



DEPARTMENT OF THE ARMY
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS
1100 COMMERCE STREET, SUITE 831
DALLAS TX 75242-1317

CESWD-RBT

22 MAY 2017

MEMORANDUM FOR Commander, Fort Worth District

SUBJECT: Review Plan approval for Lewisville Lake Dam, Dam Safety Modification Project Pre-Construction, Engineering, and Design, Lewisville, Texas

1. References:

a. EC 1165-2-214, Water Resources Policies and Authorities - Civil Works Review, 15 Dec 2012.

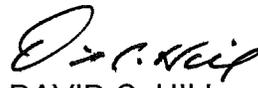
b. Final Review Plan for Lewisville Lake Dam, Dam Safety Modification Pre-Construction, Engineering, and Design (PED) Activities and Risk Management Center endorsement (Encl).

2. In accordance with 1.a., I hereby approve the enclosed Review Plan (RP) for the subject project.

3. Please post the final approved RP with a copy of this memorandum to the District's public internet website. Prior to posting to the District website, the names of USACE employees should be removed.

4. The SWD point of contact for this action is Mr. Michael Southern, CESWD-RBT, at 918-669-7148.

Encl


DAVID C. HILL
Brigadier General, USA
Commanding

CF:
CESWF-PM-C/ Gray (w/encl)

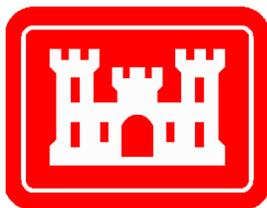
Review Plan U.S. Army Corps of Engineers Southwestern Division Fort Worth District

Lewisville Lake, Lewisville, TX



MSC Approval Date: 22 May 2017

Last Revision Date: 26 Mar 2019



**US Army Corps
of Engineers®**

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1. Purpose and Requirements

a. Purpose

This Review Plan is intended to ensure a quality-engineering project is developed by the Corps of Engineers. This Review Plan has been developed for Lewisville Lake, Texas. This Review Plan was prepared in accordance with EC 1165-2-217, "Review Policy for Civil Works". The Review Plan shall layout a value added process that assures the correctness of the information shown. This Review Plan describes the scope of review for the current phase of work, and is included in the Project Management Plan (P2 #139886).

The plan defines roles, responsibilities, and accountability of the project team members for quality control. It addresses cooperative efforts of the Project Delivery Team (PDT), Quality Control (QC) and Agency Technical Review (ATR) team members for accomplishing seamless review throughout the product development phase. This plan also defines the process and requirements for Value Engineering (VE), and Biddability, Constructability, Operability, Environmental and Sustainability (BCOES). The Lewisville Dam Safety Project is currently in the final stages of the Dam Safety Modification Study with preconstruction, engineering and design (PED) expected to begin in FY17 for items identified and approved in the Dam Safety Modification Report (cited in section 1.b. below). This review plan covers design and construction activities related to the plans, specifications, and design documentation report (DDR) for the construction of the project described herein. Design and construction packages will be broken up and prioritized as necessary to mitigate dam safety risks as quickly as possible. This Review Plan is a living document and will be updated as additional information becomes available. A template for documenting updates to this Review Plan is provided in Attachment 1. A list of acronyms and abbreviations used in this document is included in Attachment 2.

b. Guidance and Policy References

Quality Control (QC) is defined as the evaluation of technical products and processes to ensure they comply with applicable laws, and Corps regulations/policies (planning, engineering, construction, and post-construction). Quality control ensures the use of sound technical practices and that customer requirements/expectations are met. Lewisville Lake Dam Safety Modification Project implementation documents and critical design features will receive a high level of technical quality verification by each discipline. Products will be reviewed to ensure that the following objectives are met:

- The design is practicable, environmentally acceptable; compatible with existing projects; and will be safe, functional, and meet the authorized purposes and comply with existing water supply agreements.
- The engineering concepts, assumptions and methods are appropriate and valid, and analyses are correct.
- The design complies with engineering policy and accepted engineering practice both within the Corps and industry-wide.

- The cost estimate is reasonable.
- The schedule is expeditious, practical, and coordinated with the cost estimate.

This technical review will be conducted using guidance from the following documents:

- EC 1165-2-217, Review Policy for Civil Works, 20 Feb 2018
- EC 1165-2-203, Implementation of Technical Policy Compliance Review
- ER 1110-1-12, Quality Management, 31 Mar 2011
- ER 1110-1-8159, Engineering and Design, DR Checks, 1 Jan 2015
- ER 1110-2-1156, Engineering and Design, Safety of Dams – Policy and Procedure, 31 Mar 2014
- ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999
- ER 11-1-321, Value Engineering 01 Jan 2011
- ER 415-1-11, Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review, 1 Jan 2013
- ER 415-1-13, Design and Construction Evaluation (DCE), 29 Feb 1996
- AR 15-1, Committee Management, 29 May 2015 (Federal Advisory Committee Act Requirements)
- ER 1105-2-100, Planning Guidance Notebook, 22 Apr 2000
- Dam Safety Modification Report, Lewisville Dam, January 2017
- Lewisville Lake Dam Safety Modification Report Project Review Plan, 7 Dec 2012
- SWD Dam Safety Production Center Quality Management Plan-Volume I, 1 Feb 2018

c. Requirements

This plan was developed in accordance with EC 1165-2-217 (dated 20 Feb 2018). This document establishes procedures for ensuring quality within US Army Corps of Engineers (USACE) decision and implementation documents via independent review. The Review Plan (RP) describes in general the scope of review for design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R) for the Lewisville Dam Safety project. All appropriate levels of review (QC, CE, ATR, BCOES, VE, Policy Compliance, IEPR, and Legal Review) are addressed in this document. Any levels deemed inapplicable will require documentation in the RP of the risk-informed decision not to undertake that level of review. The RP identifies the most important skill sets needed in the reviews, the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for each particular feature of the project.

In Progress Updates. In-Progress Updates include both In-Progress Reviews (IPR) and Vertical Team Updates. The Project Delivery Team (PDT) is responsible for scheduling and conducting IPRs as needed and vertical team updates at least on a monthly basis. IPRs facilitate a rapid exchange of information between the PDT and the Review Team. The IPR is very helpful especially at concept level design as scoping issues are being defined. Vertical team updates provide regular progress updates with RMC, MCX, SWD, and HQ USACE personnel and exchange ideas for potential design



solutions throughout the life of the project. In addition, the PDT is responsible for assuring work is performed in accordance with the Fort Worth District and Southwestern Division (SWD) Quality Manuals. District Project Manager as part of the PDT will establish, coordinate, and oversee In-Progress Updates. These reviews will serve as both information and decision-making forums.

