. However, the ITR team will be available to act as advisors to the PDT during design.

b. ITR should focus on offering the advantages, disadvantages, and concerns of options considered by the PDT, and offer any other alternatives and/or better practices not considered by the PDT. The PM must ensure that the ITR team maintains situational awareness with respect to project challenges and opportunities. This could include, at a minimum, scheduled periodic project briefings and site visits.

3-12. Communication and Resolution of Issues.

a. The ITR process must be an integrated process with formal reviews coordinated with the PDT at scheduled milestones, minimizing unproductive design effort and rework. ITR team members will be available, knowledgeable, and willing to offer guidance as major issues arise. PDT members are encouraged to seek concurrence from the ITR throughout the product delivery process as prescribed in the PMP. The PM is responsible to ensure appropriate dialogue occurs between the ITR team and the PDT. The TL is responsible for facilitating resolution of technical comments resulting from all reviews, as appropriate. The ITR team will furnish the PDT feedback at critical points during project formulation and design and will conduct formal reviews at scheduled milestones and as products are completed. Formal ITR of products only occurs when a holistic, comprehensive review of the overall product is performed.

3-13. Biddability, Constructability, Operability, Environmental, and Sustainability Review. Review of a project's biddability, constructability, operability, and environment aspects is a required element of design quality control and quality assurance reviews. At a minimum, three BCOES reviews must occur according to ER 415-1-11. The reviews must be conducted at the concept design stage, at the final document stage, and for a final backcheck review. The PM must ensure distribution of design documents to BCOES reviewers. Reviewers will record all comments related to the BCOES aspects of the project within the scheduled design review periods. BCOES reviews must be coordinated to occur concurrently with ITR to the greatest degree possible.

3-14. Comment Documentation via DrChecks^{SM} Module. The DQC review team, DQA review team, ITR team, and BCOES reviewers will document comments and recommendations, for all formal reviews, using the DrChecks^{SM} module in ProjNet according to ER 1110-1-8159.

a. Comments. Each comment must be succinct and enable timely resolution of the concern. Comments should be limited to those that are required to ensure product adequacy. The four key parts of a quality review comment normally include:

(1) The Review Concern. Identify the work product's information deficiency or incorrect application of policy, guidance, or procedures.

(2) The Basis for the Concern. Cite the appropriate law, policy, guidance, or procedure that has not been properly followed.

(3) The Significance of the Concern. Indicate the importance of the concern regarding its potential impact on topics such as plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, federal interest, or public acceptability.

(4) The Probable Specific Action Needed to Resolve the Concern. Identify the actions that must be taken to resolve the concern. In some situations, especially addressing incomplete or unclear information, comments may seek clarification to then assess whether further specific concerns may exist.

b. Preferential Comments. Comments should generally not include attempts to enforce personal preferences over otherwise acceptable practices (i.e., alternate solutions or analysis/ design methods) when the authors have already used appropriate methods to develop an adequate solution or attempts to address issues that do not add value toward the work product decisions and recommendations and do not make the work product more safe, functional, or economical. In addition, comments should not include grammar, spelling, or punctuation items unless these items detract from the overall work product.

c. PDT Comment Responses. Upon receiving the review comments, the PDT will develop responses to the specific concerns and coordinate those responses with the appropriate review teams using DrChecks[SM]. Technical responses will be made by the author or by an individual experienced in that discipline area. Responses will acknowledge and specifically address the comments, indicating resolution steps taken or to be taken. The PDT must assess each review comment and either implement the comment or provide a logical, well-thought-out response as to why not to implement the comment.

d. Issue Resolution.

(1) PDT responses and the ensuing discussion are to seek resolution of the concerns to the mutual satisfaction of the PDT and the review teams. The PM and TL are responsible for facilitating contact between the review teams and the PDT throughout the project development process. When the PDT does not concur with a review comment, the best means of resolution is a discussion between PDT and review team members. When such a discussion does not result in an appropriate resolution, the issue must be elevated through the chain of command.

(2) The review teams do not have authority to cause resolution of comments; the authority for comment resolution lies with the chain of command. The Chief of Engineering Function is the final authority for resolution of review comments. The Regional Headquarters may be asked to act as an informal sounding board for an unresolved issue or may be asked by the District to resolve the issue. All comments in the DrChecks[SM] module will be backchecked against the final documents prior to closing and issuing any review certifications.

3-15. Certification Process. The PM must initiate and route certifications for all final products and final documents. The certifications signed by TL, PM, and the Chief of Engineering Function must indicate that the issues raised by the review teams have been resolved. Sample certifications are included in Appendix E. Commands may modify the statements to fit local needs.

3-16. District and Center Responsibilities. The command that has overall project management responsibility for a project is responsible for ensuring that ITR is performed and certified within established guidelines. As such, the command must ensure that all requirements and processes are understood and followed.

3-17. Architect-Engineer Contractors. A-E contractors will be required to accomplish design reviews of their products as part of their quality control process, also using the DrChecks[SM] module of ProjNet, and the responsible USACE command will perform quality assurance in addition to the QC reviews indicated in this chapter. The A-E contractor is still responsible for quality control of its work. The USACE command is still responsible for policy and standards compliance on all projects.

Chapter 4
Check Phase: Quality Assurance

4-1. General.

a. Quality assurance (QA) is defined as that part of quality management focused on providing confidence that project quality requirements defined in the PMP will be fulfilled. QA focuses on the PROCESS. QA is the means of ensuring that the project or product meets the requirements for technical adequacy, and that QC activities have been properly performed and documented. Technical adequacy is the determination that correct criteria, including laws, codes, regulations, policies, and guidance have been referenced and applied, and that a valid engineering or design methodology has been used and documented. Spot checks of calculation and analysis may be performed for validation. Together, the engineering and design QA/QC activities must be effective in producing engineering and design products that meet the required quality standards.

4-2. Responsibility and Accountability for Ensuring Quality of Engineering and Design Work. For engineering and design products or services being prepared by a District, that District's Regional Headquarters is responsible and accountable for QA of the District's engineering and design products. For engineering and designs prepared by another District or Center, government agency, or A-E contract, the QA responsibility and accountability for engineering and design are assigned to the "Home" District for which the work is being performed. The "Home" District's engineering organization must lead QA of engineering and design products.

a. The Regional Headquarters will conduct regular Regional-level QA activities for engineering and design using their established regional audit process. Regional leaders are responsible to verify periodically that their QA activities for engineering and design are effectively ensuring the quality of all engineering and design products produced for use within their region. If a critical or persistent quality problem exists with engineering or design work performed within the Region, then the Regional Headquarters will promptly conduct on-site reviews to identify the root cause of the quality problem and take prompt actions to correct the engineering or design quality problems.

b. Districts or Centers will mandate all QA actions needed to produce engineering and design products that meet the required quality standards. These actions will include needed training and staffing; preparation of Quality Assurance Processes tailored by PDTs for each specific project; review and approval of another District, Government agency, or A-E Quality Control Processes; and disciplined, effective QA oversight.

4-3. Quality Assurance Plan Implementation. The Quality Assurance Plan prepared by the TL and PDT during the planning phase will be implemented during execution of the engineering and design phase. The TL will update the Quality Assurance Plan in the PMP as required for changing project conditions. The TL may prepare additional Quality Assurance Plans for different engineering and design phases and products, depending on nature of the associated work.

4-4. Typical Quality Assurance Activities. Typical QA activities for engineering and design work include, but are not limited to:

a. Review and approval of another District, Government agency, or A-E-prepared Quality Control Plan.

b. Assurance that described activities of another District, Government agency, or A-E's Quality Control Plans have been/are being performed and that the results are being implemented effectively.

c. Verification that designers and reviewers are the same technically qualified staff or a fully technically qualified substitute (as proposed by the other District, Government agency, or A-E's SF-330) as identified in the PMP.

d. Assurance that an ITR is conducted in accord with Chapter 3, with emphasis on a determination that the ITR was appropriate to the level of risk and complexity inherent in the engineering and design aspects of the project; that the ITR verified compliance with established policies and procedures; that it utilized justified and valid assumptions; and that it reviewed methods, procedures, alternatives, and reasonableness of results, including whether the product meets stakeholder's needs.

e. Verification that the DOR (A-E or another District/Government agency) is fulfilling their contractual requirements.

f. Verification that appropriate technically qualified staff in another District, Government agency, or A-E have completed and signed the required engineering and design QC certifications.

g. Assurance that all engineering and design QC review comments have been adequately resolved in future submittals.

h. Verification that the latest version of the construction/implementation documents is used in the solicitation package.

i. Detailed technical reviews of critical, essential or "cannot fail" elements of engineering and design work as part of overall QA reviews.

Chapter 5
Check Phase: Design Responsibility

5-1. General. In addition to addressing the validity and accuracy of the design effort, the subject of design responsibility encompasses several other areas of professional accountability. These include both legal and financial accountability, state professional licensing issues, and the process of establishment and control of a unique and legally identifiable Designer of Record. This chapter covers USACE policies concerning these issues. Appendix F presents the official position of the United States Government in addressing the doctrine of Federal Supremacy regarding state professional registration requirements.

5-2. Designer of Record. The DOR is defined as the individual who is ultimately responsible and liable for the adequacy and safety of a design. For in-house designs, the DOR is designated as the Chief of Engineering Function. For designs prepared by another District, the DOR is designated by that District's Chief of Engineering Function. For A-E designs and services, the DOR is the principal of the A-E firm who is in charge of the project.

5-3. Design Liability. Design liability is defined as legal and financial accountability for the adequacy and safety of a design. Design liability rests with the DOR.

5-4. Design Responsibility. Design responsibility means the final and total responsibility for ensuring the correctness of design, specifically the adequacy and safety of the structure or system.

5-5. Direct Supervisory Control. This is a term utilized by state boards of professional registration as an absolute requirement before a registered engineer may sign/seal professional work. It means that this individual has direct control or dominion over the work and has the ability to control the direction and scope of the project at any point in time. The individual is not required to perform all the drafting, calculations, reproduction, and computer techniques that can be done by others, but direct input, control, and ability to change the documents must remain with the responsible registered professional. This person must be qualified professionally through experience and training to do the work. Finally, this person may sign only that portion of the work developed by the registrant or under his/her immediate personal supervision.

5-6. Professional Accountability. Designation of the Chief of Engineering Function or other equivalent position as the DOR does not relieve the individual designer and reviewer from accountability for the adequacy and safety of their design. Accuracy and quality of design effort will always serve as a factor in each designer's performance evaluation. Design accountability must always rest with those individuals who are performing and/or checking the actual design calculations or making critical decisions relevant to the project. For A-E developed products FAR Clause 52.236-23: "Responsibility of the Architect-Engineer Contractor" clearly defines the responsibility of the A-E in performing work.

5-7. Procedures for Signature and Indication of Registration. The procedures for signature and indication of registration are:

a. Professional Registration.

(1) USACE requirements for professional registration for key technical management positions are identified in ER 1110-1-8152: Professional Registration and Signature on Design Documents. USACE does not, however, require that registration be in any particular state. Appendix F provides a detailed summary of a HQUSACE legal analysis of Federal Supremacy issues concerning a state's authority to require professional registration for federal projects.

(2) USACE is not required to comply with state requirements except in those situations where Congress has waived the Federal Government's Supremacy. In the case of six environmental statutes (identified in Appendix F), Congress has waived Federal Supremacy and the federal government must comply with state substantive requirements, permits and certifications. While this concession does not specifically address professional registration, Districts and Regional Business Centers are directed to cooperate with states in the spirit of partnership, while not unduly compromising Federal Supremacy. This wording implies that the use of professional stamps for design projects covered by any of these six environmental statutes (while not specifically a legal requirement) may be appropriate.

b. Responsibility.

(1) The Chief of Engineering Function, or designated deputies, will sign and date all in-house design documents and associated certifications, as well as all appropriate permit applications executed by the USACE. District Chiefs of Construction and Construction-Operations or equivalent position (or their designated deputies) will sign and date certifications required during or after construction. Districts are encouraged to contact HQUSACE for guidance concerning unusual situations. The responsible professional's signature will be followed by "P.E." (Professional Engineer), "R.A." (Registered Architect), or another appropriate designation indicating that the signer is currently a registered professional.

(2) All documents may be sealed or stamped, rather than using the "P.E." or "R.A." designation, at the discretion of the District. This responsibility may be further delegated to appropriate subordinate senior registered professionals. In the rare case when a Chief of Engineering Function is not a registered professional, this responsibility will be delegated to appropriate senior registered professionals. Any delegation must be reflected in the individual registered professional's position description and in specific written District procedures. Individuals signing according to this paragraph are required to do so within the scope of their employment.

c. Architect-Engineers. A-E service contracts will require the A-E to sign and stamp or seal and date at least one set of design documents, permit applications, or certifications. The deliverables under each A-E services contract will include: one set of properly signed, stamped, or sealed and dated drawings; a certified cover document showing for each discipline the name and stamp or seal of the professional who supervised the work and the date each stamp or seal was affixed; or an electronic signature that indicates for each discipline the name, stamp, or seal of the professional who supervised the work and the date each stamp or seal was affixed.

Chapter 6
Check Phase: Construction Quality Assurance

6-1. General. Obtaining quality construction is a combined responsibility of the construction contractor and the Government. The Contractor is always responsible for construction Quality Control. The Contractor and Area/Resident Offices, as applicable, plan, coordinate, and manage the Construction Quality Management Program; plan and coordinate partnering of construction contracts; manage the RMS; monitor and evaluate Command Management Review performance; and share responsibility for construction Quality Assurance. Many of these tasks are accomplished using the RMS. According to ER 1180-1-6: Construction Quality Management, Construction Branch and Area/Resident Office personnel perform quality assurance of construction products.

6-2. Engineering Support. The PDT will give priority to supporting construction contract activities, as response time is critical to ensure cost-effective contract execution. The PM will ensure that the engineer support to construction is adequately resourced, including A-E construction phase (Title II) services (as required). Site visits by the appropriate PDT members, coordinated by the TL, are encouraged to verify conditions assumed during the design phase and offer technical support to the field staff relative to design intent. Needed changes to the contract documents will be formalized and initiated by field personnel and coordinated with the TL to the appropriate discipline lead (for in-house designs) or DOR (for A-E contracted designs) for review.

a. Engineering Considerations and Instructions for Field Personnel.

(1) An Engineering Considerations and Instructions for Field Personnel (ECIFP) is a brief document outlining the engineering considerations used to make design decisions. It includes the project discussions on the intent and why specific designs and materials were selected and any features requiring special attention. ECIFP is the transition document from engineering to construction and is required before Ready to Advertise (RTA).

(2) The DOR must prepare an ECIFP according to specific Military Programs or Civil Works guidance; refer to the sample provided in Appendix G. Do not duplicate extensive information included in the Design Analysis (DA)/Design Documentation Report (DDR). The ECIFP should highlight important design decisions and refer to substantiating data included in the models, drawings, specifications, and DA/DDR as necessary. Prepare the document before RTA, provide insight and background necessary to review submittals, and resolve minor construction problems without compromising design intent.

(3) The TL will synchronize input from the PDT and incorporate it into the document. ECIFP is used to transmit special design concepts, assumptions, and instructions on how to construct unique design features and is the means of communication and coordination between design and construction personnel for preconstruction and preparatory meetings, submittal reviews, shop drawings, samples, certifications, and test results. The TL is responsible for briefing field personnel on both the document and general design conditions.

b. Contractor Submittal Requirements. ER 415-1-10: Contractor Submittal Procedures provides guidance on Contractor Submittal Procedures. Submittals that always require government approval are extensions of design, critical materials, variations, government-required plans, schedules, O&M manuals, as-built drawings, or equipment that must be compatible with the entire system (e.g., cybersecurity). Submittals requiring DOR or A-E review and approval include:

(1) Critical construction features expressed in terms of performance standards with design details.