Quality Control (QC). QC is an internal review process of basic science and engineering work products focuses on fulfilling the project quality requirements. The Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) review and internal Cross-Discipline (Product) Review (CDR) are part of the QC process. Documentation of QC activities is required and shall be in accordance with Southwestern Division – Dam Safety Production Center (DSPC) guidance and Quality Manuals of Fort Worth District and Southwestern Division. The QC will be managed by the Fort Worth District and the Southwestern Division DSPC in accordance with ER 1110-1-12, and the Southwestern Division DSPC / Fort Worth District Quality Management Plans. The QC roster includes the following disciplines: civil, geotechnical, structural, cost, engineering geologist, environmental, and operations.

Agency Technical Review (ATR). The purpose of the ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. A Constructability Evaluation (CE) is part of the ATR process. ATR is managed within USACE by the designated Review Management Organization (RMO) and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC. The ATR team members represent the following disciplines: civil, geotechnical, hydrology & hydraulics, structural, engineering geologist, environmental, real estate, and cost.

Value Engineering (VE). A value engineering study is required during PED to include the risk-informed decision criteria which include: a) tolerable risk guidelines, b) as low as reasonably practicable guidance, and c) essential engineering guidelines. The objective of the project will be the objectives as specified at the beginning of the design phase. The value engineering process shall be conducted in accordance to ER 11-1-321 Value Engineering. Refer to Section 3 for details.

d. Review Management Organization

The USACE Risk Management Center (RMC) is the Review Management Organization (RMO) for this project. Contents of this review plan have been coordinated with the RMC and SWD, the Major Subordinate Command (MSC). In-Progress Review (IPR) team meetings with the RMC, SWD, and HQ will be scheduled on an “as needed” basis to discuss programmatic, policy, and technical matters. The SWD Dam Safety Program Manager will be the POC for vertical team coordination. This review plan will be updated



for each new project phase. SWF will assist the RMC with management of the ATR and IEPR reviews and development of the draft ATR and IEPR “charges”.

2. Project Description and Information

a. Project Description

In the River and Harbor Act of 2 March 1945 (Public Law 79-14, 79th Congress, 1st Session), Congress authorized the first elements of the comprehensive program for the development of the water resources of the Trinity River basin consisting of four multiple-purpose lakes and two floodway projects, one of which was Lewisville Dam. The primary purposes of the project are flood control (now referred to as flood risk management), water supply, recreation, and non-Federal hydropower.

Construction of the embankment began in December 1948, and closure was started in June 1954. The dam was completed in August 1955. Deliberate impoundment began in November 1954 and conservation pool (elevation 515) was first attained in May 1957. All elevations mentioned in this document are expressed in feet, NGVD. As a result of the additional storage provided by Ray Roberts Dam (upstream of Lewisville), Lewisville Dam’s conservation pool was raised from elevation 515 to 522 on 30 November 1988. The spillway has been engaged seven times during flood events that occurred in the following years: 1957 (same year when conservation pool of 515 was attained), 1981, 1982, 1989, 1990, 2007, and 2015. The pool of record was established on 30 May 2015 when the reservoir reached elevation 536.9 (4.9 feet above the crest of the uncontrolled spillway).

The project includes an earthen embankment with gated outlet works and an uncontrolled concrete ogee weir spillway. The 32,328 feet long earth fill embankment has a maximum height of 125 feet, to elevation 560.0 feet, and consists of approximately 13,208,400 cubic yards of alluvial clay and clay-shale materials.



- c) PFM 7: Spillway weir instability due to spillway apron failure during high velocities and high stagnation pressure in the existing offset joints in the apron slabs leads to undermining and sliding of the spillway weir, resulting in loss of pool.
- d) PFM 8: Embankment slope failure (shallow slides). The shear stress exceeds the shear strength of the embankment material, resulting in slow deformations developing into a shallow slide.
- e) PFM 2: Internal erosion of embankment along the main conduit.

This dam safety project is needed to establish Lewisville Dam as a safe facility that meets USACE risk reduction guidelines for existing dams and allows the project to provide the benefits for which it was authorized.

b. Project Sponsor

Products and analyses provided by non-Federal sponsors as work in-kind services are subject to QC, ATR, and IEPR reviews. No work in-kind products or analyses will be provided by the non-Federal sponsors.

The city of Dallas has a water supply storage contract dated May 1953 for storage below elevation 515 feet. Additional storage (authorized September 1980 for the City of Dallas and City of Denton) entitles the water suppliers storage between elevations 515 and 522 feet.

The City of Denton installed a hydropower facility, connected to the Brazos River Authority distribution network, at Lewisville Dam on 23 October 1991. This facility is now owned and operated by the City of Garland. The “run-of-river” facility is capable of producing 2,892 Kilowatts, when downstream water supply and small flood releases are used to generate power.

3. Review Types

The work products will be reviewed using an interdisciplinary team approach. The products will be reviewed for scope and adequate level of detail; compliance with guidelines, policy, and customer needs; and consistency, accuracy, and comprehensiveness. The various review types that will be used on this project are listed in the following sections below.

a. Design Team Reviews

Design team reviews are initiated by the review team. The reviews are primarily internal, but necessary to ensure compliance with good design practice. For this project, Discipline-specific Peer reviews and Cross-Discipline (Product) Quality reviews (CDR) are required. In-Progress reviews (IPRs) are optional for the PDT’s use.

1) Discipline Specific Review

As part of quality control, all work products, reports, evaluations, and assessments shall undergo a discipline specific review as part of design development. Any calculations, design assumptions, or quantity development presented in the design deliverables or

Design Documentation Report (DDR) shall be checked by an independent peer of the same discipline.

2) Cross-Discipline (Product) Quality Review (CDR)

The Lead Engineer and appointed team shall internally review all design deliverables (plans, specifications, DDR, and cost estimate) at each phase of work. At minimum, the CDR team will review across the disciplines and verify the following:

- a) All disciplines have received a discipline specific review and all issues are resolved to the Lead Engineer's satisfaction.
- b) Design intent is maintained and consistent with the preferred design alternative.
- c) The documents as written are clear and express a single design solution.
- d) The design method proposed is complementary of the planned contract method.
- e) The design method proposed does not have the potential for harm to an existing civil works structure.

Pertinent CDR comments shall be recorded in DR Checks.

3) In-Progress Reviews (IPR)

The IPR facilitates a rapid exchange of information between the PDT and the Review Team. PDT members will prepare presentations relative to their disciplines for presentation at the in-progress review. Review Team members should be prepared with questions and look for resolution on outstanding issues directly from PDT members. At the conclusion of the IPR, the Review Team Lead should ensure formal comments are added to the DR Checks system for evaluation and closure. Significant comments that were resolved during the in-progress review should be noted in the Final Review Report prepared by the Review Team Lead. IPRs for multiple required reviews such as ATR may be held concurrently in order to maximize efficiency so long as each review panel is independently led, understands its review charge, and provides an independent report of findings related to its review charge.

b. District Initiated Reviews

1) BCOES

As a part of quality control, a Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) review shall occur both before and after ATR review on the plans, specifications, and cost estimate. Per ER 415-1-1, the value of BCOES reviews "is based on minimizing problems during the construction phase through effective checks performed by knowledgeable, experienced personnel prior to advertising for a contract. BCOES requirements must be emphasized throughout the planning and design processes." This helps ensure the Government's contract requirements are clear, executable, and readily understandable by private-sector bidders or proposers. It also ensures construction can be done efficiently, in an environmentally sound manner, and sufficiently sustainable. Effective BCOES reviews of design and contract documents will reduce risks of cost and time growth, unnecessary changes and claims, as well as support safe, efficient, sustainable operations and maintenance by the facility users after construction is complete. BCOES reviews will be performed in accordance with ER 415-1-1. All BCOES comments shall be recorded in DR Checks.