(2) Any variation prior to construction requires documentation per ER 1110-1-8152: Professional Registration and Signature on Design Documents.

(3) Fire protection systems.

(4) Structural steel connections.

(5) Total building commissioning.

(6) Pre-manufactured metal buildings and other special systems.

(7) Control systems cybersecurity.

c. Design Modifications. Engineering will review all construction changes that have a significant impact on design, including Value Engineering Change Proposals, waivers and system changes, to ensure that design intent, safety, health, and environmental requirements are not compromised. All design modifications will be coordinated with the TL to the appropriate discipline lead or DOR, and will be reviewed for design deficiencies that may require changes in design criteria.

6-3. Site Visits. Periodic and timely visits to construction sites must be made by design and review personnel. Coordination between construction and engineering should be sufficient to enable design personnel to be fully aware and conversant about construction progress in their area of design responsibility.

a. These site visits will ensure that:

(1) Site conditions throughout the construction period are in conformance with the design intent and critical design assumptions and principles as outlined in the design documents.

(2) Project personnel are given assistance in adapting project designs to actual site conditions that are revealed during construction.

(3) Any engineering or construction problems not fully assessed in the original design are observed and evaluated, and appropriate action is taken to modify the contract and improve future designs.

b. Frequency of site visits by design personnel should be based on actual construction schedules and activities, and project complexity. A schedule of visits to the construction site must be established and coordinated between field personnel, the PM, and the TL. The schedule will identify the purpose of the visit, timeframe, disciplines, and office of participants involved. Site visit requirements must be included in the A-E's construction phase (Title II) services contract.

c. Representatives from HQUSACE and the appropriate Major Subordinate Command (MSC) offices are to be advised of construction progress in a timely manner to permit participation in field inspections at critical construction stages. Refer to Civil Works and military design policies (located online at https://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations) regarding those activities which require inspection.

d. Costs for both scheduled and contingency visits must be identified in the PMP. All scheduled site visits during preconstruction and construction (after construction contract award) will be funded by Engineering During Construction or Design During Construction funds. Contingency visits will be funded from Supervision and Administration funds.

e. When one or more consultants have been employed in the design of a project, the consultants may be invited to visit the construction site at appropriate times.

6-4. Operation and Maintenance (O&M) Plans, Manuals, and Training. A major component of the user's overall impression of the quality of the facility received is its operability. An O&M manual is a comprehensive plan for properly operating and maintaining a facility. Onsite training of base/sponsor O&M personnel may also be included to shorten the learning curve and provide familiarization of complex systems as the new facility comes online. ER 1110-345-723: Total Building Commissioning Procedures, provides requirements for Military Construction projects. At the predesign conference, the need for an O&M plan or systems commissioning should be discussed on projects such as power plants, water treatment plants, sewage treatment plants, mechanical equipment and electrical systems, medical facilities, and Air Force projects. Preparation of electronic O&M manuals and training must be included in the associated construction contract.

6-5. As-Built Drawings. The use of an electronic format for documentation of redlines and as-builts, and delivery of record drawings during construction, is required. The construction contractor develops, maintains, and submits as-built documentation in the specified advanced model electronic format. Refer to United Facilities Guide Specification (UFGS) Section 01 78 00: Closeout Submittals in the contract documents for as-built requirements. As-built drawings must be included on the submittal register as necessary to incorporate extensions of design by the construction contractor and reviewed by field personnel a minimum of once per month. Engineering provides a technical QA review of working as-built drawings and a QA review of the electronic files from which the drawings are generated.

6-6. Resident Management System. The Government module of RMS is the automated construction management/quality assurance information system that must be used for monitoring

and administration of all construction contracts. The contractor uses the Government-furnished RMS Contractor's Module (RMS CM) to record, maintain, and submit various information throughout the contract period. UFGS Section 01 45 00.15 10: Resident Management System Contractor Mode (RMS CM), covers the requirements for contract monitoring and administration. RMS CM might not be required by the construction office for small, simple, short duration construction contracts, or for contracts where its use would not be beneficial overall. RMS CM is included in the construction solicitation, when needed.

Chapter 7
Check Phase: Design-Build Method

7-1. General. In using the D-B delivery method, the contractor provides integrated design and construction services while USACE performs quality control and quality assurance of solicitation documents, and quality assurance on both design and construction deliverables. The contractor is responsible to perform quality control on both design and construction deliverables.

7-2. Use of Design-Build. Planning is the process that determines which contracting method will be used to deliver a product. Specific details for this process are outlined in PROC 2050 in the USACE Project Delivery Business Process. Refer to ER 1180-1-9: Design Build Contracting for the requirements of design build contracting. Current USACE Acquisition Instruction (UAI) clauses are critically necessary for inclusion in every D-B RFP to ensure the D-B contract is implemented appropriately. This regulation focuses only on the quality management processes associated with D-B and assumes the determination to use it as a delivery method has been done appropriately during acquisition planning.

7-3. District and Major Subordinate Command Responsibilities. MSC Quality Managers, or similar points of contact, are responsible for establishing Division-level Quality Management processes, to include QC/QA of projects executed using Design-Build. District processes must be based on the MSC guidance.

7-4. Project Delivery Team Responsibilities: Pre-Solicitation.

a. Develop scope of work and associated documents required for the successful solicitation and award of D-B RFP. The RFP may be developed by an in-house team, in partnership with another district, or contracted to an A-E. In any case, the PM and TL must both be engaged to ensure that these deliverables included clear communication of the program, scope, and criteria.

b. Refer to the UAI for exact contract clauses to be included in all D-B solicitations. Using the clauses in the UAI and FAR are critical to contract administration.

7-5. Design Quality Control Review and Independent Technical Review Team Responsibilities.

a. Pre-Solicitation. Perform QC/QA activities described in the PMP to ensure technical quality of solicitation documents. Ensure that the RFP includes requirements for the contractor to develop and submit for approval quality control plans for both design and construction. Additionally, ensure the RFP includes provisions for the contractor to provide constructability input to the D-B contractor's DOR during the post-award design phase.

b. Solicitation. Review and evaluate D-B proposals for technical compliance with solicitation requirements. Provide the Contracting Officer with necessary information to substantiate best-value determinations.

c. Post-award Design.

(1) Perform quality assurance reviews of design submittals from D-B contractor. This review must ensure the submitted design meets contract obligations to include performance and prescriptive criteria. This process is in addition to the D-B contractor's own quality control review.

(2) Additionally, this review must also include an assessment for conformity with the contractor's own submitted and accepted Quality Control Plan. The Contractor's QCP must demonstrate how the design is reviewed internally and independently (i.e., ITR) for technical sufficiency to substantiate and meet the contract requirements and all applicable technical criteria, codes, and other regulations.

7-6. Design-Build Contractor Responsibilities.

a. General. The D-B contractor's roles must be described and substantiated by a clearly written and technically accurate RFP with supporting contract documents. These roles include overall responsibility for quality of both design and construction services. ER 1180-1-6 defines specific construction quality management responsibilities. UFGS Section 01 45 00.00 10: Quality Control must be included in the contract documents. Section 01 45 00.00 10 must include the requirement for the contractor to develop and submit for approval of both Design and Construction Quality Control Plans for all deliverables provided during design and construction stages, respectively. Additional responsibilities described below must also be included in contract documents.

b. Post-Award Design.

(1) Integrity of Design. The D-B contractor is responsible for the professional quality, technical accuracy and the coordination of all designs, calculations, models, drawings, and other services furnished under the contract. This also includes design work performed by its subcontractors. Unlike design-bid-build project delivery in which the DOR and construction contractor are not contractually linked, in D-B projects the contractor is responsible for correcting design errors identified during construction through the DOR.

(2) Constructability Input. BCOES review for D-B projects occurs as part of the RFP development. ER 415-1-11 requires that D-B contractors include BCOES considerations, to specifically include constructability, as part of its quality control procedures. The Design Quality Control Plan must describe how the construction component of the D-B contractor will be engaged during design to address constructability, systems coordination, and project costs.

(3) Responsibility for Design. The UAI prescribes the specific contract clause to include that defines the D-B contractor's responsibility for design. The D-B contractor is liable for the quality of and corrections to design deliverables as well as upholding the professional standard of care for all design and construction services provided. Government review, approval, acceptance, or payment for design products does not waive the contractor of this liability.

(4) Warranty of Design. The UAI prescribes the specific contract clause to include that defines the D-B contractor's warranty of design. The D-B contractor warrants the design will be performed according to the contract requirements. The design warranty of the D-B contractor will be effective from the government's acceptance of work through the Statute of Limitations and Statute of Repose.

(5) Design Quality Control. The Design Quality Control Plan must be prepared and submitted by the D-B contractor for approval by the Government. At a minimum, the Design Quality Control Plan must designate a qualified design quality control manager, incorporate DQC and ITR reviews into the design schedule, identify fast-track submittals and describe how DrChecks^{SM} will be used. Additionally, the Design Quality Control Plan must address procedures for design submittal reviews and for the DOR to review and approve construction submittals. The Design Quality Control Plan must be consistent with the overall contract schedule.

(6) Design Submittals. Designs must be submitted prior to beginning construction for each applicable feature of work and according to the approved design schedule, to include accounting for fast tracking if applicable. Format and content of submittals must meet contract requirements. Record design review comments, to include non-concurrence and/or resolution, using DrChecks^{SM}.

c. Post-Award Construction.

(1) DOR Quality Role During Construction. The D-B Contractor is obligated to ensure that construction is completed according to the approved design documents. This should be accomplished with the support of the subcontracted DOR that verifies construction is performed according to the accepted design. The DOR's quality role during construction must be described in the Construction Quality Control Plan and includes, but is not limited to, reviewing and approving shop drawings, correcting design errors and omissions, revising the design for official changes and approved variations from the accepted design, resolving field questions or problems and approving final as-built drawings and record models.

(2) Construction Submittals. The D-B contract must require the contractor's DOR to perform a technical review and approval of construction submittals as identified in the submittal register.

(3) As-Built Documentation. The D-B contract must require the contractor's DOR to review, sign, and stamp as-built documentation. The D-B contractor will develop, maintain, and submit electronic redlines, as-builts, and record models in the specified advanced model electronic format (e.g., .pdf, .dgn, .dwg) file types.

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Chapter 8
Act Phase: Continual Improvement

8-1. General. Continual improvement is a performance imperative for every command and is achieved through the review of project results, identification of non-conformities and systemic problems, tools for root cause analysis, and implementation of appropriate corrective actions. The process of continual quality improvement leads to the refinement of the overall quality system. Processes and tools for continual improvement include quality management review, AAR, lessons learned, best practices, and quality metrics.

8-2. Quality Management Review. Each District will stipulate procedures for management review of production processes at project and organization levels. District-level Quality Management processes and requirements are referenced using the USACE Quality Management System Qualtrax platform (https://qualtrax.usacegis.us/).

8-3. After-Action Review. An AAR is a professional discussion of an event focused on improving the performance of the organization or team. The focus of the AAR is analyzing what was supposed to happen, what actually happened, and why it happened. Through the AAR process, the team compares the actual outcome with the expected outcome of a program, project, event, activity or service, identifies gaps and corrective actions, and develops lessons learned. The AAR process is described online in the Army Training Network: How to Conduct an AAR (video): https://atn.army.mil/unit-training-management-(utm)/training-topics/how-to-conduct-an-aar-(video).

a. PMs will conduct an AAR at the end of each major project phase.

(1) For Military projects, an AAR must be performed when these phases/events are completed: planning charrette; design; construction; and the nine-month post-completion inspection.

(2) For hazardous, toxic, and radioactive waste projects, an AAR must be performed when these phases/events are completed: reconnaissance, feasibility, construction, and other major milestones associated with the program type.

(3) For all projects, an AAR must be performed when:

(a) An error or other significant change causes one or more of these conditions to occur: a cost increase of 5% or more, a design schedule slippage of 30 days or more, a construction time growth of 60 days or more, and/or a consequent reduction in project quality.

(b) An innovation has resulted in a significant project success.

b. AARs will be scheduled and budgeted for in the PMP. The PM will determine the most efficient manner to accomplish the AAR.

c. AARs may be formal or informal, depending on the nature of the activity being assessed. All AARs will be documented in the project record. Lessons learned and best practices from the AAR will be documented and shared regionally.

d. Stakeholders, including A-Es and contractors, will be offered the opportunity to participate in each AAR. AAR results will be shared with stakeholders.

e. The District's Project Management Review will provide oversight of the AAR results.

8-4. Lessons Learned. According to Change Management PROC3010 and Activity/Project/Program Closeout PROC4000, ER 5-1-11 requires the PDT to capture lessons learned (LL) associated with project changes and whenever projects and/or phases of projects are completed. Lessons Learned PROC3020 establishes a general process for the PDT and review teams to capture project-related LL. At project initiation, each PDT and review team members will review the appropriate LL repositories for information pertinent to the project. The Regional Headquarters will ensure that Districts are using the appropriate LL systems and are effectively capturing and sharing LL internally and with other Districts.

8-5. Best Practices. A best practice is a process, technique, or innovative use of technology, equipment, or resources that has a proven record of success in providing significant improvement in cost, schedule, quality, performance, safety, environment, or other measurable factors that impact an organization. Identifying and sharing best practices is another effective method for improving processes, products, and stakeholder satisfaction. The District should implement a procedure to identify, document, and share best practices. The Regional Headquarters will identify best practices during District quality visits and communicate them across the region.

8-6. Quality Metrics. The District will develop metrics to measure and track progress with established quality objectives. Examples of metrics may include, but are not limited to:

a. Met project, agency, and stakeholder requirements as documented in the PMP (measure: percentage of applicable items passed on graded QC/QA checklist: each checklist item pass/fail or not applicable).

b. Delivered safely (measure: pass/fail, loss worker time threshold, or no fatalities).

c. Code and life safety complaint (measure: pass/fail, no code or safety violations).

d. Free of defects, systems perform as intended (measure: pass/fail as captured by rework post turnover).

e. Chosen based on lifecycle cost effectives (measure: pass/fail, no premature system or product failures).

f. Functional, meeting the stakeholder's functional needs (measure: pass/fail, stakeholder agreement).

g. Maintainable and/or sustainable, the stakeholder can maintain and/or sustain the product or service (measure: pass/fail, stakeholder agreement).

8-7. Process Improvements. Each District will prescribe procedures to measure conformity and conduct analyses that will lead to continual improvement. AARs, LL, and stakeholder satisfaction surveys will be among the methods used to identify needs for corrective actions and process improvements. To select process improvements USACE organizations should consider such factors as:

a. Control. Will the improvement provide better control to ensure the project meets stakeholder expectations?

b. Sustainability. Will the improvement provide better project results in a cost-efficient way over time and as conditions change?

c. Reliability. Will the improvement produce the intended results for all quality factors (e.g., better, cheaper, and faster) without lowering the quality of any single factor?

d. Feasibility. Is the improvement change for the sake of change, or will it provide real positive results? Will the improvement optimize performance at a cost acceptable to quality and the organization?

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Appendix A
References

Reference sources:

Federal Acquisition Regulations (FAR): https://www.acquisition.gov/browse/index/far

Army Regulations (AR): https://armypubs.army.mil/ProductMaps/PubForm/AR.aspx

Engineer Regulations (ER): https://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations/

Engineer Pamphlets (EP): https://www.publications.usace.army.mil/USACE-Publications/Engineer-Pamphlets/

Engineer Manuals (EM): https://www.publications.usace.army.mil/USACE-Publications/Engineer-Manuals/

Uniform Facility Guide Specifications (UFGS): https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs

A-1. FAR Part 36: Construction and Architect-Engineer Contracts.