2) Value Engineering

A Value Engineering (VE) study is required during PED and will be conducted on the project as required by ER 11-1-321. This study will ensure that Value Methodology (VM) techniques are integrated into the project delivery process to optimize overall project value, ensure objectives and requirements of all stakeholders are identified and addressed. The SAVE International 6 Step Process shall be used: Information Phase, Function Analysis Phase, Creative Phase, Evaluation Phase, Development Phase, and Presentation Phase.

The VE team shall concentrate on increasing the maximum cost savings of the project while still incorporating all the necessary project requirements. Although cost savings is a primary goal of the VE study, the VE team shall also place emphasis on the value (function verse cost) of each VE proposal including Life Cycle Cost Analysis (LCCA).

Per value engineering guidance, if there is a low opportunity to achieve cost savings based upon the type of work and specific construction work conditions, documentation will be noted in Fort Worth District's Value Management Officer Files.

c. Agency Initiated Reviews

1) Agency Technical Review (ATR)

ATR is mandatory for all implementation documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct, received robust District and design team reviews, comply with published USACE guidance, and whether the document explains the analyses/results in a reasonably clear manner for the public and decision makers.

The PDT should obtain ATR agreement on key data such as hydraulic and geotechnical parameters early in design process. The goal is to have early involvement of ATR team, especially when key decisions are made. Value added Lessons Learned from the ATR team should be shared early on to have the best chance of being adopted by the PDT.

2) Constructability Evaluation (CE) Review

In accordance with ER 1110-2-1156 and ER 415-1-13, a Constructability Evaluation shall be performed. The review's purpose is to ensure risks are adequately addressed by the design and all construction-related risks are fully identified and mitigated to an acceptable level on the plans and specifications. The CE process will use a team composed of DSMMCX and DSPC members, often from outside the geographic district.

d. Independent External Peer Review (IEPR)

1) Requirements

IEPR may be required for implementation documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed



decision, as described in EC 1165-2-217, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts outside USACE in the appropriate disciplines. IEPR teams will represent a balance of expertise, suitable for the review being conducted.

Type II IEPRs, or Safety Assurance Reviews (SAR), are managed outside USACE and conducted on design and construction activities for hurricane, storm, flood risk management, and other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

2) Decision on Type II IEPR

Type I IEPR was completed on the Dam Safety Modification Report and the Environmental Assessment in 2016. A summary of the results can be found at (<http://www.swf.usace.army.mil/Home/Lewisville-Lake-Dam/>). Using EC 1165-2-217 factors (Sections 12.6 through 12.8), a risk-informed decision was made to perform a Type II IEPR (Safety Assurance Review – SAR) for this project. A Type II IEPR is performed during the Implementation Phase on the design and construction activities associated with the following features: plans and specifications, the Design Documentation Report (DDR), supporting data, and analyses.

A risk informed decision was made that this project does pose a significant threat to human life (public safety) since Flood Risk Management is a primary purpose of this dam. This project reduces flood risk for approximately 431,000 people and \$2.4 billion in capital investment downstream (reference Figure 1 for potential visual impacts). For a Type II IEPR, the selection of IEPR review panel members will be made up of independent, recognized experts from outside USACE in the appropriate disciplines, representing a balance of expertise suitable for the review being conducted. For a Type II IEPR, the selection of IEPR review panel members will be selected using the National Academy of Science (NAS) Policy which sets the standard for “independence” in the review process. A site visit will be scheduled for the IEPR Team.

As previously identified in Section 2, areas of concern at Lewisville include potential for internal erosion and structural stability. The risk to human life and property should failure occur is high enough to warrant remediation of the identified deficiencies. Therefore, a Type II IEPR (Safety Assurance Review) is warranted. The IEPR team will be contracted with an A/E contractor or arranged with another government agency to manage external to the Corps of Engineers.

e. Policy and Legal Compliance Review

All implementation documents will be reviewed throughout the project for law and policy compliance. These reviews culminate in reported recommendations, supporting analyses, and coordination that comply with law and policy. These items warrant approval or further recommendation to higher authority by the home MSC Commander.



CDR (Product Review) and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies.

4. Deliverables for Review and Schedule

The Lewisville Dam Safety Modification Project will be broken up into three main design efforts:

- a) Design Phase 1: PFMs 4a, 4b, 8b, and 2
- b) Design Phase 2: PFMs 6 & 7
- c) Design Phase 3: Any remaining items not captured in Design Phases 1 and 2.

PFMs 4a, 4b, 8b, and 2 are all earthwork-based activities. Therefore, design efforts are concurrently scheduled. PFMs 8b and 2 are ALARP measures and may or may not be constructed within the first contract. Each deliverable (product) will be reviewed by the different teams at various levels of design and construction. To the extent practical, reviews should not extend the design schedule but should be embedded in the design process. Reviewers should be involved at key decision points and are encouraged to provide timely over the shoulder comments. The deliverables undergoing review during the PED and Construction phase for each contract are listed in the tables below.



<i>Phase: Design/Construction for PFM 4a/4b and 8b/2</i>		Deliverables Reviewed									
Design Phase	Review Team	Calculations *	Plans	Specifications	Contract Clauses	DDR	Cost Estimate	ECIFP	Construction Updates	Completion Report	Review Dates
Pre-Concept Design of Selected Alternative	Peer Review	X	X			X					
	CDR-Product		X			X	X				Sep 2016
Concept Design of Selected Alternative	BCOES		X	X			X				Oct 2016
	Value Engrg		X			X	X				TBD
Pre-65% Design	Peer Review	X	X	X		X					Mar 2017
	CDR-Product		X	X		X	X				Apr 2017
65% Design	ATR		X	X		X	X				Apr 2017
	CE Review		X	X		X	X				Apr 2017
	IEPR		X	X		X	X				May 2017
Pre-95% Design	Peer Review	X	X	X		X					Sep 2017
	CDR-Product		X	X	X	X	X	X			Oct 2017
95% Design	BCOES		X	X	X		X	X			Nov 2017
	ATR**		X	X		X	X	X			Nov 2017
	IEPR**		X	X		X					Nov 2017
100% Design	CDR-Product		X	X	X	X	X	X			Mar 2018
Construction Phase											
50% Construction	IEPR								X		
75% Construction	CDR-Product									X	
	ATR									X	
95% Construction	IEPR								X		
100% Construction	CDR-Product									X	
Post Implementation Phase											

* Calculations are included in the DDR

** Back Check 65% Comments.



Phase: Design/Construction for PFM 6 & 7		Deliverables Reviewed									
Design Phase	Review Team	Calculations *	Plans	Specifications	Contract Clauses	DDR	Cost Estimate	ECIFP	Construction Updates	Completion Report	Review Dates
Pre-35% Design	Peer Review	X	X			X					March 2019
	CDR-Product		X			X	X				April 2019
35% Design	BCOES		X	X			X				April 2019
	Value Engrg		X			X	X				April-June 2019
	ATR	X	X	X		X					April 2019
Pre-65% Design	Peer Review	X	X	X		X					February 2020
	CDR-Product		X	X		X	X				March-April 2020
65% Design	ATR		X	X		X	X				April 2020
	CE Review		X	X		X	X				April 2020
	IEPR		X	X		X	X				April 2020
Pre-95% Design	Peer Review	X	X	X		X					October 2020
	CDR-Product		X	X	X	X	X	X			Oct.-Nov. 2020
95% Design	BCOES		X	X	X		X	X			December 2020
	ATR**		X	X		X	X	X			December 2020
	IEPR**		X	X		X					December 2020
100% Design	CDR-Product		X	X	X	X	X	X			March 2021
Construction Phase											



50% Construction	IEPR									X		
75% Construction	CDR-Product										X	
	ATR										X	
95% Construction	IEPR									X		
100% Construction	CDR-Product										X	
Post Implementation Phase												

* Calculations are included in the DDR

** Back Check 65% Comments



Phase: Design/Construction for Remaining Items		Deliverables Reviewed									
Design Phase	Review Team	Calculations *	Plans	Specifications	Contract Clauses	DDR	Cost Estimate	ECIFP	Construction Updates	Completion Report	Review Dates
Pre-35% Design	Peer Review	X	X			X					Jan 2024
	CDR-Product		X			X	X				
35% Design	BCOES		X	X			X				
	Value Engrg		X			X	X				
Pre-65% Design	Peer Review	X	X	X		X					
	CDR-Product		X	X		X	X				
65% Design	ATR		X	X		X	X				
	CE Review		X	X		X	X				
	IEPR		X	X		X	X				
Pre-95% Design	Peer Review	X	X	X		X					
	CDR-Product		X	X	X	X	X	X			
95% Design	BCOES		X	X	X		X	X			
	ATR**		X	X		X	X	X			
	IEPR**		X	X		X					
100% Design	CDR-Product		X	X	X	X	X	X			
Construction Phase											
50% Construction	IEPR								X		
75% Construction	CDR-Product									X	
	ATR									X	
95% Construction	IEPR								X		
100% Construction	CDR-Product									X	
Post Implementation Phase											

* Calculations are included in the DDR

** Back Check 65% Comments

Additional documents that can require review include O&M Manual updates, changes to the water control manual, and site specific probable maximum precipitation (PMP) / probable maximum flood (PMF) analyses. As the project progresses, additional detail for project-related deliverables (i.e. not tied to a specific contract) and post-implementation phase deliverables will be outlined and updated in this review management plan.

5. Review Team Qualifications

a. Project Management and Project Delivery Teams (PDT)

The PDT and all review team rosters are provided in Attachment 3. The Project Manager is point of contact with a copy furnish to the PDT Lead Engineer. The PDT Lead Engineer, in consultation with the project manager and design leads, is ultimately responsible for any engineering/design scopes of work.

b. BCOES Review Team

The BCOES team rosters are provided in Attachment 3. Per ER 415-1-11, reviewers shall “include construction and operations-maintenance staff familiar with the project’s location, project site conditions, potential site-related problems, and plans for post-construction operations and maintenance. These reviewers should have extensive knowledge of the construction market place, site and access conditions and requirements, as well as experience in management of construction projects, determining construction durations, scheduling construction trades and activities, and experience in the operations-maintenance of facilities.” The BCOES will be coordinated by Fort Worth District, Construction Branch.

c. Value Engineering Team

The objectives of the Value Engineering Team include:

- Identify potential changes to the design that would satisfy the essential functions of the project at a lower cost;
- Identify potential changes to the design that would better accomplish the essential functions of the project while providing better overall value;
- Improve confidence in the effectiveness of the design;
- Provide additional input into the selected project decisions.

The Value Engineering Team is comprised of a value consultant and the appropriate subject matter experts (one subject matter expert for the disciplines specified in the design under development). See Attachment 3 for VE Team members.

Unless a waiver is provided, the Value Engineering Team shall conduct a workshop on each design package on the Lewisville Dam Safety Modification Project. The Value

Consultant will lead the team. At minimum, the Value Consultant shall be certified by SAVE International as a Certified Value Specialist (CVS).

d. Agency Technical Review (ATR) Team

ATR teams are comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead is from outside the home MSC. See Attachment 3 for ATR members.

The following provides an estimate of the disciplines and experience required for the ATR of the Lewisville Dam Safety Modification Project. The engineering disciplines needed for one phase of work versus another phase may vary. If a discipline is not needed, then that discipline will not be represented on that phase of work. The ATR team was chosen based on each individual's qualifications and experience with similar projects. The ATR reviewers must have a minimum of ten years of experience in the discipline, have a professional license or equivalent qualifying experience, and not be involved in the design or supervision of the project. For the disciplines that play a crucial part in the project, Subject Matter Experts (SMEs) are preferred for filling the ATR roster. All engineering or construction reviewers will be certified in CERCAP: <https://maps.crrel.usace.army.mil/apex/f?p=105>.

ATR Lead: The ATR team lead is a senior professional outside the home MSC with extensive experience in preparing Civil Works documents and conducting ATRs. The lead has the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline. The disciplines needed for the various designs on this project include: Geotechnical Engineering, Civil Engineering, Engineering Geologist, Hydraulics Engineering, Structural Engineering, Construction Engineer, Cost Engineer, Environmental, and Real Estate. Specific qualifications for crucial team members is listed below.

Geotechnical Engineer - Reviewer should be a senior level, professionally registered engineer with extensive experience in the civil works engineering field with particular emphasis on dam safety projects. The reviewer should have a minimum of 10 years of experience directly related to dams and/or levees. The reviewer shall have experience in analysis, design, and construction of gated outlet works dams with rolled-earth-filled embankments. The geotechnical engineer shall have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion protection design, and earthwork construction. The geotechnical engineer shall have knowledge and experience in design and construction of measures to address seepage, settlement, stability, and deformation problems associated with high head dams and appurtenances constructed on rock and soil foundations.

Civil Engineer – Reviewer should be a senior level, professionally registered engineer with extensive experience in the civil works engineering field with particular emphasis on dam safety projects. The Civil reviewer should have a minimum of 10 years of experience.