A-2. FAR Clause 52.236-23: Responsibility of the Architect-Engineer Contractor.

A-3. AR 702-11: Army Quality Program.

A-4. ER 5-1-11: Management, U.S. Army Corps of Engineers (USACE) Business Process.

A-5. ER 415-1-10: Construction, Contractor Submittal Procedures.

A-6. ER 415-1-11: Engineering and Construction, Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review.

A-7. ER 1110-1-8152: Engineering and Design, Professional Registration and Signature on Design Documents.

A-8. ER 1110-1-8159: Engineering and Design, DrChecksSM.sm

A-9. ER 1110-345-53: Engineering and Design, Structural Steel Connections.

A-10. ER 1180-1-6: Contracts, Construction Quality Management.

A-11. ER 1180-1-9: Contracts, Design-Build Contracting.ER 1180-345-723: Engineering and Design, Total Building Commissioning Procedures.

A-12. EP 715-1-7: Procurement, Architect-Engineer Contracting in USACE.

A-13. EM 5-1-11 Project Delivery Business Process

A-14. UFGS Section 01 45 00.00 10: Quality Control.

A-15. UFGS Section 01 45 00.15 10: Resident Management System Contractor Mode (RMS CM).

A-16. UFGS Section 01 78 00: Closeout Submittals.

Appendix B
Sample: Engineering Quality Management Content in PMP

Access editable version in Microsoft Word format here:

https://apps.usace.army.mil/sites/TEN/EC/Documents/forms/allitems.aspx

Folder: ER 1110-3-12 Quality Management Appendices

This document provides guidance regarding Engineering contribution to the quality management content in the PMP, as outlined in the PDBP in Engineer Regulation 5-1-11 USACE Business Process. In addition, content contributions by other branches (PPMD, Construction, Contracting, etc.) must be merged by the PM in the PMP in order to avoid redundancies.

BACKGROUND: Provides recommendations to draft the section effectively and efficiently.

EXAMPLE: Illustrates how each section may look in a drafted PMP. The examples do not come from a single PMP and range in program, size, and complexity. They should not be construed as the minimum requirements of a PMP – that can only be determined depending on the project-specific circumstances.

TEAM IDENTIFICATION (PROC2020)

1. PROJECT DELIVERY TEAM

BACKGROUND: The PDT is involved with the day-to-day production of a product/project and mostly includes designers (A-E or in-house).

EXAMPLE:

Project Delivery Team (PDT)				
Name	Role	Phone	Email	Responsibilities
	Project Manager			
	Technical Lead			
	Civil Designer			
	Structural Designer			
	Architect Designer			
	Landscape Architect Designer			
	Fire Protection Designer			
	Mechanical Designer			
	Electrical Designer			
	Telecommunications Designer			
	Cost Estimator			
	Sustainability Manager			
	CADD/BIM Manager			

2. DISTRICT QUALITY CONTROL (DQC) REVIEW TEAM

BACKGROUND: The DQC Review Team includes USACE Home District reviewers that are not involved with the day-to-day production of a product/project.

EXAMPLE:

District Quality Control (DQC) Review Team				
Name	Role	Phone	Email	Responsibilities
	Review Lead			
	Contracting Officer Representative			
	Civil Reviewer			
	Structural Reviewer			
	Architect Reviewer			
	Landscape Architect Reviewer			
	Fire Protection Reviewer			
	Mechanical Reviewer			
	Electrical Reviewer			
	Telecomms Reviewer			
	Sustainability Reviewer			
	CADD/BIM Reviewer			
	Specifications Reviewer			

3. INDEPENDENT TECHNICAL REVIEW (ITR) TEAM

BACKGROUND: The ITR team includes stakeholders and specialists/experts from another district or center that are not involved with the day-to-day production of a product/project.

EXAMPLE:

Independent Technical Review (ITR) Team				
Name	Role	Phone	Email	Responsibilities
	Regional Technical Specialist			
	Subject Matter Expert			
	Center of Expertise			
	Civil Reviewer – [X] District			
	Stakeholder #1			
	Stakeholder #2			

SCHEDULE (PROC2030)

1. SCHEDULE OF REVIEWS

BACKGROUND: The schedule of reviews provides a general overview of QC and QA activities, and is integrated by the PM into the overall project schedule. This schedule also documents reviews that have been completed to the satisfaction of the TL.

EXAMPLE:

Schedule of Reviews			
Milestone	Start Date	Finish Date	Duration (Calendar Days)
Charrette Report			
Charrette Report Review			
Concept (35%) Design			
Concept (35%) DQC Review			
Concept (35%) Design ITR and BCOES Review			
Finalize VE Report			
Intermediate (65%) Design			
Intermediate (65%) DQC Review			
Intermediate (65%) Design ITR			
Final (95%) Design			
Final (95%) DQC Review			
Final (95%) Design ITR			
Final (95%) BCOES Review			
Final Backcheck (100%) Design			
Final Backcheck (100%) DQC Review and ITR Closeout and Certification			
BCOES Certification			

FUNDING (PROC2040)

1. BUDGET

BACKGROUND: The budget should be broken down into the different types of reviews.

EXAMPLE:

Program Amount (PA): [XXX]	
Review	Budget
District Quality Control (DQC)	
Independent Technical Review (ITR)	
Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES)	
Quality Assurance (QA)	
Value Engineering Study	
Total:	

ASSUMPTIONS & CONSTRAINTS (REF8005G)

1. CODES AND CRITERIA

BACKGROUND: List applicable codes and criteria mandated.

EXAMPLE:

Codes and Criteria	
Number	Name
	Higher Authority Mandates
UFC 1-200-01	General Building Requirements
NFPA 101	Life Safety Code
IBC 2012	International Building Code

Stakeholder Criteria
U.S. Air Force Regulations and Instructions
U.S. Air Force Information Systems
Installation Design Guidance
Public Laws
Executive Orders
National Security Telecommunications and Information Systems Security Committee
U.S. Army Regulations
VA Design Guide
U.S. Army Information Systems Command

2. UNIQUE DESIGN FACTORS AND COMPLEXITY OF PROJECT

BACKGROUND: List unique features of design requiring special review attention.

EXAMPLE:

Project-Specific Design Features/Complexity	
SCIF	
	Review of SCIF facilities should be performed by SME.
Mission Critical	
	Facility is mission critical and has unique features to maintain operation.
Ballistic protection	
	This project includes ballistic resistance glazing and walls for the waiting room. Project must be reviewed according to UL 752.

RISK ANALYSIS (REF8007G)

1. RISK/HAZARD FACTORS

BACKGROUND: List potential risks to the project, what would trigger the risk and the potential impact of that risk. This section is meant to analyze potential setbacks upfront to address those issues early and mitigate potential problems. Information provided here will contribute to the PMP's Risk Register.

EXAMPLE:

Risk/Hazard Factors			
Type of Risk	Risk Description	Triggers	Potential Impact
Schedule	Failure to meet a milestone	Scope change	Schedule delay
Schedule	Remove 65% design submittal requirement	Compress project schedule	Decrease in design quality
Complexity	MEDIUM: Technically specific design criteria on SCIF	More time and detail required	Need a technical expert to assist with design (time & money)
Resource availability	Limited electrical engineering resources are available	Electrical Engineer priorities shift	Schedule delay

QUALITY MANAGEMENT (REF8008G)

1. QUALITY CONTROL PROCESS

BACKGROUND: Outline the project-specific quality control process here. This can be achieved by either referencing the district's Business Quality Process or noting the process here. Typical documentation is in paragraph form and describes the process and when it takes place. Adapt project-specific processes, if necessary, to achieve quality.

EXAMPLE: Reference [X] District Business Quality Process #### "Product Development In-House" for specific quality control activities.

OR

DQC review: DQC reviews will take place at each milestone. A discipline-specific reviewer, separate to the day-to-day production, will review the product at a detailed level. When necessary the reviewer and designer will problem-solve together to develop the best design solutions. Each discipline must have a checklist of items to review and check off before a product goes out for review.

The Branch Chief will check any deliverables before review for quality control measures and consistency and can hold up any product they do not see meets the level of quality required.

2. QUALITY ASSURANCE PROCESS

BACKGROUND: Outline the project-specific quality assurance process here. This can be achieved by either referencing the district's Business Quality Process or noting the process here. Typical documentation is in paragraph form and describes the process and when it takes place. Adapt project-specific processes, if necessary, to achieve quality.

EXAMPLE: Reference [X] District Business Quality Process #### "Contract Design for Quality" for specific quality assurance activities.

OR

Quality Assurance: The TL will ensure that the processes as identified in this PMP and ER 1110-1-12 are being properly implemented, including but not limited to:

1. Verification of PDT and ITR team are the same technically qualified staff as identified in this PMP.
2. Assurance that all engineering and design review comments have been adequately resolved in future submittals.
3. Verification that the latest version of the construction documents is used in the solicitation package.

The COR will ensure that the A-E is meeting the submittal, schedule, and quality requirements of the A-E services contract.

Appendix C
Sample Certification Forms

CERTIFICATION OF DISTRICT QUALITY CONTROL REVIEW

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

BCOES CERTIFICATION

Access editable versions in Microsoft Word format here:

https://apps.usace.army.mil/sites/TEN/EC/Documents/forms/allitems.aspx

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(TO BE MODIFIED IAW DISTRICT LEVEL SOP)

CERTIFICATION OF DISTRICT QUALITY CONTROL REVIEW
In-House Design

The District has completed the District Quality Control Review of (*project name and location*). Notice is hereby given that a District Quality Control Review, that is appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Project Management Plan. During the District Quality Control Review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions, methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the stakeholder's functional needs consistent with law and existing USACE policy. The District Quality Control Review was accomplished by (*an independent team*). All comments resulting from the District Quality Control Review have been resolved.

_____ _____
Technical Lead *Date*

_____ _____
Project Manager *Date*

_____ _____
Chief of Engineering Function *Date*

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

The District has completed the Independent Technical Review of (*project name and location*). Notice is hereby given that an Independent Technical Review that is appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Project Management Plan. During the Independent Technical Review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions, methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the stakeholder's functional needs consistent with law and existing USACE policy. The Independent Technical Review was accomplished by (*an independent team*). All comments resulting from the Independent Technical Review have been resolved.

_____ _____

Technical Lead *Date*

_____ _____

Project Manager *Date*

_____ _____

Chief of Engineering Function *Date*

BCOES CERTIFICATION

Name of Project/Project Number:

Phase or Type of Project:

Certification Date:

I, (the PM), certify that the Value Engineering process as required by ER 11-1-321 (Change 1 or latest version), Army Programs Value Engineering has been completed for this procurement action. I certify compliance with Public Law 99-662 (33 USC 2288) and the Office of Management and Budget (OMB) Circular A-131. Since the construction cost estimate for this project was less than $1 million, a Value Engineering Study was not required. Therefore, the Value Engineering requirements have been addressed.

_____ _____

Assigned Project Manager *Value Engineering Officer (dd/mm/yr)*

The Bid or RFP Package has been reviewed for Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) requirements in accord with ER 415-1-11. The undersigned certify that all appropriate BCOES review comments have either been incorporated into the Bid or RFP Package or otherwise satisfactorily resolved. Comments, evaluations, and backchecks are documented in ProjectWise.

_____ _____

Chief, Engineering (dd/mm/yr) *Chief, Construction (dd/mm/yr)*

_____ _____

Chief, Planning (when appropriate) (dd/mm/yr) *Chief, Operations (when appropriate) (dd/mm/yr)*

_____

Chief, Real Estate (when appropriate) (dd/mm/yr)

Appendix D
Federal Supremacy for Professional Licensing

D-1. Federal Supremacy. An extensive USACE effort to address professional registration issues began in the early 1990s. This effort was essentially completed with the issuance of the CECC-ZA legal opinion (November 1992, Subject: State Regulation of USACE "In-House" Engineering Work). The legal opinion concluded that, under the doctrine of Federal Supremacy, generally the USACE is not required to comply with state registration requirements. The Chief Counsel's legal opinion drew the following conclusions, which form the basis for the policy adopted by USACE senior management in this regulation:

a. The Supreme Court has specifically ruled that no state may legally require federal employees to be licensed by the state.

b. The Supreme Court has also generally ruled that no state has the legal authority to require the Federal Government to submit permit applications, certifications, and designs for state review or approval. These general principles are true except in areas where Congress has waived the Federal Government's Supremacy. In six environmental statutes, Congress has waived Federal Supremacy as to state substantive requirements, permits, and certifications. The six environmental statues are the Clean Water Act, Safe Drinking Water Act, Clean Air Act, Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and Noise Control Act. Accordingly, the USACE must submit permit applications, certifications, and designs for state review and approval for projects falling under these six statutes.

c. Licenses and professional registration, however, are not specified in any of the environmental waivers. Therefore, a state rule requiring licensing of USACE engineers or other team members in that state (or in any state), or requiring execution of documents by professional engineers or other team members licensed in the particular state where the work is located (or in any state), is not enforceable by the state against USACE. This is true whether or not the state professional registration statute exempts federal employees from its requirements.

D-2. Federal Agency Requirements.

a. USACE is, however, obliged to comply with federal agency requirements, such as the Environmental Protection Agency's (EPA's) regulations, which require submission to EPA of certifications signed by registered professional engineers. The policy and guidance in this regulation require supervisors to exercise "responsible charge" over work they supervise, that is, exercise effective direct control and personal supervision, resulting in control over and detailed professional knowledge of, that work. Supervisors have this responsibility whether or not they indicate their professional credentials, and/or stamp or seal work performed under their supervision.

b. Using a private sector registered architect or engineer to seal in-house designs and other documents is unacceptable as a matter of policy and will not relieve the USACE from liability in the case of, for example, a design deficiency. This practice would be a violation of the required Direct Supervisory Control required for use of a professional stamp.

D-3. Partnering with States. In order to resolve state specific registration matters, Districts should convey the USACE commitment to work with each state, while not unduly compromising Federal Supremacy. Districts are encouraged to identify state officials and agencies responsible for environmental and other professional registration matters, and initiate partnering dialogues and build relationships to address and satisfy public interest issues.

Appendix E
Sample: Engineering Considerations and Instructions for Field Personnel

Access editable version in Microsoft Word format here:

https://apps.usace.army.mil/sites/TEN/EC/Documents/forms/allitems.aspx

Folder: ER 1110-3-12 Quality Management Appendices

It is essential that all personnel associated with the construction of any project be familiar with the design criterion, material requirements, operational performance, and all special details of the project. To accomplish this, and to ensure that field personnel are aware of the design assumptions regarding field conditions, the Designer of Record will prepare a short report titled "Engineering Considerations and Instructions for Field Personnel." This report will also include guidance for critical portions of the contract documents. The report may be augmented by briefings, instructional sessions, and guidance for laboratory testing.

Field personnel can provide important input to the design process and must be consulted during the design process. This report should be developed throughout the design process, similar to the design analysis. Field personnel are responsible for reviewing the report before it is provided in final form at contract award.

The sample outline below contains standard verbiage that should be used in the general overview section of the document. The Engineering Considerations and Instructions for Field Personnel (ECIFP) outline must be updated to be project-specific, and at minimum include the PURPOSE, GENERAL PROJECT INFORMATION, DISCIPLINE-SPECIFIC INFORMATION, and SPECIAL REQUIREMENTS sections.

[The bracketed, italicized commentary is provided for informational purposes and should be deleted in the final document.]