Engineering Geologist - Reviewer should be a senior level, professionally registered engineer or geologist with extensive experience in the civil works engineering field with particular emphasis on dam safety projects. The reviewer should have a minimum of 10 years of experience. The reviewer should be able to show experience in assessing internal erosion (seepage and piping) beneath gated outlet works dams constructed on shale formations. The engineering geologist shall be familiar with identification of geological hazards, exploration techniques, field and laboratory testing, and instrumentation. The engineering geologist shall be experienced in concrete mix designs, and other materials used in foundation seepage barriers. The engineering geologist shall have experience in identification and remediation of seismic hazards.

Hydraulic Engineer – Reviewer should be a senior level, professionally registered engineer with extensive experience in the civil works engineering field with particular emphasis on dam safety projects. The reviewer should have a minimum of 10 years of experience. The reviewer shall have experience in the analysis and design of hydraulic structures related to dams including the design of hydraulic structures (e.g., spillways, outlet works, and stilling basins). The hydraulic engineer shall be knowledgeable and experienced with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, Corps application of risk and uncertainty analyses in flood risk management studies, and standard Corps hydrologic and hydraulic computer models used in drawdown studies, dam break inundation studies, hydrologic modeling and analysis for dam safety investigations.

Structural Engineer – Reviewer should be a senior level, professionally registered engineer with extensive experience in the civil works engineering field with particular emphasis on dam safety projects. The reviewer should have a minimum of 10 years of experience. The reviewer shall have experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies, and external stability analysis including foundations on high head mass concrete structures and earthen embankment dams. The structural engineer shall have specialized experience in the design, construction and analysis of foundation anchors.

Construction Engineer – Reviewer should be a senior level, professionally registered engineer with extensive experience in the engineering construction field with particular emphasis on dam safety projects. The Construction reviewer should have a minimum of 10 years of experience. Experience with foundation anchors, seepage barriers, and foundation drains is preferred.

Real Estate – The Real Estate team member should have significant experience in defining and reviewing real estate requirements for civil works projects and particularly on projects operated and maintained by USACE. Specific areas of emphasis include understanding of the Government's estates in land and the limitations thereof, real estate land acquisition criteria, familiarity with real estate outgrants, and foresight with regard to possible project requirements related to access routes, borrow and disposal sites, relocations, and future operations and maintenance.

e. Independent External Peer Review (IEPR) / Safety Assurance Review (SAR)

The following provides an estimate of the Type II IEPR panel members and the types of expertise that should be represented on the review panel. The engineering disciplines needed for one phase of work versus another phase may vary. If a discipline is not needed, then that discipline will not be represented on that phase of work. All panel members shall be recognized experts in their field and have specialized experience pertaining to the work being performed in this project.

The disciplines needed for various reviews on this project include: Geotechnical Engineering, Civil Engineering, Engineering Geologist, Hydraulics Engineering, and Structural Engineering. Specific qualifications for team members is listed below and team members may be combined if they meet the qualifications for more than one discipline.

Geotechnical Engineer - The Geotechnical engineering panel member should be a registered professional geotechnical engineer from an Architect-Engineer or consulting firm, a public agency, or academia with 20 years of demonstrated experience in evaluating, designing, and constructing large embankment dams (>150 feet high) for water storage and large levees embankments; and with a minimum BS degree or higher in engineering. Active participation in related profession societies is encouraged. Geotechnical panel member shall have at least 15 years or more experience in the general field of geotechnical engineering; experience in subsurface investigations; soil mechanics; seepage and piping; landslide and slope stability evaluations; bearing capacity and settlement; design and construction of foundations on alluvial soils; erosion protection design; sheet piling, and retaining wall design. The Geotechnical panel member shall have knowledge and experience in the forensic investigation of seepage, settlement, stability, and deformation problems associated with embankments constructed on weathered and jointed rock, alluvial soils, and other geological formations. The Geotechnical panel member shall have familiarity with preparing plans and specifications for USACE projects, knowledge of USACE design and construction procedures and policies, and USACE dam safety assurance policy and guidance.

Civil Engineer (Construction Emphasis) – The Civil engineering panel member shall be a registered professional engineer from an Architect-Engineer or consulting firm, a public agency, or academia with 20 or more years of experience and have extensive experience in the design, layout, and construction of major flood control structures including dams, levees, diversion channels, and other hydraulic structures, with a minimum BS degree or higher in engineering. Active participation in related professional engineering and scientific societies is encouraged. The panel member should have demonstrated experience in performing cost engineering/construction management for all phases of flood risk management related projects. Experience in associated contracting procedures, total cost growth analysis and related cost risk analysis is desired. The Civil Engineering panel member shall have demonstrated knowledge in a variety of construction-related activities involving site layout, surveying, 3-dimensional modeling, construction techniques, grading, hydraulic structures, erosion



control, interior drainage, earthwork, concrete placement, design of access roads, retaining walls design, and relocation of underground utilities. Practical knowledge of construction methods and techniques as it relates to structural portions of projects is required.

Engineering Geologist – The Engineering Geology panel member shall be a registered professional geologist from an Architect-Engineer or consulting firm, a public agency, or academia with 20 years or more of demonstrated experience in the general field of engineering geology; and should have extensive experience in similar types of work as described in the project description. Active participation in related professional engineering and scientific societies is encouraged. The Engineering Geology panel member should be proficient in assessing seepage and piping through and beneath dams constructed on or within various geologic environments, including but not limited to weathered and jointed rock, faulted rock alluvial soils, and other geological formations. The Engineering Geology panel member should be familiar and knowledgeable with identification of geological hazards; exploration techniques including soil and rock logging, geologic mapping, geophysical investigations, and air photo interpretation; field & laboratory testing and the determination of in-situ material properties; landslide assessment; seismic hazard assessment, and the determination and evaluation of dynamic site-specific response spectra analysis and the evaluation of soil-structure interaction; foundation grouting and other foundation treatment methods including construction of foundation seepage barriers; and the design, installation and assessment of instrumentation. The Engineering Geology panel member shall have familiarity with preparation of factual data and interpretative geology reports, including the preparation of Geotechnical Baseline Reports for USACE projects. The Geotechnical panel member shall have familiarity with preparing plans and specifications for USACE projects, knowledge of USACE design and construction procedures and policies, and USACE dam safety assurance policy and guidance.