SECTION 1: PURPOSE, KEY CONTACTS, and COMMUNICATION

1.1 PURPOSE

This ECIFP expands on the construction specifications and drawings in areas where added information, not considered essential to the contractor, is considered helpful to construction personnel administering the contract. This information helps to ensure that project features are constructed according to design assumptions, constraints, and overall intent.

Additionally, the ECIFP points out critical construction issues and concerns and highlight specific items that may need additional clarification. This document does not modify and should not conflict with contract plans and specifications. The Design Analysis (DA) is also available to the field team and documents the logic and calculations relevant to design decisions. Neither the DA nor the ECIFP are part of the contract.

[The DA can be quite voluminous, especially with appendices containing calculations. The ECIFP should summarize specific topics relating to construction. It may be helpful to have the same organizational structure in the ECIFP and DA, but it should not duplicate the DA.]

Lastly, the ECIFP establishes a baseline for communication and coordination between the design and construction personnel; not every issue is addressed in this document. Feedback and open communication between designers and field personnel, prior to and during construction, is encouraged.

1.2 KEY CONTACTS

[Provide a list of key contacts, such as the TL, the DOR, discipline-specific representatives, reviewers, or outside agencies such as privatized utilities for use by the field office.]

SECTION 2: GENERAL PROJECT INFORMATION

[Use this section for general project description and to address background information on frontend specification sections and overarching issues such as sustainability or commissioning. A sample outline is provided but should be customized to the specific project. Sustainability and commissioning may also be sub-topics within the discipline sections for easier reference to discipline-specific information.]

2.1 PROJECT DESCRIPTION

2.2 WORK RESTRICTIONS

2.3 PROJECT SCHEDULE/PHASING

2.4 HAUL ROUTES

2.5 VALUE ENGINEERING DECISIONS

2.6 ADVANCED MODELING REQUIREMENTS

2.7 SUSTAINABILITY REPORTING

2.8 TOTAL BUILDING COMMISSIONING

SECTION 3: DISCIPLINE-SPECIFIC INFORMATION

[The discipline-specific sections below should correspond to the disciplines in the Index of Drawings. Break the information within each discipline into subheadings for easy reference by the field office. Provide background in areas where the contractor may have some design responsibility, such as mechanical or structural connections.]

3.1 ENVIRONMENTAL

3.2 GEOTECHNICAL

3.3 CIVIL

3.4 LANDSCAPE

3.5 STRUCTURAL

3.6 ARCHITECTURAL

3.7 INTERIOR DESIGN

3.8 FIRE PROTECTION

3.9 PLUMBING

3.10 MECHANICAL

3.11 ELECTRICAL

3.12 TELECOMMUNICATIONS

SECTION 4 – SPECIAL REQUIREMENTS

[The special requirements sections below should focus on special features and items that need to be heavily coordinated between disciplines.]

4.1 SPECIAL SECURITY REQUIRMENTS

4.2 SPECIAL OPERATIONAL REQUIREMENTS

4.3 USER REQUESTED FEATURES

Appendix F
Quality Management Plan: Outline

Access editable version in Microsoft Word format here:

https://apps.usace.army.mil/sites/TEN/EC/Documents/forms/allitems.aspx

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QUALITY MANAGEMENT PLAN: OUTLINE

The outline below provides an abbreviated view of key components included in each QMP; the guidance in Attachment B is comprehensive. The notation at the end of each heading refers to requirements documents where more information can be found; however, many requirements are cross referenced in the PDBP.

Many PDTs will utilize QMP template developed and maintained by their district, which should feature each of the components listed below. For Civil Works projects, district Review Plan templates should satisfy the requirements for Quality Control and Quality Assurance as they are required to be project specific. If district templates do not address each focus area, they should be updated accordingly; use the guide in Attachment B to help streamline this process.

If a District does not have a QMP template, use the outline and the guide to create one that meets the intent of the PMP while minimizing repetitive work. Additionally, the word file for Appendix B is available on the E&C Technical Excellence Network (TEN) to use as a starting point.

SECTION 1. QMP PURPOSE

1.1	OVERVIEW	PDBP REF8008G
1.2	PURPOSE PDBP REF8008G	
1.3	DISTRICT QUALITY MANAGEMENT PROCESSES	ER 5-1-14

SECTION 2. QUALITY MANAGEMENT APPROACH

2.1	OVERVIEW: PLAN-DO-CHECK-ACT	PDBP REF8008G
2.2	SECOND SET OF EYES	ER 1110-3-12
2.3	SCOPE & COST VALIDATION	

SECTION 3. QUALITY OBJECTIVES PDBP REF8008G

3.1	REQUIREMENTS	
3.2	COST AND BENEFIT OF QUALITY OBJECTIVES	PDBP REF8008G
3.3	QUALITY OBJECTIVE THRESHOLDS	PDBP REF8008G

SECTION 4. QUALITY MANAGEMENT ER 1110-3-12 (1-8.C)

4.1	QUALITY CONTROL PLAN	ER 1110-3-12 (1-8.C)
4.2	QUALITY ASSURANCE PLAN	ER 1110-3-12 (2-4)

SECTION 5. SPECIAL CONSIDERATIONS

5.1	ENGINEERING CONSIDERATIONS AND INSTRUCTIONS FOR FIELD PERSONNEL	ER 1110-2-1150

SECTION 6. CONSTRUCTION QUALITY MANAGEMENT PLAN ER 1180-1-6

6.1	PRE-AWARD ACTIVITIES	ER 1180-1-6 (7.B-2)
6.2	CONTRACTOR QUALITY CONTROL	
6.3	GOVERNMENT QUALITY ASSURANCE	ER 1180-1-6 (7.B-1)

SECTION 7. PROJECT-SPECIFIC REQUIREMENTS PDBP REF8008G

SECTION 8. SAMPLE QMP DOCUMENTS

QUALITY MANAGEMENT PLAN: GUIDE

This document provides additional guidance with regard to the requirements of the QMP. The QMP is an integral part of each PMP as outlined in the PDBP Manual. The use of the Manual is required by Engineer Regulation 5-1-11: USACE Business Process.

Quality is planned for and managed according to the QMP, which includes Quality Control and Quality Assurance Plans. The PM, the TL, and the rest of the PDT are responsible for determining the procedures necessary to achieve the level of quality established for the project and agreed upon by the stakeholder.

PDT members ensure that the stakeholder's quality objectives are effectively defined and clearly articulated in the QMP.

The guide below follows the structure of the PDBP requirements for the QMP. Each section consists of three parts:

GUIDANCE: Indicates if this section of the QMP can be standardized within a District, must be project specific, or any other recommended paths forward.

GUIDANCE^{R}: Guidance annotated with a superscript "R" indicate recommended additions to the QMP. While not formally adopted in the PDBP, these recommendations are based on lessons learned and feedback from multiple districts and are will likely be added to the PDBP and applicable engineer regulations in subsequent updates.

BACKGROUND: Provides explanation of the intent of the section and recommended ways to draft the QMP effectively and efficiently.

EXAMPLE: Illustrates how each section may look in a drafted QMP. The examples do not come from a single QMP and range in program, size, and complexity.

a. The examples should not be construed as the minimum requirements of a QMP—that can only be determined depending on the project-specific circumstances.

SECTION 1. QMP PURPOSE

1.1 OVERVIEW PDBP REF8008G

GUIDANCE: *Can be standardized.*

BACKGROUND: PDTs can utilize a standardized overview of the QMP for each PMP, as the intent should not vary. This can typically be found in the District Quality Management System, or the example below can be modified.

EXAMPLE: *"Engineer Regulation 5-1-11 defines quality as 'the degree to which a set of inherent characteristics fulfills requirements.' Furthermore, quality should be regarded as the conformance to established objective requirements—not a degree of goodness. Therefore, the awarded construction documents (e.g., drawings and specifications) establish the contractual baseline for quality. As metrics are developed for individual projects, it is imperative that the PDT understands and endorses what the quality product characteristics will be and ensures that the construction documents are developed and administered to appropriately reflect these quality requirements."*

1.2 PURPOSE PDBP REF8008G

GUIDANCE: *Can be standardized.*

BACKGROUND: PDTs can utilize a standardized explanation of QMP purpose for each PMP, as the intent should not vary. This can typically be found in the District Quality Management System, or the example below can be modified.

EXAMPLE: *"The Quality Management Plan (QMP) is the quality component of each PMP. The QMP documents the project-specific Quality Objectives, each threshold for achieving the objectives, and other project-specific requirements.*

The QMP also identifies Quality Control (QC) and Quality Assurance (QA) procedures appropriate to the size, complexity, and nature of the project. These plans identify QC and QA requirements for the entire project, to include work performed by in-house personnel as well as that performed by contractors (e.g., Architect-Engineer, Construction, and/or other).

The PM, in concert with the TL and PDT, determines the procedures necessary to achieve the level of quality required for the project. The PDT ensures that the stakeholder's quality objectives are effectively defined and clearly articulated in the QMP."

1.3 DISTRICT QUALITY MANAGEMENT PROCESSES ER 5-1-14

1.3.1 Overview

GUIDANCE: *Can be standardized.*

BACKGROUND: AR 702-11: Army Quality Program requires each District to establish a comprehensive management system for ensuring stakeholder quality objectives. Some districts refer to these standard operating procedures as Business Quality Processes (BQPs).

The District quality processes should be the baseline for this overview section and can be referred to within the QMP. However, a complete QMP can and should not refer to the District process without alteration. Project-specific requirements, and any variances to the District processes must be documented.

EXAMPLE: *"This QMP is based on and refers to established Regional and District QM processes:*

[QMS numbers].

Project-specific requirements and changes to these procedures are indicated below, according to ER 1110-3-12."

1.3.2 Variances from District Quality Management Processes

GUIDANCE: *Must be project specific.*

BACKGROUND: Changes to District-established QMS procedures should be documented and based on a risk assessment that accounts for the complexity, budget, schedule, and quality objectives established by the PDT in coordination with the stakeholder. In general, these variances should be limited, but may be addressed in an overarching Program Management Plan (PgMP), if applicable.

EXAMPLES: *"To accommodate project schedule requirements, the PDT has agreed to reduce the DQC review timeline from 14 calendar days to 7 calendar days as reflected in Section 4.1: Design Quality Control below."*

"Due to the complexity of the project and lack of in-house technical expertise, the PDT has agreed to issue a scope of work for A-E services to augment the design team with structural engineers specializing in seismic retrofit design."

"Section 4.2: Quality Assurance addresses the means through which the A-E will be managed to ensure stakeholder quality objectives are met."

SECTION 2. QUALITY MANAGEMENT APPROACH

2.1 OVERVIEW: PLAN-DO-CHECK-ACT PDBP REF8008G

GUIDANCE: *Can be standardized.*

BACKGROUND: PDTs can utilize a standardized explanation of the Plan, Do, Check, Act Cycle for each PMP, as the intent should not vary. This is outlined in ER 1110-3-12.

EXAMPLE: *"The Plan-Do-Check-Act (PDCA) Cycle is the guiding quality management procedure for USACE business processes. The quality management policies and procedures of PDCA are outlined in Engineer Regulation 1110-3-12: Military Engineering & Design Quality Management. The purpose of each PDCA step is summarized as follows."*

2.1.1 Plan: Quality Management Plan

EXAMPLE: *"As a part of the PMP, the QMP defines stakeholder quality objectives and defines how they will be measured."*

2.1.2 Do: Quality Control Process

EXAMPLE: *"The management procedures outlined below for quality control, quality assurance, and measuring quality objectives will be executed as described."*

2.1.3 Check: Quality Assurance Process

EXAMPLE: *"Quality objectives will be measured against the established thresholds after each phase of the project (e.g., planning, design, construction, and post-occupancy) as described."*

2.1.4 Act: Continual Process Improvement

EXAMPLE: *"Results of the quality objective measurement will be analyzed after each phase of the project, captured as lessons learned, and either incorporated into the updated PMP or District QMS as appropriate."*

2.2 SECOND SET OF EYES ER 1110-3-12

GUIDANCE: *Can be standardized.*

BACKGROUND: PDTs can utilize a standardized explanation of the Second Set of Eyes principle for each PMP, as the intent should not vary. This is outlined in ER 1110-3-12.

EXAMPLE: *"Technical quality of engineering products will be ensured through the use of a Second Set of Eyes for every project deliverable and internal milestone document. While everyone on a PDT both individually and collectively is responsible for quality, every significant project document must pass before a Second Set of Eyes."*

2.3 SCOPE AND COST VALIDATION

GUIDANCE[R]: *Should be project specific.*

BACKGROUND: Each QMP must include a plan for scope and cost validation throughout the project execution. While this may include a process for initially accepting work from stakeholders, scope and cost validation must continue throughout the life of the project.

This includes but is not limited to the following: verifying scopes of work solicited for design services and construction contracts, generating and validating Independent Government Estimates (IGE), utilizing QC/QA procedures to substantiate appropriate scope and cost are reflected in construction documents, utilization of Value Engineering as required by regulation, and administering all contracts effectively to ensure stakeholder cost and scope objectives are achieved.

EXAMPLES: *"The PDT for the 28th BN HQ and DFAC project was involved in the planning phase and helped to define the scope authorized in the DD-1391. Prior to design, a scope validation workshop will be held on site with the stakeholder to verify all requirements are understood and that no additional funding is required. Once this is complete, a memo reflecting this validation will be included in the project file and the design charrette will be executed per the project schedule. If, however, the validation workshop indicates mis-programming either in scope or budget, the PDT will provide a recommendation to the PM to either cut scope or request additional funding."*

"Prior to accepting this project, the E&C Cost Engineering Section will provide an initial evaluation of scope and the Programmed Amount and offer a recommendation on whether or not to request additional funds or re-program the project. This evaluation will be reflected in a memo included in the project file."

GUIDANCE: *Must be project specific.*

BACKGROUND: PDTs are responsible for documenting stakeholder expectations and achieving a consensus for quality management objectives on a project-specific basis. These quality objectives should be accurately reflected in each deliverable for which the PDT is responsible, whether created in-house or contracted (e.g., solicitation, contract, and construction documents).

Objectives should be written concisely and effectively identify a verifiable measure of quality.

3.1 REQUIREMENTS

3.1.1 Baseline Quality Objectives

GUIDANCE[R]: *Should be standardized.*

BACKGROUND: The baseline project quality objectives are considered minimum quality standards against which all projects will be measured. Each objective requires a project-specific cost and benefit analysis, evaluation process, and performance threshold.

3.1.1.1 Code Compliance & Life Safety

EXAMPLE: *"The project must be compliant with all applicable codes, specifically inclusive but not limited to federal, Department of Defense, agency, and life safety codes. Any variances to life safety codes must be addressed by the Authority Having Jurisdiction and appropriately documented in the Project File. A complete list of codes is included in the Appendix ZZ: Quality Control Plan."*

3.1.1.2 Contract Compliance

EXAMPLE: *"At project turnover milestones, there must be no outstanding, known defects; the project must be completed to the standards required by the contract."*

3.1.1.3 Life Cycle Cost Analysis

EXAMPLE: "*The project must be designed and constructed based on the findings of a Life Cycle Cost Analysis (LCCA). This analysis should be carried through to completion of the project to influence stakeholder decisions.*

Any decisions made during the lifecycle of the project (i.e., planning, design, construction, post-occupancy) that do not conform to the findings of the LCCA must include appropriately documented justification and include the stakeholder's concurrence."

3.1.1.4 Functionality

GUIDANCE[R]: *Should be project specific.*

BACKGROUND: All projects must meet the functional requirements as set by the project stakeholders. While it should be assumed that each project that is turned over is functional according to the programming documents (e.g., standard design documents), specific functional requirements must be included as quality objectives. Include any specific feature that impacts mission execution.

EXAMPLE: *"The CBRN Training Facility includes both training and administrative functions, which means students, contracted instructors, and post personnel will need varying access to specific areas of the building. A comprehensive accessibility and security study will be performed to ensure the functional layout of the facility will meet this requirement."*

3.1.1.5 Maintainability and Sustainability

GUIDANCE[R]: *Should be project specific.*

BACKGROUND: All projects must be maintainable and sustainable utilizing the available operational resources as identified by the project stakeholders. Prepare documentation of stakeholder resource capabilities for the ongoing operation of the project and maintain an updated status. This will serve as a means of tracking project history and a measuring tool to determine the maintainability and sustainability of the project.

EXAMPLE: *"Due to the industrial nature of the functions within the TEMF and the limited resources available to the installation DPT, durable and easily maintainable finishes and fixtures are a priority to the function of the facility. The DPW maintenance personnel will be included in the review of finishes and functional layout to ensure maintenance equipment can readily move throughout the building."*

3.1.1.6 Professional Standards PDBP REF8008G

GUIDANCE: *Must be project specific.*

BACKGROUND: Stakeholder professional standards objectives must be project-specific and identify legal, environmental, economic, code, life safety, and health. If the programmatic requirements of the project require specialized certifications on behalf of the design and/or construction team, they should be identified here.

EXAMPLE: *"The installation DPW is authorized to and has included additional funding in the DD-1391 to seek LEED Gold certification. Due to this requirement, a LEED AP BD+C will be included as a full-time member of the PDT."*

"The inclusion of a SCIF in the Brigade HQ is a mission-essential feature of this project. Due to this requirement, the installations security personnel will be included throughout the design review process to ensure all technical requirements are being met and the SCIF will be certified and functional at the time of facility turnover."

3.1.2 Stakeholder Quality Objectives

GUIDANCE: *Must be project specific.*

BACKGROUND: The stakeholder quality objectives must be tailored for each project. At a minimum, each project should address the six areas outlined below: cost, schedule, functionality, maintainability and sustainability, professional standards, and unique objectives. Each objective requires a project-specific cost/benefit analysis, evaluation process, and performance threshold.

All quality objective statements should meet these three criteria:

a) Specific: The objective should refer to a relevant standard or governing document or other objective criteria.
b) Achievable: The objective should not be described in superlatives such as "best effort" or "maximize."
c) Measurable: The team should be able to identify when the objective has been met, and if not met, describe the amount or degree by which the objective was missed.

3.1.3 Cost PDBP REF8008G

GUIDANCE: *Must be project specific.*

BACKGROUND: Identify any concerns with funding availability, phased funding, and impacts of cost growth.

EXAMPLE: *"The Programmed Amount for this project is $2.8M and includes design as well as construction costs. In order to maximize the scope achieved during construction, the PDT has decided to accelerate the design schedule and reduce the number of solicitation documents. The risks associated with this decision are reflected in the Risk Register."*

"This project utilizes phased funding, appropriated each year from FY17-FY20: $120M in FY17; $140M in FY18; $180M in FY19 and $200M in FY20.

As such, the planning and design scopes and schedules will be structured to account for providing complete and useable features of work to coincide with the possibility that phased funding will not be available."

3.1.4 Schedule PDBP REF8008G

GUIDANCE: *Must be project specific.*

BACKGROUND: Identify overall schedule requirements due to funding availability, applicable phased turnover of facilities, milestones due to programmatic requirements, and impacts of schedule growth. If there are no specific driving forces with regard to schedule and the stakeholder's needs, then this needs to be indicated in the QMP.

EXAMPLE: *"Temporary housing for the 110th Chemical BN is available from 30 Jul 2017 until 30 July 2018; at that point the permanent battalion will return from deployment and no other temporary facilities will be available. Because of this, the Barracks renovations must be complete and ready for the 110th Chemical BN to move back in NLT 30 Jun 2018. These requirements will be included specifically in the Design Build scope of work and will be part of the proposal evaluation criteria as part of the best value acquisition strategy."*

3.1.5 Unique Objectives

GUIDANCE: *Must be project specific.*

BACKGROUND: Any additional stakeholder objectives unique to the project should be explicitly included. Project specific objectives should be described in such a way that they can be appropriately included in solicitation documents and administered through the contract documents. This allows impartial metrics to be established for achieving quality objectives.

EXAMPLE: *"The Troop Medical Clinic requires specific programming validation by the Army Institute for Public Health. Representatives for the institute will be included both during design reviews and periodic construction inspections to ensure all requirements are being met."*

"The additional time required to include the Army Institute for Public Health as part of the review process ensures the Troop Medical Clinic will be designed appropriately and will be certified at each major project milestone. The facility will not be allowed to turnover without these certifications, and any potential delays to turnover will come at a cost that exceeds those associated with proper planning and design."

3.2 COST AND BENEFIT OF QUALITY OBJECTIVES PDBP REF8008G

GUIDANCE: *Must be project specific.*

BACKGROUND: Each quality objective must be analyzed for an impact to cost and schedule and what benefits will be achieved. This cost and benefit analysis must be documented in the QMP. If the district has an existing form to perform these analyses, it's acceptable to include that as an attachment to the QMP and reference it below. The examples below are narrative in nature but should be expanded as necessary to ensure they are described appropriately.

3.3 QUALITY OBJECTIVE THRESHOLDS PDBP REF8008G

GUIDANCE: *Must be project specific.*

BACKGROUND: The means through which each stakeholder quality objective is evaluated must be documented in the QMP and be consistent with the PDCA Cycle. Objective evaluations should happen at multiple intervals throughout the project lifespan and may require updating the QMP and/or the overall PMP. Performance thresholds for each stakeholder quality objective must be quantifiable, impartial, and measurable against agreed awarded contract requirements. The example below is a recommended frequency and process by which thresholds can objectively be evaluated.

EXAMPLE: "*After each phase is complete, as identified below, a stakeholder survey will be provided by the PM for input. This survey utilizes quantifiable measures of satisfaction that each quality objective has been achieved.*

Planning

Design & Acquisition

Construction

Post Occupancy (at one year after BOD)

Once the survey results are collected, an AAR will be held, and lessons learned documented and incorporated into an updated PMP and QMP (if applicable).

Refer to Attachment XX for samples of the survey. Completed surveys are included in Attachment YY.

SECTION 4. QUALITY MANAGEMENT ER 1110-3-12

GUIDANCE: *Should be project specific.*

BACKGROUND: Quality Management must address both Quality Control and Quality Assurance processes for in-house and contracted work, to include review team members, schedules, and budgets to accommodate each type of review throughout the project lifecycle. While each plan may be based on a generic template managed by the district, they need to be tailored as necessary and the schedule, budget, risks, and special considerations should be project specific.

Each QMP must identify a TL who is responsible for coordinating with the PM to lead the development of product-specific components of the QMP to ensure the technical quality of E&C deliverables.

For projects that are executed as part of an overarching program, have low complexity and higher tolerance for risk (e.g., SRM projects), generic QC/QA plans may be utilized, provided they are based on district-established QM processes.

Civil Works projects utilize the Review Plan to meet Design Quality Management requirements, outlined in Section 5; all other projects for any business line or stakeholder must follow the guidelines in this section.

GUIDANCE: *Should be project specific.*

BACKGROUND: The Quality Control Plan is a component of the QMP and PMP and must be prepared and approved prior to commencement of project design. The PDT will prepare the QCP in order to monitor specific project deliverables to determine if they meet performance thresholds defined in the QMP. However, during design, changes may ensue which require additional updates and implementation to ensure project success during the project execution phase.

At a minimum, the Plan will: describe how quality control through DQC review and ITR will be performed; list the PDT and review team members and their review responsibilities; identify stakeholders and other subject matter experts (SME) that will be involved in the QC process; provide a schedule for the frequency and durations of QC reviews; describe risks inherent to the project that should require special attention during QC reviews; and, address any special considerations and/or crucial design features that should require special attention during QC reviews.

The Design Quality Control Plan must identify a TL and describe the utilization of a design deficiency tracking (e.g., DrChecks^{SM}) system to incorporate independent technical and DQC reviews.

EXAMPLE: *See Attachment D: Design Quality Control Plan.*

The narrative descriptions in the rest of this section describe the requirements and intent of the components of the QC Plan and should be used for reference in conjunction with the regulation cited. Additional examples are provided in the Attachment referenced above.

a. Project Delivery Team (PDT) PDBP PROC2020

GUIDANCE: *Must be project specific.*

BACKGROUND: This PDT is typically identified during initial drafting of the whole PMP and should be kept up to date when a member of the PDT/ITR team is added or replaced. Rather than repeating the same information provided in the overall PMP, it is appropriate to refer to that PDT list.

However, if the PDT list is incomplete with regard to quality control, then the remaining PDT members must be included in the QC Plan. For example, if only the technical discipline lead is included in the PMP PDT

list, then supporting designers assigned to the project must be include in the QC Plan. Similarly, DQC reviewers, support functions (e.g., CAD/BIM support, specification writers) and team members outside of E&C (e.g., contracting, legal, safety) should be indicated to as well.

4.1.1 Design Budgets PDBP PROC2040

GUIDANCE: *Must be project specific.*

BACKGROUND: Typically, districts have a template for PDTs to use when estimating design budgets. These are a good starting point – and they may have built in metrics to ensure the budget stays near a specific threshold overall (e.g., 6% of PA) or by discipline (e.g., Architecture is 17% of the total design) – but they should be updated on each project to ensure they are accurate.

Other districts have set design budgets for projects of a certain size or value; a good example of this is a dedicated budget for SRM projects under $1M that stays the same across projects. Regardless of the approach, the QC plan should reflect what is being delivered to ensure keeping within that budget.

Any change to the project that affects the budget – user requested changes, re-programming, changes in the design process – must be coordinated through the TL and to the PM to ensure the scope and schedule will still be met. Design budgets should not be unilaterally cut by any one member of the PDT without proper coordination.

4.1.2 Deliverables PDBP PROC2010

GUIDANCE: *Must be project specific.*

BACKGROUND: Deliverables must be looked at through two lenses. The first of which is the typical identification of what is being provided as part of the project itself – a complete design is generally thought of as contract documents, to include construction drawings, specifications, and design analyses. These items must be identified for each specific project so every PDT member is on the same page as far as what must be produced, whether it be an RFP or a full design.

The second consideration is what deliverables are produced as part of the QC process itself. Generally, this will be the documents required for each submittal, marked-up drawings from DQC reviews, QC checklists that indicate specific items have been reviewed, Specs Intact error reports, and review meeting minutes.

The QC plan should clearly indicate what is being delivered for the project and the documentation provided to verify the quality management process has been followed.

4.1.3 Schedule PDBP PROC2030

GUIDANCE: *Must be project specific.*

BACKGROUND: The schedule consists of activities which comprise the total work that needs to be performed in order to complete the project. Each activity should be clearly defined by activity type, durations, responsible offices for each activity, funds scheduled for each activity, and primary milestone dates.

Project schedules are often driven by outside factors that the PDT may not have the ability to influence. The PM coordinates these influences with the stakeholder and works with the TL and PDT to validate the schedule can be met. This may require changes to the QM and/or overall design process to include a reduction in project deliverables and abbreviated review schedules. Each of these decisions must be made as a PDT and accurately reflected in the QMP within the PMP. Any decision made throughout the project that may affect the schedule should be identified immediately and communicated through the TL to the PM.

4.1.4 Codes and Criteria

GUIDANCE: *Must be project specific.*

BACKGROUND: All projects must be compliant with all applicable building code and criteria, which are typically identified in the Unified Facilities Criteria (UFCs) which are found on the Whole Building Design Guide (wbdg.org).

At a minimum, references to standards, codes, and criteria must be included and must specifically identify life safety and welfare related codes. Depending on the scope of the project, special criteria may also be included and must be identified. Lastly, any waivers to standards, criteria, or code should also be identified in this section of the QC Plan.

4.1.5 Stakeholder Criteria

GUIDANCE: *Must be project specific.*

BACKGROUND: Any stakeholder specific criteria, either in addition to or in lieu of typical codes and criteria, must also be identified. The decision to use stakeholder criteria that differs from Army/USACE requirements is generally

documented in a Memorandum of Agreement or Interagency Agreement document; these should be coordinated with the PM and understood by the PM prior to starting the project. Stakeholder specific criteria does not inherently mean that specific codes do not need to be followed. Projects where the Authority Having Jurisdiction is questioned must be well coordinated and clearly documented in the PMP and QMP.

4.1.6 Risk/Hazard Factors & Complexity ER 1110-3-12 | REF8007G

GUIDANCE: *Must be project specific.*

BACKGROUND: The Risk/Hazard Factors and Complexity of a project should be identified within the Risk Management Plan, which is a systemic process of identifying, analyzing, and responding to risk for the entire project life cycle. The RM Plan should be actively managed by the PM and implemented by the PDT throughout the project in order to provide the required level of quality.

This section should be used as a preliminary introduction to project specific concerns and risk management, which should be fully explored in the Risk Management Plan. Essentially, complexities associated with the project should be identified here and highlighted as features that must be accounted for during Quality Control reviews.

4.1.7 Quality Control Process

GUIDANCE: *Should be project specific.*

BACKGROUND: In general, each district should have a defined process for performing Quality Control to ensure qualified individuals are performing complete technical reviews of project deliverables. The QC process should also identify when and how changes to the PMP and QMP are to be made. This should be repeatable and consistent for all disciplines associated with the PDT and maintained through the life of the project. Any variance to these processes must be identified within the QC Plan.

4.1.7.1 Adapt Processes to Specific Project to Achieve Quality ER 1110-3-12

GUIDANCE: *Must be project specific.*

BACKGROUND: All district-established Quality Management processes should be scalable to the level of complexity of each project. Any variances to District QMS required to achieve the established quality objectives should be described here. This may be a strategic reduction from a robust Quality Control

process in order to expedite the project schedule. It may also be a modification these processes to allow additional time for review due to a particularly complex project.

4.1.8 Independent Technical Review (ITR) Team ER 1110-3-12

GUIDANCE: *Must be project specific.*

BACKGROUND: ITR is a review by a qualified person or team not involved in the day-to-day production of a project/product, for the purpose of confirming the proper application of clearly established criteria, regulations, laws, codes, principles, and professional practices. ITR team members should demonstrate senior-level competence in the type of work being reviewed. An ITR is an integral part of design Quality Control and is required for all projects.

All project deliverables will be subjected to an ITR. At a minimum the design QCP will describe how the ITR will be performed; list the PDT and ITR team members and their review responsibilities; state the risks inherent to the project; and address any special considerations and/or crucial design features that must be addressed.

4.1.9 A-E Design Quality Control EP 715-1- 7

GUIDANCE: *Must be project specific.*

BACKGROUND: The DOR is always responsible for quality control, whether project work is performed in-house or under an A-E contract.

When contracting work is being performed by an AE, that office (whether acting as a consultant or designer of record) is required to follow the same Engineer Regulations regarding Quality Management. The QMP should describe this requirement and the PDT must ensure it is accurately reflected in the Scope of Work. A project specific QCP must be developed and submitted by the A-E and reviewed by the PDT. Additionally, EP 715-1-7 includes detailed information about the A-E contracting process to include a sample A-E Scope of Work in Appendix W of that document.

4.2 QUALITY ASSURANCE PLAN ER 1110-3-12

GUIDANCE: *Should be project specific.*

BACKGROUND: The Quality Assurance Plan is a component of the QMP and PMP and must be prepared and approved prior to commencement of project design. A

robust and verifiable Quality Assurance process is required on every USACE project.