Hydraulics Engineering – The Hydrology and Hydraulics engineering panel member shall be a registered professional engineer from an Architect-Engineer or consulting firm, a public agency, or academia with 20 or more years of demonstrated experience in hydraulic engineering with an emphasis on large public works projects, with extensive background in hydraulic theory and practice, and river geomorphology, with a minimum BS degree or higher in engineering. Active participation in related professional engineering and scientific societies is encouraged. The H&H panel member shall have experience associated with flood risk management projects, and the analysis and design of hydraulic structures related to flood control projects include the design of hydraulic structures such as outlet works, spillways, and stilling basins, flood control channels and levees, diversion channel design, and large river control structures. The H&H panel member must have performed work in hydrologic analysis, floodplain analysis, hydraulic design of channels and levees using various channel and bank protection works, and river sedimentation. The H&H panel member must demonstrate knowledge and experience with physical modeling and the application of data from physical model testing to the design of stilling basins and scour protection, and in the ability to coordinate, interpret, and explain testing results with other engineering disciplines, particularly structural engineers, geotechnical engineers, and geologists. In



regard to hydrologic analysis, the H&H panel member must demonstrate knowledge and experience with the routing of inflow hydrographs through multipurpose flood control reservoirs using multiple discharge devices, including gated sluiceways and gated spillways. The H&H panel member shall be familiar with USACE application of risk and uncertainty analyses in flood damage reduction studies and also have a familiarity with standard USACE hydrologic and hydraulic computer models (including but not limited to HEC-1, HEC-HMS, HEC-2, HEC-RAS, FLO-2D, and HEC-DSS) used in drawdown studies, dam break inundation studies, hydrologic modeling and analysis for dam safety investigations. The H&H panel member must have experience with using 3-Dimensional numerical hydraulic analysis in the design/analysis of hydraulic structures. The H&H panel member shall have familiarity with preparing plans and specifications for USACE projects, knowledge of USACE design and construction procedures and policies, and USACE dam safety assurance policy and guidance.

Structural Engineering – The Structural engineering panel member shall be a registered professional civil engineer from an Architect-Engineer or consulting firm, a public agency, or academia with 20 or more years of demonstrated experience, with a minimum BS degree or higher in engineering. Active participation in related professional engineering and scientific societies is encouraged. The Structural panel member shall have extensive experience in the design and construction of hydraulic structures for large and complex civil works projects including spillways, outlet works, and flood walls. The Structural panel member should be a recognized expert in stability analysis and structural design of mass concrete scour protection and stilling features including the design of baffles, end sills, and training walls; seismic design, the determination and evaluation of dynamic site-specific response spectra analysis, and the evaluation of soil-structure interaction; and the design and construction of T-wall and L-wall floodwall design. The Structural Engineering panel member should be proficient in performing stability analysis using limit equilibrium analysis; design and construction of deep sheet pile walls; design and installation of post-tensioned high-strength steel anchors to stabilize mass concrete structures; and cofferdam design. The Structural panel member shall have familiarity with preparing plans and specifications for USACE projects, knowledge of USACE design and construction procedures and policies, and USACE dam safety assurance policy and guidance.

6. Review Documentation

Review comments will be identified with author and affiliation, and are expected to be constructive and relevant to the product. Review comments will contain the following elements: (a) a clear statement of the concern, (b) the basis for the concern, (c) the significance of the concern, and (d) the specific actions needed to resolve the concern. Reviewers must identify any significant deficiency; however, comments should be limited to those required to ensure adequacy of the product in meeting the stated objectives. Typographic errors and other minor stylistic changes should not be part of the formal technical review comments. Such comments will be provided separately to the PDT Lead Engineer for use. A list of review parameters for each review team is listed in Attachment 4.

a. Cross-Discipline (Product) Review (CDR) Documentation and Comment Resolution

When the Review Team Lead is satisfied that pertinent comments have been incorporated, a CDR Certification form will be completed and signed (Attachment 5). This form recommends sending the design package out for BCOES or ATR review. Any unresolved CDR Team comments or concerns will be noted on the form before forwarding the design products to the next review team (BCOES, VE, ATR, etc.). The signed form will be sent forward with the design products.

b. Comment Resolution with External PDT Reviewers

Review comments with external PDT reviewers (e.g., VE, BCOES, CE, ATR, IEPR, etc.), do not necessarily have to be complied with, but each comment must be addressed and resolved. If a PDT member disagrees with a comment, the PDT member will try to resolve the comment through discussions with the Review team member. The review team leader, the PDT Lead Engineer, and SWD DSPC Quality Manager will help facilitate those discussions as needed. If this does not result in resolution, the issue will be elevated through the SWD Dam Safety Production Center as necessary for final coordination. If an ATR concern cannot be satisfactorily resolved, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

c. Technical and Policy Issue Resolution

Issues involving technical and policy interpretation shall be brought to the attention of the SWD Dam Safety Production Center Quality Manager, copy furnish the MSC Dam Safety Officer, MSC Dam Safety Program Manager, Lead Engineer, and Project Manager.

d. Certification

1) QC Certification

For internal product development, quality control certifications will be documented using the CDR Certification Sheet, as shown in Attachment 5. For final products, a certification will be signed stating that issues raised by the CDR team have been resolved. The CDR certification will be signed by the CDR Team Members, PDT Discipline Lead, the Architect Engineering Contractor (if appropriate), and SWD DSPC Lead Engineer. Attachment 5 form shall be used unless current standard Corps certification forms are available.

2) BCOES Certification

Certification shall be as per ER 415-1-11, Appendix A. A copy is located in Attachment 6.

3) VE Certification

A statement that appropriate VE actions have been completed should accompany the Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) document. The statement shall read: "I, (the PM), certify that this procurement action has completed the Value Engineering process. A VE study was (completed/waived) on (date). All VE proposals indicating potential savings over \$1,000,000 have been resolved with approval of the MSC and Engineering Center Commander." See Attachment 6.

4) ATR Certification

At the conclusion of each design contract, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- (1) Identify the document(s) reviewed and the purpose of the review;
- (2) Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- (3) Include the charge to the reviewers;
- (4) Describe the nature of their review and their findings and conclusions;
- (5) Identify and summarize each unresolved issue (if any); and
- (6) Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR lead will prepare a completion of ATR and Certification of ATR. It will certify that the issues raised by the ATR team have been resolved (or elevated to the vertical team). The completion and certification should be completed based on the work reviewed to date for the project. For final products, the ATR certification will be signed by: the ATR Team Leader, the Project Manager (PDT Leader), the PDT Lead Engineer, the SWD DSPC Director, Director RMC (or assigned RMO representative) and the District Chief of Engineering & Construction Division. Current standard USACE certification forms will be used, see Attachment 7.

e. Documentation of Type II IEPR

The Type II IEPR will be managed by an AE firm which meets the criteria set forth in EC 1165-2-217. DrChecks review software will be used to document the Type II IEPR comments and aid in the preparation of the Review Report

Comments should address the adequacy and acceptability of the engineering and environmental methods, models, and analyses used as well as the proposed

construction methodology and practices. Type II IEPR comments should generally include the same four key parts as described for ATR comments. The A/E contractor will be responsible for compiling and entering comments into DrChecks.

No later than 60 days following each milestone, the Type II IEPR panel will prepare a Review Report that will accompany the publication of the final report for the project and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

This review report, including reviewer comments and a recommendation letter will be provided to the RMC as soon as they become available. Written responses to the IEPR Review Report will be prepared to explain the agreement or disagreement with the views expressed in the report, the actions undertaken or to be undertaken in response to the report, and the reasons those actions are believed to satisfy the key concerns stated in the report (if applicable). These comment responses will be provided to the RMC for concurrence. The revised submittal will be provided to the RMO with the USACE response and all other materials related to the review.