The PDT will prepare the QAP in order to monitor project quality performance, particularly for specific project deliverables for which they do not have direct technical responsibility. Any work that is either partially or completely contracted to an A-E must be reviewed for compliance with the contract and ensure that the A-E is following its own Quality Control procedures. Furthermore, the scope of work issued to the A-E, and its subsequent deliverables, must also be developed to meet performance thresholds defined in the QMP. Refer to EP 715-1-7 for additional guidance on contracting to an A-E.

At a minimum, the Plan will describe how quality assurance will be performed; list the team members responsible for QA review; identify stakeholders and other subject matter experts (SME) that will be involved in the QA process; provide a schedule for the frequency and durations of QA reviews; state the risks inherent to the project; and address special considerations and/or crucial design features that must be addressed by another district, Government agency, or A-E firm.

The Design Quality Assurance Plan must identify a TL and describe the utilization of a design deficiency tracking (e.g., DrChecks^{SM}) system to incorporate independent technical and DQC reviews. For projects that have both in-house and A-E contracted design deliverables, a single TL can be identified.

EXAMPLE: *See Attachment E: Design Quality Assurance Plan.*

The narrative descriptions in the rest of this section describe the requirements and intent of the components of the QA Plan and should be used for reference in conjunction with the regulation cited. Additional examples are provided in the attachment referenced above.

4.2.1 Quality Assurance Process ER 1110-3-12

GUIDANCE: *Should be project specific.*

BACKGROUND: In general, each District should have a defined process for performing quality assurance to ensure qualified individuals are performing appropriate reviews of project deliverables prepared by an author outside of the District. These reviews should include a complete review of the AE's QC Plan and spot checking the technical aspects of the project deliverables to verify the QC Plan was followed. QA review process should not require a complete

technical review of the deliverables; rather, the PDT should be checking for contract compliance.

4.2.2 Quality Assurance Review Team ER 1110-3-12

GUIDANCE: *Must be project specific.*

BACKGROUND: For engineering and design products or services being prepared by a geographic district, the district's Regional Headquarters is responsible and accountable for QA of the District's engineering and design products.

For deliverables prepared by another District or center, government agency, or A-E contract, the QA responsibility and accountability for engineering and design are assigned to the geographic district for which the work is being performed. The District's engineering organization is responsible for leading the QA of engineering and design products and should be identified within the QA Plan.

4.3 DELIVERABLES ER 1110-3-12

GUIDANCE: *Must be project specific.*

BACKGROUND: Quality assurance must be documented through a statement of technical review that includes: a statement of completion of an ITR and QA review and a statement of certification of the ITR and QA review. These reviews must include validation of the QCP, designer/checker/ITR personnel technical qualification, and compliance with requirements of the contract, USACE and the stakeholder.

ER 1110-3-12, Appendix F provides a sample of this documentation. QA personnel will perform a BCOES review, and the review will be certified with a signed statement of completion.

SECTION 5. SPECIAL CONSIDERATIONS

5.1 SPECIALIZED REVIEWS PDBP REF8008G

5.1.1 Stakeholder Review Team

GUIDANCE: *Must be project specific.*

BACKGROUND: Specific personnel that need to be included as part of specialized reviews as a part of, or on behalf of the stakeholder must be identified.

EXAMPLE: *"Since utilities such as electric, sanitation, and water are privatized at Fort Lee stakeholders such as Dominion Virginia Power, Old Dominion Utility Services, Inc., and Virginia American Water Works, respectively, are involved with project review for utility coordination and design purposes."*

5.1.2 Mandatory Center of Expertise Review ER 1110-1-8158

GUIDANCE: *Must be project specific.*

BACKGROUND: Centers of Expertise (CX) are designated USACE organizations (District, Lab, or Center) that have demonstrated capability and expertise in a specialized area. CXs improve capabilities and management, eliminate redundancy, optimize the use of specialized expertise and resources, enhance USACE-wide consistency, facilitate technology transfer, help maintain institutional knowledge in key areas, and improve service to customers, including rapid response to emergencies.

EXAMPLE: *"The new Brigade Headquarters includes a Sensitive Compartmented Information Facility (SCIF). In order to ensure the design meets all security requirements and will be certified by installation personnel, the Protective Design Center (CENWO) will be included as a part of the review team during design and for follow on coordination during construction. These PDT members are identified in the Quality Control Plan."*

5.1.3 Technical Center of Expertise ER 1110-1-8158

GUIDANCE: *Must be project specific.*

BACKGROUND: A Technical Center of Expertise (TCX) is a USACE organization that has been approved by HQUSACE as having a unique or exceptional technical capability in a specialized subject area that is beneficial to HQUSACE, USACE commands, and other organizations. The services to be rendered by a TCX are not mandatory, are available upon request, and must be reimbursed by project funds. Minimum customer service quality standards established in operating procedures are also maintained by the TCX. TCXs and services rendered can be found on the E&C Technical Excellence Network (TEN).

EXAMPLE: *"The restoration work to be completed on the tainter gates includes removal of existing corrosion protection system and application of a new system. In order to ensure the technical specifications are written correctly, and the QA procedures during construction are executed effectively, the Paint Center (CERL) has been identified as part of the PDT as indicated in the Quality Control Plan."*

5.1.4 Center of Standardization Review ER 1110-1-8158

GUIDANCE: *Must be project specific.*

BACKGROUND: Each year the strategy for Military Programs Delivery is authorized via Operations Order, which establishes the Centers of Standardization (COS) as the mechanism through which USACE develops and maintains the Army standard designs. As such, COS must be involved in the planning and design for standard design projects, including any alteration to or variances from the standards. For applicable projects, the COS team must be identified and their roles and responsibilities described.

EXAMPLE: *"This project includes the design and construction of an Unaccompanied Enlisted Personnel Housing (UEPH), a General Purpose Warehouse (GPW), and a Company Operations Facility (COF). As designated Centers of Standardization, the Fort Worth (UEPH, GPW) and Savannah Districts (COF) have been identified in the PDT list included in the QC Plan. Representatives from each team will attend the planning charrette, design charrette, and participate in the QC and ITR reviews, as outlined in the QC Plan."*

5.1.5 Engineering Considerations and Instructions for Field Personnel ER 1110-3-12

GUIDANCE: *Must be project specific.*

BACKGROUND: The DOR (whether in-house or contracted) is responsible for generating the ECIFP according to ER 1110-3-12. An ECIFP is a brief document outlining the engineering considerations used to aid construction personnel in the supervision and inspection of the contract. It should include the discussions on why specific designs and materials were selected and any features requiring special attention.

The document should provide insight and background necessary to review submittals and resolve minor construction problems without compromising design intent. ECIFP is used to transmit special design concepts, assumptions, and instructions on how to construct unique design features and is the means of communication and coordination between design and construction personnel for preconstruction and preparatory meetings, submittal reviews, shop drawings, samples, certifications, and test results.

EXAMPLE: *Refer to Attachment F: Sample Report on Engineering Considerations and Instructions to Field Personnel .*

GUIDANCE: *Must be project specific.*

BACKGROUND: USACE Construction Quality Management activities are outlined in ER 1180- 1-6: Construction Quality Management, and supplemented with additional information in EP 415-1-260: AE/RE Management Guide. Construction personnel must engage in an integrated project team, providing input to the QMP for appropriate oversight of the solicitation documents (to include design documents) and the construction contract, regardless of the delivery method.

This portion of the QMP does not take the place of the existing District or Resident Office Quality Management Process, or the project-specific Contractor Quality Assurance Plan. Rather, each of these processes should work in concert and be used throughout the project; achieving quality construction is a combined effort and responsibility of the construction contractor and the government.

Lastly, proper staffing is integral to successful project quality. Office staffing is outlined in the District and Resident Office Quality Management Process; additional project-specific staffing (in excess to the District process) must be addressed in the QMP.

6.1 Pre-Award Activities ER 1180-1-6

6.1.1 Acquisition Strategy Development

GUIDANCE^{R}: *Should be standardized.*

BACKGROUND: Typically, acquisition strategy decisions include input from the Chief of Construction as part of the District standards processes. This involvement should be documented as a part of the QMP in the PMP. The level of detail of the strategy will be equal to the value and complexity of the proposed acquisition. As the acquisition method directly impacts how the construction contract is administered, integrating construction personnel directly impacts the successful execution of the project.

EXAMPLE: "*During initial planning, the Chief of Construction Division provides input with regard to project complexity and risk management to help determine the proper acquisition strategy for the project, according to District Process XYZ."*

6.1.2 Input During Design ER 1180-1-6

GUIDANCE: *Must be project specific.*

BACKGROUND: Construction personnel should participate in design review conferences, BCOES reviews, conduct site plan-in-hand reviews, and help to establish the contract CQC requirements. The QMP should describe this level of involvement and should be based on district standard procedures.

EXAMPLE: *"The project engineer and an office engineer from the Fort Leonard Wood resident office have been identified as PDT members, included in the PMP. Additionally, they will be included in each design review as well as the BCOES process, as outlined in the Quality Control Plan. They will review the technical design, as well as provide specific input to the Div 01 Construction Administration specifications."*

6.2 Contractor Quality Control

GUIDANCE: *Must be project specific.*

BACKGROUND: Contractor QC requirements are found in specification UFGS 01 45 00.00 10 for USACE contracts. It is imperative that the PDT discuss additional Contractor QC activities that may be necessary early in the development of the solicitation package, document them in this QMP, and integrate them into the contract.

Special Contractor Quality Control (CQC) Plan requirements for this contract in addition to baseline in UFGS 01 45 00.00 10 should be outlined in the QMP, to include:

a. Requiring additional staffing for specific features of work;
b. Unique submittal submission and review processes;
c. Integration of stakeholder, user, or DOR into the three-phase inspection process (advanced notification for meetings or request for inspection);
d. Unique testing requirements; and
e. Update the QMP to reference Contractor's approved Quality Control Plan, with transmittal number and approval date for retrieval from RMS.

EXAMPLE: "*The subject matter experts for review of the contractor's daily blasting plans are located at the District office. Therefore, we have included a requirement that all associated submittals are delivered electronically a minimum of 48 hours in advance of the contractor's proposed execution of work."*

6.3 Government Quality Assurance ER 1180-1-6

GUIDANCE: *Must be project specific.*

BACKGROUND: Government QA includes the various functions, including testing and inspections, performed by the Government as well as enforcement of the three-phase quality control process, to ensure the contractor has fulfilled the contract's requirements for quality, quantity, and other aspects of the contract.

6.4 Staffing and Training ER 1180-1-6

GUIDANCE: *Must be project specific.*

BACKGROUND: The PDT is responsible for developing a project specific supplement to the QA Plan in addition to regional or District-level quality assurance plans. This supplement should identify any specific plans for additional staffing or training necessary to successfully execute the project.

EXAMPLE: *"The PDT plans to execute the following activities in advance of construction procurement:*

a. *Development of a schedule of visits or list of critical features of work to be reviewed and/or inspected by the Designer of Record.*
b. *The project will be LEED Silver certified; therefore, all QA staff will attend the USACE PROSPECT No. 244 Course.*
c. *Temporary assignment of personnel to similar ongoing construction project at XXX District to familiarize themselves with unique facility challenges and capture lessons learned.*
d. *Advertisement of temporary assignments for personnel from other districts or MSCs in order to staff the project adequately."*

6.5 Additional Resources ER 1180-1-6

GUIDANCE: *Must be project specific.*

BACKGROUND: The QA Plan must be kept current and adjusted for changes in workload and staffing. Therefore, after initial development, the plan will be reviewed and updated as often as necessary but not less than annually. Any additional resources (staffing, equipment) that are required for project execution should be identified in the plan.

EXAMPLE: *"For a critical roofing project, the QA Plan included the need for special inspections by a roofing consultant and an infrared camera that would aid in proper quality assurance inspections."*

6.6 Designer of Record

GUIDANCE[R]: *Should be project specific.*

BACKGROUND: The Construction QAP should document how construction personnel will incorporate the DOR from pre-award through construction completion. This includes participation in meetings and onsite QA activities, and definition of roles in answering Requests for Information and reviewing submittals.

EXAMPLE: *"The DOR will participate telephonically during monthly PDT meetings and attend onsite QA activities for placement of critical features of work. RFIs and submittals that are administrative in nature will be addressed by the project office. Technical RFIs and submittals will be coordinated with the DOR in a frequency commensurate with the complexity of the issue."*

6.7 Risk/Hazard Factors and Complexity

GUIDANCE[R]: *Should be project specific.*

BACKGROUND: Similar to the design risk/hazard factors and complexity, the Construction QAP should address project issues that affect the construction of the project after award and Notice to Proceed has been issued. This section should highlight risks specific to construction, which are fully addressed in the Risk Management Plan.

EXAMPLE: "*The contractor has proposed an aggressive schedule that relies on favorable weather conditions for building dry-in before winter. In the event of schedule slippage, the government will review specific plans for temporary environmental control measures."*

SECTION 7. PROJECT-SPECIFIC REQUIREMENTS PDBP REF8008G

GUIDANCE: *Must be project specific.*

BACKGROUND: Any additional project-specific requirements not previously addressed in other parts of the QMP should be added to ensure all unique conditions have been accounted for.

EXAMPLE: *"The new administration building on the West Point campus is subject to many high-ranking visitors during construction. Because of this, a Visitor's Plan has been developed to outline scheduling and accommodations and is attached as an Appendix to the PMP. The Resident Office will handle VIP visitors and work in conjunction with the General Contractor's on-site staff to minimize impacting project execution."*

SECTION 8. SAMPLE QMP DOCUMENTS

SAMPLE: DESIGN BUDGET

The sample design budget is to be used as a starting point for creating the QMP budget, which is a requirement of the PDBP. If the PMP budget is detailed with regard to the quality management, a quick reference to the PMP budget should be utilized.