The Fort Worth District's responses shall be submitted to the Fort Worth MSC for final MSC Commander Approval. After the MSC Commander's approval, the District will make the report and responses available to the public on the District's website located at the following location: <http://www.swf.usace.army.mil/Home/Lewisville-Lake-Dam/>.

7. Review Costs

a. ATR Cost

The cost for the ATR is approximately \$65,000 per review. For updates to the schedule and cost of the ATR please see project 139886 in USACE's Primavera Project Manager (PPM) or contact the project manager at the Fort Worth District (SWF).

b. IEPR Costs

A Type II IEPR will be required for this project. Initial indications are that the estimated cost for the Type II IEPR is in the range of \$85,000 to \$135,000 per phase (e.g., one design phase or one construction phase). This estimate will be refined when the Scope of Work for the IEPR Type II contract is completed. The IEPR Type II contractor will be



involved with the project through the construction phase and into the OMRRR phase. More specific milestone dates will be added in the future during the construction phase, but it can be assumed to occur near the mid-point of construction and near the end of construction.

8. Public Participation of Review Plan

As required by EC 1165-2-217, the approved Review Plan will be posted on the District public website (<http://www.swf.usace.army.mil/About/Organization/PPMD/Peer-Review-Plans/>). There is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. This engagement will ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the federal government.

9. Review Plan Approval and Updates

The MSC for this is the Southwestern Division. The MSC Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving the Fort Worth District, MSC, and RMC) as to the appropriate scope and level of review for the study and endorsement by the RMC. Like the PMP, the Review Plan is a living document and may change as the study progresses, the district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC. Commander approval are documented in Attachment 1 to this plan. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-endorsed by the RMC and re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, will be posted on the District's webpage <http://www.swf.usace.army.mil/About/Organization/PPMD/Peer-Review-Plans/> and linked to the HQUSACE webpage. The latest Review Plan should also be provided to the RMO and home MSC.

10. Engineering Model Certification and Approval

The use of certified or approved engineering models is required for all activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to CDR, ATR, and IEPR (if required). The following engineering models are anticipated to be used:



MODEL	STATUS
Bentley InRoads V8i, Select Series 4	Commercially Available Software
Bentley AECOSim Building Designer Select Series 5	Commercially Available Software
STAAD Pro V8i	Commercially Available Software
ArcGIS version 10.2.2	Commercially Available Software
HEC-HMS version 3.5	Commercially Available Software
HEC-HMS version 4.0	Commercially Available Software
HEC-RAS version 5.0.1	Commercially Available Software
Geo-Slope (Slope-W)	Commercially Available Software
Geo-Slope (Seep-W)	Commercially Available Software
Ensoft - PYWall Version 2015.5.4	Commercially Available Software
Ensoft - LPile Version 2018.10.02	Commercially Available Software

11. Review Plan Points of Contact

NAME/TITLE	ORGANIZATION	EMAIL/PHONE

ATTACHMENT 1: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
27 Nov 2018	Removed references to EC 1165-2-214 and replaced them with EC 1165-2-217	Various
27 Nov 2018	Removed references to Lead Engineer Quality Review (LEQR). Reference have been replaced with Cross-Discipline (Product) Review (CDR)	Various
27 Nov 2018	Updated Attachment 3 – Team Rosters	
27 Nov 2018	Updated Attachments 5 & 7 Certification Templates to comply with EC 1165-2-217.	
26 Mar 2019	Updated Schedule and Personnel for Phase 2 (PFM 6 & 7) throughout document.	Various

ATTACHMENT 2: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
AE	Architect-Engineer Contractor	PMP	Project Management Plan
AEIM	Architect-Engineer Instruction Manual	PL	Public Law
ALARP	As Low As Reasonably Practical		
AR	Army Regulation	QMP	Quality Management Plan
ASA(CW)	Assistant Secretary of the Army for Civil Works	QA	Quality Assurance
ATR	Agency Technical Review	QC	Quality Control
BCOES	Biddability, Constructability, Operability, Environmental, and Sustainability	RMC	Risk Management Center
CDR	Cross-Discipline (Product) Review	RMO	Review Management Organization
CE	Constructability Evaluation	RP	Review Plan
DDR	Design Documentation Report	SAR	Safety Assurance Review
DSMMCX	Dam Safety Modification Mandatory Center	SME	Subject Matter Experts
DSPC	Dam Safety Production Center	SWD	USACE Southwestern Division
DSPM	Dam Safety Program Manager	USACE	U.S. Army Corps of Engineers
EA	Environmental Assessment	VE	Value Engineering
EC	Engineer Circular	WRDA	Water Resources Development Act
EIS	Environmental Impact Statement		
ER	Engineering Regulation		
ETL	Engineering Technical Letter		
FRM	Flood Risk Management		
Home	The District or MSC responsible for the		
HQUSACE	Headquarters, U.S. Army Corps of		
IEPR	Independent External Peer Review		
IPR	In-Progress Reviews		
MSC	Major Subordinate Command		
NED	National Economic Development		
NER	National Ecosystem Restoration		
NEPA	National Environmental Policy Act		
O&M	Operation and Maintenance		
OMB	Office and Management and Budget		
OMRR&R	Operation, Maintenance, Repair,		
PCX	Planning Center of Expertise		
PDT	Project Delivery Team		
PE	Professional Engineer		
PED	Preconstruction, Engineering, and Design		
PM	Project Manager		

ATTACHMENT 4: REVIEW TEAM GUIDANCE

CROSS-DISCIPLINE (PRODUCT) REVIEW GUIDANCE

Concept Design Purpose:

- a) To provide sufficient design information for the user to determine the acceptability of the proposed design as meeting their functional requirements for operational use and economical maintenance during the anticipated life of the facility.
- b) To provide USACE sufficient data for determining engineering sufficiency and soundness of the basic approach to the design for each technical discipline. Also, it will serve as a documentary check that the designer has been provided or has developed the essential engineering criteria necessary for all facets of final computations and detailed development of a thoroughly engineered and coordinated, economical and functional design.
- c) To provide the earliest possible check as to whether construction costs will be within the allowable percentage of programmed dollars. This check point can only be reached when all functional requirements are fully known and the designer has incorporated them into the design.
- d) To limit design submissions to only those data essential to provide the above information, so a minimum of time and monies will have been expended to reach a point of decision for such problems as the following:
 - a. Inadequate funds for initial project scope.
 - b. Incomplete understanding between either the designer, USACE, or the user as to the needs, and the monies required for those needs.
- e) To provide the designer (after review) with an approved set of technical conditions with which he/she may proceed with confidence to develop the complete project, by the application of sound engineering principles and details.