DESIGN BUDGET								
Key Activities	Kickoff Meeting	35% Design	65% Design	95% Design	Corrected Final	Advertising and Award	Approximate Hours	Subtotal
Design Kick-off								
E&C Div.	$380.00	$380.00	$380.00	$380.00	$380.00	$380.00	19	$2,280.00
Engineering Branch	$1,532.00	$3,740.00	$3,288.00	$3,288.00	$3,288.00	$3,288.00	154	$18,424.00
Civil Section	$13,455.00	$77,400.00	$77,500.00	$77,500.00	$20,000.00	$5,000.00	2,257	$270,855.00
Architectural Section	$26,825.00	$225,000.00	$100,000.00	$225,000.00	$20,000.00	$5,000.00	5,015	$601,825.00
Mechanical Section	$26,825.00	$147,607.00	$271,000.00	$251,000.00	$20,000.00	$5,000.00	6,012	$721,432.00
Structural Section	$26,825.00	$77,400.00	$100,000.00	$150,000.00	$20,000.00	$5,000.00	3,160	$379,225.00
Electrical Section	$26,825.00	$77,400.00	$185,000.00	$200,000.00	$20,000.00	$5,000.00	4,285	$514,225.00
A-E Support	$30,000.00	$50,000.00	$50,000.00	$50,000.00	$10,000.00	$0.00	1,583	$190,000.00
Cost Section	$3,182.00	$22,871.00	$22,989.00	$22,989.00	$10,644.00	$10,644.00	778	$93,319.00
Geo-Environmental Section	$12,045.00	$23,000.00	$23,000.00	$23,000.00	$2,000.00	$0.00	692	$83,045.00
Design Management	$15,148.00	$7,000.00	$7,000.00	$7,000.00	$10,000.00	$7,000.00	443	$53,148.00
Supplies	$2,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	17	$2,000.00
Travel	$4,300.00	$10,000.00	$10,000.00	$10,000.00	$5,000.00	$10,000.00	411	$49,300.00
Printing/Registration Cost	$950.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	216	$25,950.00
Military Projects Branch	$20,000.00	$23,000.00	$23,000.00	$23,000.00	$5,000.00	$5,000.00	825	$99,000.00
Programs Branch	$5,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	125	$15,000.00
Construction Branch	$5,000.00	$7,500.00	$17,500.00	$17,500.00	$17,500.00	$10,000.00	625	$75,000.00
Contracting Branch	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$30,000.00	458	$55,000.00
VE Study	$5,000.00	$110,000.00	$0.00	$0.00	$0.00	$0.00	958	$115,000.00
Independent Technical Review	$0.00	$0.00	$0.00	$31,000.00	$10,000.00	$0.00	342	$41,000.00
BCOES	$0.00	$0.00	$0.00	$40,000.00	$10,000.00	$0.00	417	$50,000.00
Specifications Section	$5,000.00	$5,000.00	$5,000.00	$10,000.00	$10,000.00	$10,000.00	375	$45,000.00
Subtotals	$235,292.00	$879,298.00	$907,657.00	$1,153,657.00	$205,812.00	$118,312.00	29,167	$3,500,028.00
Total Design Cost (P&D)								$3,500,028.00
PA								$42,000,000.00

SAMPLE: DESIGN SCHEDULE

The sample design schedule is to be used as a starting point for creating the QMP schedule, which is a requirement of the PDBP. Detailed P2 schedules are used in some Districts. If the PMP schedule is detailed with regard to quality management, a reference to the PMP schedule should be utilized. The schedule can be combined with the design budget if possible.

DESIGN SCHEDULE				
Milestone	Name	Duration	Start Date	Finish Date
Receive Code 6		0	1-Jan-17	1-Jan-17
	Set Up Initial Funding	30	1-Jan-17	31-Jan-17
	Develop Team	45	1-Jan-17	15-Feb-17
	Prepare Draft PMP	60	1-Jan-17	2-Mar-17
	Finalize PMP	30	2-Mar-17	1-Apr-17
Receive Executive Staff Approval to Move forward with Design (CP Bravo)		8	1-Apr-17	9-Apr-17
	prepare for kickoff	60	9-Apr-17	8-Jun-17
Conduct Kickoff Meeting		2	9-Apr-17	11-Apr-17
	Quality Control Plan	7	9-Apr-17	16-Apr-17
	Ensure NEPA/ Section 106 is Complete	395	11-Apr-17	11-May-18
Complete Schematic Design		90	11-Apr-17	10-Jul-17
	DQC Review	3	10-Jul-17	13-Jul-17
	Distribute Schematic Design Package for review	1	13-Jul-17	14-Jul-17
	Provide review comments	14	14-Jul-17	28-Jul-17
	Conduct comment resolution conference	4	28-Jul-17	1-Aug-17
	Concept Cost Estimate Complete	14	10-Jul-17	24-Jul-17
	Value Engineering Study Summary	5	28-Jul-17	2-Aug-17
	VE Study Draft Report	7	2-Aug-17	9-Aug-17

DESIGN SCHEDULE				
Milestone	Name	Duration	Start Date	Finish Date
	Value Engineering Decisions Completed	7	9-Aug-17	16-Aug-17
	Value Engineering Report Finalized	14	16-Aug-17	30-Aug-17
Complete Design Development		120	10-Jul-17	7-Nov-17
	DQC Review	3	7-Nov-17	10-Nov-17
	Distribute design Development Package for review	1	10-Nov-17	11-Nov-17
	Provide review comments	14	11-Nov-17	25-Nov-17
	Conduct comment resolution	4	25-Nov-17	29-Nov-17
	Interim Cost Estimate Complete	14	7-Nov-17	21-Nov-17
Construction Documents		90	7-Nov-17	5-Feb-18
	DQC Review	3	5-Feb-18	8-Feb-18
	Distribute Construction Document Package for review	1	8-Feb-18	9-Feb-18
	ITR review	14	9-Feb-18	23-Feb-18
	BCOES review	60	9-Feb-18	10-Apr-18
	COS review	7	9-Feb-18	16-Feb-18
	Provide review comments	14	9-Feb-18	23-Feb-18
	Conduct Comment Resolution	7	23-Feb-18	2-Mar-18
	Plan in hand site visit review	3	23-Feb-18	26-Feb-18
	Final Cost Estimate Completed	14	5-Feb-18	19-Feb-18
Complete For Construction Design Documents		14	2-Mar-18	16-Mar-18
	Backcheck For Construction Design Documents	7	16-Mar-18	23-Mar-18

DESIGN SCHEDULE				
Milestone	Name	Duration	Start Date	Finish Date
	Complete Draft 1354	5	23-Mar-18	28-Mar-18
	Prepare BCOE Certification	3	10-Apr-18	13-Apr-18
Design Package is RTA/IGE Complete			28-Mar-18	28-Mar-18
	Receive Executive Staff Approval to move forward with Award (CP Charlie)	7	28-Mar-18	4-Apr-18
	Submit Design Package to NAO Contracting	7	4-Apr-18	11-Apr-18
	FEDBIZOPS Notification	30	11-Apr-18	11-May-18
	Advertise	3	11-Apr-18	14-Apr-18
	Receive Bids	30	14-Apr-18	14-May-18
	Source Selection	21	14-May-18	4-Jun-18
	Award	7	4-Jun-18	11-Jun-18
	Provide Notice to Proceed	14	11-Jun-18	25-Jun-18
PM duration		98	1-Jan-17	9-Apr-17
Design duration		353	9-Apr-17	28-Mar-18
Contracting duration		89	28-Mar-18	25-Jun-18
Total duration		540	1-Jan-17	25-Jun-18

SAMPLE: DELIVERABLES

The sample deliverables list is to be used as a starting point. In many cases, a deliverable date is included in this list. This list is not exhaustive and needs to be tailored for each project. Districts may decide to combine this list with the schedule.

DESIGN DELIVERABLES
Project Initiation
Field Investigation
Topographic and Utility Survey
Geotechnical Investigation
Environmental Report
Erosion/Sediment Pollution Control Plan
Schematic Design Submittal
Draft Design Analysis
In-progress BIM Model/CAD
Draft Construction Documents
Draft Specifications
Initial IGE
Schematic DrChecks Design Review & Resolution Meeting Minutes
Design Development Submittal
Interim Design Analysis
In-progress BIM Model/CAD
Interim Construction Documents
Interim Specifications
Interim IGE
Draft Bid Schedule
BIM Clash Detection Report
Design Development Review & Resolution Meeting Minutes
Construction Document Design Submittal
Interim Design Analysis
In-progress BIM Model/CAD
Interim Construction Documents
Interim Specifications
Interim IGE

DESIGN DELIVERABLES
Draft Bid Schedule
BIM Clash Detection Report
Construction Document Review & Resolution Meeting Minutes
For Construction Design Submittal
Final Design Analysis
Final BIM Model/CAD
Final Construction Documents
Final Specifications
Final IGE
Final Bid Schedule
Final DD-1354
ECIFP
BCOES Documentation
For Construction Design Review & Resolution Meeting Minutes
Backcheck
***Please note these items may vary per project.*

SAMPLE: QUALITY CONTROL PLAN (QCP)

This document provides additional guidance with regard to the requirements of the QMP. The QMP is an integral part of each PMP as outlined in the PDBP Manual. The use of the manual is required by Engineer Regulation 5-1-11: USACE Business Process.

The sample design Quality Control Plan is to be used as a starting point for creating the QCP. The QCP is an integral part of each QMP. Duplication of information already located in the PMP should be minimized by referencing the PMP location of the information.

The guide below follows the structure of the PDBP requirements for the QCP. Each section consists of two parts:

BACKGROUND: Provides explanation of the intent of the section and recommended ways to draft the QCP effectively and efficiently.

EXAMPLE: Illustrates how each section may look in a drafted QCP. The examples do not come from a single QCP and range in program, size, and complexity. They should not be construed as the minimum requirements of a QCP—that can only be determined depending on the project-specific circumstances.

QUALITY CONTROL PLAN

1. PROJECT DELIVERY TEAM (PDT)

BACKGROUND: The PDT team is involved with the day-to-day production of a product/project.

This area could reference PMP PDT table location to reduce duplication of information, as long as that listing is complete.

Often, the PDT table in the PMP will only list the primary or lead designers for each discipline. If this is the case, the QCP should identify the complete PDT to include support designers and functions.

EXAMPLE:

Project Delivery Team (PDT)			
Responsibility	Name	Email	Phone
Technical Lead	John Smith	john.smith@usace.army.mil	202-555-0000
Lead Civil			
Support Civil			
Landscape Architect			
Lead Structural			
Support Structural			
Lead Architect			
Support Architect			
Fire Protection			
Mechanical Engineer			
Electrical Engineer			
Sustainability Manager			
BIM Manager			
CADD/BIM Technician			
Specifications Manager			

2. TECHNICAL LEAD

BACKGROUND: The TL must be identified here and his or her responsibilities to the project should be reemphasized.

EXAMPLE: The TL manages issues concerning technical quality of E&C deliverables through design and construction. This individual is the primary interface with the PM and is also the District Chief's representative for a specific project regarding quality management of E&C deliverables.

The TL ensures the PDT identifies and properly uses appropriate professional standards for legal, environmental, economic, building code, life safety, and health criteria when producing all engineering and design products. The TL's active role as proponent is essential to ensuring technical quality. Any proposed change to the project scope, budget, or schedule that may affect the technical quality of E&C deliverables, or execution of quality procedures outlined in the QA/QC portions of the approved QMP must be coordinated with the TL. TLs provide PDT leadership and coordination with responsibility for ensuring Quality Assurance of E&C deliverables.

3. INDEPENDENT TECHNICAL REVIEW (ITR) TEAM

BACKGROUND: The ITR team members should be senior-level experts that are not involved with the day-to-day production of a product/project. The ITR is typically comprised of designers from another district, but may be within the same District provided none of the review members are also PDT members. The ITR review focuses on confirming the proper application of clearly established criteria, regulations, laws, codes, principles, and professional practices.

EXAMPLE:

Independent Technical Review (ITR) Team				
Responsibility	Name	Office	Email	Phone
Technical ITR Lead	Jane Smith	CESAS	jane.smith@usace.army.mil	202-555-0001
Civil				
Landscape				
Structural				
Architectural				
Fire Protection				
Mechanical				
Electrical				
Sustainability				
BIM Manager				
Specifications				

4. SPECIALIZED REVIEW TEAM

BACKGROUND: List who the specialized reviewers are and the significance for reviewing this project.

EXAMPLE: *The building being planned was developed from a standard design. To verify project requirements and intent of the building, a team from the Center of Standardization, XXX District, will review the documents. The team will focus their efforts on compliance with the standard, function of the building and approve any changes to the original design. Below are the team members associated with the review:*

Specialized Reviews Team				
Responsibility	Name	Office	Email	Phone
Civil	Jim Smith	SWF/COS	jim.smith@usace.army.mil	202-555-0002
Landscape				
Structural				
Architectural				
Fire Protection				
Mechanical				
Electrical				
Sustainability				
BIM Manager				
Specifications				

5. QUALITY CONTROL BUDGET

BACKGROUND: The quality control budget should define the funding used for quality control specifically. This budget should not duplicate information located elsewhere in the PMP or QMP.

EXAMPLE:

TOTAL PROJECT DESIGN FUNDS: [XXX]			
Quality Control Budget Breakdown			
REVIEW	DISCIPLINE	BUDGET	PERCENTAGE
DQC Review: Schematic Design	Civil	$1,600.00	
	Structural	$1,600.00	
	Architecture	$1,600.00	
	Mechanical	$1,600.00	
	Electrical	$1,600.00	
DQC Review: Design Development	Civil	$3,200.00	
	Structural	$3,200.00	
	Architecture	$3,200.00	
	Mechanical	$3,200.00	
	Electrical	$3,200.00	
DQC Review: Construction Documents	Civil	$2,400.00	
	Structural	$2,400.00	
	Architecture	$2,400.00	
	Mechanical	$2,400.00	
	Electrical	$2,400.00	
Total QC funding		$36,000.00	

6. QUALITY CONTROL SCHEDULE

BACKGROUND: The quality control schedule is used for complex projects that have a large PDT, complex reviews, or reviewers in remote locations. This QC schedule documents reviews that have been completed to the satisfaction of the Technical Lead (or Design Manager).

EXAMPLE:

QUALITY CONTROL SCHEDULE AND CHECKLIST									
MILESTONE	START DATE	FINISH DATE	DURATION (calendar)	DQC REVIEW	ITR	MCX	CoS	Safety	BCOES
Charrette Design	4/11/2017	4/18/2017	14	x					
Charrette Review Period	4/18/2017	4/25/2017	7	x					
Review of Quality Control Plan	4/9/2017	4/16/2017	14	x					
Quality Control Review of Schematic Design	7/10/2017	7/13/2017	3	x					
Schematic Design Review Period	7/14/2017	7/28/2017	14	x		x	x		
ITR of Schematic Design	NA	NA	NA	x					
Quality Control Review of Design Development	7/10/2017	7/13/2017	3	x					
Design Development Review Period	11/10/2017	11/25/2017	14	x		x	x		
BIM Clash Detection	11/10/2017	11/13/2017	3						
Quality Control Review of Construction Documents	2/5/2018	2/8/2018	3	x					

QUALITY CONTROL SCHEDULE AND CHECKLIST									
MILESTONE	START DATE	FINISH DATE	DURATION (calendar)	DQC REVIEW	ITR	MCX	CoS	Safety	BCOES
Construction Documents Review Period	2/9/2018	2/23/2018	14	x	x	x	x	x	x
ITR of Construction Documents	2/9/2018	2/23/2018	14	x	x				
Plan-In-Hand Site Visit and Review	2/23/2018	2/26/2018	3	x					
Quality Control of Final Design Documents	3/16/2018	3/23/2018	3	x	x	x	x	x	x
BCOES Review	2/9/2018	4/13/2018	60	x					x

7. QUALITY CONTROL

a. Codes and Criteria

BACKGROUND: Provide a comprehensive list of the codes required for quality control. This list should provide a complete list of codes that must be met for the project to be successful. Stakeholder criteria should be highlighted near this section.

EXAMPLE:

CODES AND CRITERIA	
NUMBER	NAME
	Higher Authority Mandates
UFC 1-200-01	General Building Requirements
	U.S. Green Building Council
IBC 2012	International Building Code

b. Stakeholder Criteria

STAKEHOLDER CRITERIA
U.S. Air Force Regulations and Instructions
U.S. Air Force Information Systems
Installation Design Guidance
Public Laws
Executive Orders
National Security Telecommunications and Information Systems Security Committee
U.S. Army Regulations
VA Design Guide
U.S. Army Information Systems Command

c. Unique Design Factors & Complexity of Project

BACKGROUND: List potential risks to the project, what would trigger the risk and the potential impact of that risk. This section is meant to analyze potential setbacks upfront to address those issues early and mitigate and potential problems. Reference to PMP Risk Register should be located here and information not duplicated.

EXAMPLE:

RISK FACTORS & COMPLEXITY			
# RISK	RISK DESCRIPTION	TRIGGERS	POTENTIAL IMPACT
Schedule	Failure to meet a milestone	Scope change	Schedule delay
Complexity	Medium: Technically specific design criteria on SCIF	More time and detail required	Need a technical expert to assist with design (time & money)
Resource availability	Limited electrical engineering resources are available	Electrical Engineer priorities shift	Schedule delay

Project-Specific Design Features/Complexity	
SCIF	
	Review of SCIF facilities should be performed by SMEs.
Mission Critical	
	Facility is mission critical and has unique features to maintain operation.
Ballistic Protection	
	This project includes ballistic resistance glazing and walls for the waiting room. Project must be reviewed according to UL 752.

d. Quality Control Process

BACKGROUND: Outline the District-specific quality control procedures here. This can by either referencing the district Business Quality Process or noting the process here. Typical documentation is in paragraph form and describes the procedure and when it takes place.

(1) EXAMPLE: Reference "Kansas City District Business Quality Process 7.3.01 Product Development In-House" for specific quality control activities.

(2) EXAMPLE: DQC review: DQC reviews will take place at each milestone. A discipline-specific reviewer, separate to the day-to-day production, will review the product at a detailed level. When necessary the DQC reviewer and designer will problem solve together to develop the best design solutions. Each discipline must have a checklist of items to review and check off before a product goes out for review.

(3) EXAMPLE: Branch Chief Check: Branch chief will check any deliverables before review for quality control measures and consistency. The chief has the ability to hold up any product they do not see meets the level of quality required.

e. Adapt processes to specific project to achieve quality.

BACKGROUND: List additional or unique processes to which the team may partake in to achieve project-specific quality control. See specific examples below:

EXAMPLE:

Project-Specific Processes
Field Investigation/Existing Building Walk-Through: A thorough examination of project site and the collection of data on existing conditions are essential for the development of accurate construction plans. List how the team will accomplish this and goals for this process.
PDT Review: Project Delivery Team meets to review the set of drawings together verifying all design elements have been coordinated throughout the building. This review can take place once or at each major milestone, list here the outline of this process.
In-Progress Review (IPR): Lead designer meets with their supervisor or branch chief to discuss quality and consistency of product at each milestone.
Subject Matter Expert Review: A subject matter expert for firing ranges has been identified and will review the project at the 65% submittal. Funding will be supplied to the reviewer prior to the 65% review.

8. DELIVERABLES

BACKGROUND: A QCP specific deliverables list should be located within the QCP.

EXAMPLE:

QUALITY CONTROL DELIVERABLES		
MILESTONE	Deliverable	Deliverable Date
Charrette Review	Charrette meeting notes	4/26/2017
	DrChecks^{SM} Comment report	4/26/2017
Review of Quality Control Plan	DrChecks^{SM} Comment report	4/17/2017
Quality Control Review of 35% Design	Verified Design Checklist	7/14/2017
	Review conference meeting notes	7/14/2017
	DrChecks^{SM} Comment report	7/14/2017
Quality Control Review of 65% Design	Verified Design Checklist	11/26/2017
	Review conference meeting notes	11/26/2017
	DrChecks^{SM} Comment report	11/26/2017
Quality Control Review of 95% Design	Verified Design Checklist	2/9/2018
	Review conference meeting notes	2/9/2018
	DrChecks^{SM} Comment report	2/9/2018
ITR of 95% Design	DrChecks^{SM} Comment report	2/24/2018
		2/24/2018
Plan-In-Hand Site Visit and Review	Review conference meeting notes	2/27/2018
Quality Control of Final Design Documents	DrChecks^{SM} Comment report	3/24/2018
	Review conference meeting notes	3/24/2018
BCOES Review	Signed BCOES	4/14/2018
	DrChecks^{SM} Comment report	4/14/2018

SAMPLE: QUALITY ASSURANCE PLAN (QAP)

The sample design Quality Assurance Plan is to be used as a starting point for creating the QAP. The QAP is an integral part of each QMP, as outlined in the PDBP Manual *(Reference 8008G)*. Duplication of information already located in the PMP should be minimized by referencing the PMP location of the information.

It is not necessary to duplicate codes, standards, quality objectives or other items that are referenced elsewhere in the QMP. However, if the QAP is for review of work being performed by another District or under A-E contract, the QAP should capture all relevant information.

The guide below follows the structure of the PDBP requirements for the QAP. Each section consists of two parts:

BACKGROUND: Provides explanation of the intent of the section and recommended ways to draft the QAP effectively and efficiently.

EXAMPLE: Illustrates how each section may look in a drafted QAP. The examples do not come from a single QAP and range in program, size and complexity. They should not be construed as the minimum requirements of a QAP—that can only be determined depending on the project-specific circumstances.

Quality Assurance Plan

1. Quality Assurance (QA) team

BACKGROUND: Below is a list of the QA team members for a project with their associated roles/responsibilities:

EXAMPLE:

Quality Assurance (QA) Team			
Responsibility	Name	Email	Phone
QA Team Lead	XXX	xxx@usace.army.mil	xxx-xxx-xxxx
Civil			
Landscape			
Structural			
Architectural			
Interior Design			
Fire Protection			
Mechanical			
Electrical			
Sustainability			

2. QA Budget

BACKGROUND: The budget listed below represents the total design funds allotted for this project, and specifies budget for Quality Control activities; [Peer Review/ITR] efforts are not included in this budget and should be a separate line in the PMP budget. The QA budget sample is for a project that was design by another District, government agency, or A-E firm.

EXAMPLE:

Quality Assurance Budget Breakdown	
DISCIPLINE	BUDGET
Life Safety	$10,000
Structural	$10,000
Architecture	$10,000
Interior Design	$10,000
Civil	$10,000
Mech	$10,000
Elec	$10,000
QA Budget Total	$70,000

3. QA Schedule

BACKGROUND: Edit the specific reviews based on project-specific quality assurance activities. The reviews listed are just some examples and not all inclusive for reviews possible.

EXAMPLE:

MILESTONE	Start Date	Finish Date	DURATION (Days)
Quality Assurance of Charrette Documentation	4/25/2017	5/2/2017	7
Quality Assurance of Quality Control Plan	4/16/2017	4/23/2017	7
Quality Assurance Review of Schematic Design	7/28/2017	8/4/2017	7
Quality Assurance Review of Design Development	11/25/2017	12/2/2017	7
Quality Assurance Review of Construction Documents	2/23/2018	3/2/2018	7
Quality Assurance of Construction Documents	3/23/2018	3/30/2018	7

a. Risk/Hazard Factors and Complexity of Project

BACKGROUND: List potential risks to the project, what would trigger the risk, and the potential impact of that risk. This section is meant to analyze potential setbacks upfront to address those issues early and mitigate and potential problems.

# RISK	RISK DESCRIPTION	TRIGGERS	POTENTIAL IMPACT
EXAMPLE:1 Schedule	Failure to meet a milestone	Scope change	Schedule delay
EXAMPLE: 2 Complexity	Technically specific design criteria on SCIF	More time and detail required	Need a technical expert to assist with design (time and money)

b. Quality Assurance Process

BACKGROUND: Outline the District-specific quality assurance procedures here. This can be achieved by either referencing the district Business Quality Process or noting the process below.

EXAMPLES:

EXAMPLE 1: Reference XX District Business Quality Process #### Contract Design for Quality for specific quality assurance activities.

EXAMPLE 2: Quality Assurance Review: Reviews will take place at each milestone. A discipline-specific reviewer will evaluate the product for compliance with code, regulation, and design adherence. Each discipline must have a checklist of items to review and check off before a product is delivered.

c. Crucial Design Features

BACKGROUND: List unique features of design requiring special review attention.

Project-Specific Design Features/Complexity	
SCIF	
	Review of SCIF facilities should be performed by SMEs.
Mission Critical	
	Facility is mission critical and has unique features to maintain operation.
Ballistic Protection	
	This project includes ballistic-resistance glazing and walls for the waiting room. Project must be reviewed according to UL 752.

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Appendix G
Samples: Quality Control Checklists

Simple Quality Checklist (Scorable) 010820

Arch-ID CoP Quality Checklist (Scorable) 010820

Access functional sample checklists in Microsoft Excel format here:

https://apps.usace.army.mil/sites/TEN/EC/Documents/forms/allitems.aspx

Folder: ER 1110-3-12 Quality Management Appendices

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Appendix H
Abbreviations and Terms

Architect-Engineer (A-E)	The firm that prepares the construction/implementation documents.
Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review	The BCOES review is conducted prior to contract advertisement. The purpose of the review is to ensure that BCOES aspects of a project are considered during design and integrated into the construction procurement documents for all projects. Refer to ER 415-1-11.
Construction Documents	Term used in military projects. Plans, specifications, drawings, and design analysis prepared by the design professional pertaining to project execution.
Designer of Record (DOR)	The individual who is ultimately responsible and liable for the adequacy and safety of a design. The DOR is the principle of the A-E firm who is in charge of the project.
Engineer Regulation (ER)	Provides policy, guidance, principles, practices, and tools for delivering quality products and services to customers of the USACE.
Engineering Considerations and Instructions for Field Personnel (ECIFP)	Brief document outlining the engineering considerations used to make design decisions.
Implementation Documents	Term used in Civil Works projects. Plans, specifications, drawings, and Design Documentation Report prepared by the design professional pertaining to project execution.
Independent Technical Review (ITR)	Review by a qualified person or team not involved in the day-to-day production of a project/product, for the purpose of confirming the proper implementation of applicable criteria, regulations, laws, codes, principles, and professional practices.
Peer Review	Another term for District Quality Control Review
Process	A series of actions, tasks, or procedures with a common objective to achieve an end or result.
Project	A temporary endeavor undertaken to create a unique product, service, or result. Internal services are discrete projects when they are unique and non-recurring.
Project Delivery Team (PDT)	The PDT is a cross-functional matrixed team that includes all the necessary functional and support personnel with the requisite skills and

	expertise, from the District, Divisions, Centers of Expertise and/or labs, in order to deliver the project.
Project Management	The application of knowledge, skills, tools, and techniques to project activities in order to meet project requirements.
Project Delivery Business Process (PDBP)	Formerly known as Project Management Business Process (PMBP), the PDBP is a fundamental subset of the USACE business process used to deliver quality projects. It reflects the USACE corporate commitment to provide "stakeholder service" that is inclusive, seamless, flexible, effective, and efficient. It embodies communication, leadership, systematic and coordinated management, teamwork, partnering, effective balancing of competing demands, and primary accountability for the life cycle of a project.
Project Management Plan (PMP)	The primary document to guide delivery of a high-quality project. A formal, approved, living document used to define requirements and expected outcomes and guide project execution and control. The PMP is the "umbrella" process for completion of project planning phase; it is performed after the work has been accepted and the PM assigned. The primary uses of the PMP are to facilitate communication among participants, assign responsibilities, define assumptions, and document decisions to establish baseline plans for scope, cost, schedule, and quality objectives against that performance can be measured and to adjust these plans as actuals dictate. The PMP is developed by the project delivery team, including the stakeholder. The approval of the PMP should be delegated to the lowest appropriate supervisory level in order to maintain a minimal level of management control.
Quality	The degree to which a set of inherent characteristics fulfills requirements. Quality an objective characteristic that can be measured, managed, and improved.

Quality Assurance (QA)	The part of quality management focused on providing confidence that quality requirements of a project, product, service, or process defined in the PMP will be fulfilled. QA includes those processes employed to ensure that QC activities are being accomplished in line with planned activities and that the QC activities are effective in producing a product that meets required quality metrics.
Quality Assurance Plan (QAP)	Component of the QMP. It is a written plan that defines how quality assurance will be executed on products that are completed with another District, government agency, or A-E resources.
Quality Control (QC)	The part of quality management focused on fulfilling the quality requirements of a project, product, service, or process as defined in the PMP. It includes the processes used to ensure that project performance meets agreed upon stakeholder requirements that are consistent with law, regulations, policies, sound technical criteria, schedules, and budget.
Quality Control Plan (QCP)	Component of the QMP. The QCP is a written plan that defines how quality control will be executed for products.
Quality Management	Coordinated activities to direct and control an organization with regard to quality.
Quality Management Plan (QMP)	Component of the PMP specifying the procedures and associated resources that must be applied, by whom, and when, for a specific project, product, process, or contract. A QMP is one of the results of quality planning that identifies processes required to ensure a project will satisfy the established needs and objectives for which it was undertaken.
Quality Management System (QMS)	A management system to direct and control an organization with regard to quality.
Qualtrax	USACE Quality Management System (https://qualtrax.usacegis.us/)
Regional Business Center (RBC)	An MSC and its districts acting together as a regional business entity. This vertical and lateral integration of organizational capabilities, resource sharing, technical expertise, project management, and project delivery broadens and enhances the range of services and quality within the region.

Stakeholder	Stakeholder as used in this regulation may be a number of people/ organizations. In general, the stakeholder is any individual or organization for which USACE delivers projects or services to meet specific needs/requirements.
Technical Adequacy	A quality assurance determination that correct criteria, including laws, codes, regulations, policies, and guidance have been referenced and applied, and that a valid engineering or design methodology has been used and documented. Spot checks of calculation and analysis may be performed for validation.
Technical Lead (TL)	Designated PDT member who serves as a proponent for the project's technical quality.
Technical Quality	A quality control determination that the project meets applicable criteria, policies, and guidance; that analyses and calculations are accurate, complete, and appropriate for the project phase; and that the documents are consistent, complete, coordinated, and comply with documentation standards.
Unified Facilities Guide Specifications (UFGS)	UFGS is a system of master guide specifications that define the qualitative requirements for products, materials, and workmanship for features that occur in USACE construction projects on a repetitive basis. UFGS are published only in electronic format at http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs. Requirements for using UFGS are contained in ER 1110-1-8155.
USACE Acquisition Instruction (UAI)	UAI is a document that establishes uniform policies and procedures to ensure that business practices are consistent throughout USACE, provides internal guidance, delegations of authority, assignments of responsibilities, workflow procedures, procedures that are required by regulations to be established by the Head of the Contracting Activity (HCA), procedures that implement policies, and internal reporting requirements.
Value Engineering (VE)	VE is an effective tool to reduce the construction costs of a project. The proponent office in HQUSACE for VE is CEMP-EV. Refer to ER 11-1-321.

Acronyms

AAR	After Action Report
A-E	Architect-Engineer
AR	Army Regulation
BCOES	Biddability, Constructability, Operability, Environmental, and Sustainability
COR	Contracting Officer's Representative
DA	Design Analysis
D-B	Design-Build
DDR	Design Documentation Report
DOR	Designer of Record
DQC	District Quality Control
DrChecks^{SM}	Design Review Checking System
EC	Engineer Circular
ECIFP	Engineering Considerations and Instructions for Field Personnel
E&C	Engineering and Construction
EP	Engineer Pamphlet
ER	Engineering Regulation
FAR	Federal Acquisition Regulations
ITR	Independent Technical Review
LL	Lessons Learned
MILCON	Military Construction
MSC	Major Subordinate Command
O&M	Operation and Maintenance
PDBP	Project Delivery Business Process
PDCA	Plan-Do-Check-Act
PDT	Project Delivery Team
P.E.	Professional Engineer
PM	Project Manager
PMP	Project Management Plan
QA	Quality Assurance

QAP	Quality Assurance Plan
QC	Quality Control
QCP	Quality Control Plan
QMP	Quality Management Plan
R.A.	Registered Architect
RBC	Regional Business Center
RFP	Request for Proposal
RMS	Resident Management System
RTA	Ready to Advertise
SF	Standard Form
SME	Subject Matter Expert
TEN	Technical Excellence Network
TL	Technical Lead
UAI	USACE Acquisition Instruction
UFC	Unified Facilities Criteria
UFGS	United Facilities Guide Specifications
USACE	U.S. Army Corps of Engineers
VE	Value Engineering