Design Submittal Requirements:

Concept Design:

- a) Cost Savings Review: As early as feasible, but in no case later than the Concept Design stage, the design team shall review their design for cost saving opportunities and cost effectiveness. The purpose will be to identify high-cost, low-value items required by criteria and/or user needs, where the cost to make a change is minimal compared to potential savings; changes that could reduce the anticipated construction time; and areas that appear suitable for formal Value Engineering Studies. Upon completion of this effort, the team shall identify the ideas and areas where a formal VE Study is considered desirable to develop alternatives for achieving cost reduction in structures, equipment, materials or methods of construction. These cost reduction ideas shall be documented in the DDR.
- b) Except when specifically exempted, the design analysis will accompany all drawings submitted for review, approval, information, or record. The DDR presented with preliminary or partially completed work will be as complete as the stage of design progress permits.

Mid-Level Design:

- a) This submittal typically consists of a DDR, full size working drawings, marked-up guide specifications, and Class 4 construction cost estimate. It is the first opportunity for review of the working plans and specifications. This submittal shall incorporate the accepted review comments of the Concept Design.

Final Design (90-95%):



- a) The design documents are complete and ready for advertising at this stage except for incorporation of Final comments, if any. The Final Design data shall consist of complete construction working drawings, edited guide specifications preceded by a Bid Schedule, Final DDR, and a Class 4 cost estimate. These documents shall incorporate all accepted comments from the previous design reviews. The submittal will be reviewed for completeness, compliance with design criteria, biddability, constructability, and operability, environmental, and sustainability. For this to occur, a marked-up draft of the Division I clauses from Contracting Division must be included in this submittal.

Corrected Final Design (100%):

- a) The design documents have been corrected based on the accepted review comments of the Final Design. The submittal will be reviewed for compliance to assure all accepted comments have been incorporated. The Corrected Final Design data shall consist of fussy-size drawings, typed edited specifications preceded by a Bid Schedule and final Division I clauses from Contracting Division, final DDR, submittal register, and a final Class 4 cost estimate. These documents shall include all changes identified as a result of the Final Design review as applicable.

Source: CESWD-AEIM (August 1996)

Comment Etiquette:

- 1) Each review comment should be succinct and enable timely resolution of the concern. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment normally include:
 - a. The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures.
 - b. The basis for the concern – cite the appropriate law, AWA (CW)/USACE policy, guidance or procedure that has not been properly followed.
 - c. The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability.
 - d. The probable specific action needed to resolve the concern – identify the action(s) that must be taken to resolve the concern.
- 2) Comments should generally NOT include:
 - a. Attempts to enforce personal preferences over otherwise acceptable practices, i.e., alternate solutions or analysis methods when the practitioners have already used appropriate methods to develop an adequate solution.
 - b. Any other issues that do not add value towards the planning decisions and recommendations, or do not make the recommended plan safe, functional, or more economical.

Source: EC 1165-2-217, 20 Feb 2018

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. These comments should be marked For Information Only.

BCOES REVIEW GUIDANCE

The following describes the specific activities, documents, and aspects of the acquisition that must be reviewed during BCOES reviews:

- 1) **Biddability Review.** All biddability reviews will analyze the completeness, correctness, compatibility, clarity, and consistency of the collection of plans, specifications, clauses, forms, bid schedule and other documents and references that comprise the total solicitation package and the planned contract. The Government is responsible for determining its requirements, and the solicitation package should be prepared to help bidders or proposers understand clearly the Government's requirements and to allow the submission of a competitive bid or proposal that is responsive to the Government's requirements. The biddability review verifies the soundness of evaluation criteria during negotiated acquisitions.
- 2) **Constructability Review.** In general, the constructability review includes checking the compatibility of the design and invitation for bids document with site conditions, materials, equipment, schedules, utility connections, Government estimates, and construction methods relevant to the planned construction. It also includes evaluation of safety considerations and other planned project and contract features for their ease of successful safe execution.
 - a. All constructability reviews will include a Plan-In-Hand site visit and review by appropriate Area/Resident Engineer staff to ensure all visible and known existing characteristics of the site described in the project design and acquisition documents are included, accurate, and supportive of the project's successful acquisition and construction.
 - b. All constructability reviews will also specifically review the planned construction phasing, sequencing, and period of performance for the contract to ensure that an adequate construction period is specified.
 - c. The constructability review also needs to evaluate if the procedures used for development of the bid schedule and independent Government estimate (IGE) comply with policies, and account for items such as accelerated construction, pre-priced contract line items, and other constructability impacts on the estimated cost for the construction. Additionally, the constructability review will include a review of the basis for calculating any liquidated damages for the project, including validation of any projected estimated additional expenses that would be incurred by the customer.
- 3) **Operability Review.** Operability review of the facility to be constructed must include a good understanding and detailed consideration of the customer's operations and maintenance requirements, needs, practices, and capabilities after construction completion and turnover. The Area/Resident Engineer staff should jointly conduct an operability review with the facility's planned user(s) as a means of improving mutual understanding for a successful transfer after construction. The operability review should include a check of all commissioning requirements, transfer and handover documentation requirements, and warranty requirements and plans.
 - a. The review will include evaluation of Plans, Specifications, Engineering Considerations and Instructions for Field Personnel (ECIFP) reports, the operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) plan for the project, and other required documents.
 - b. The operability review should be led by the District's Operations staff.
- 4) **Environmental Review.** Review of the compliance of the project's design, construction, and operation with all applicable environmental laws and regulations is included in BCOES reviews. The environmental review will address the project's compliance with all applicable local, state, and Federal environmental regulations and requirements, including National Pollutant Discharge Elimination System (NPDES) permits, required permits for earth disturbance, storm water management, etc., and reports or requirements for asbestos, lead paint, and other hazardous materials handling, removal, and disposal. Archaeological, historical, hazardous, toxic, and radioactive waste (HTRW), and military munitions concerns that may impact the project's execution during acquisition and construction phases are also addressed during this

review. The District's environmental, regulatory, operations, and construction staffs should be engaged in this review.

- 5) **Sustainability Review.** Sustainability review must include a good understanding of the Federal Guiding Principles for High Performance Sustainable Buildings and compliance with other applicable laws, regulations, policies, standards, codes, and criteria for sustainability related to infrastructure. The review should include, but is not limited to application of integrated design principles; energy performance optimization, water protection and conservation, indoor environmental quality, and the environmental impact of materials (including green purchasing and diverting wastes from landfill), facility orientation, building size and layout, storm water runoff during and after construction, transportation, and facility certifications. Consult District LEED Sustainability and construction staff members for additional guidance.

Source: ER 415-1-11, 1 Jan 2013

Comment Etiquette:

- 3) Each review comment should be succinct and enable timely resolution of the concern. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment normally include:
 - a. The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures.
 - b. The basis for the concern – cite the appropriate law, AWA (CW)/USACE policy, guidance or procedure that has not been properly followed.
 - c. The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability.
 - d. The probable specific action needed to resolve the concern – identify the action(s) that must be taken to resolve the concern.
- 4) Comments should generally NOT include:
 - a. Attempts to enforce personal preferences over otherwise acceptable practices, i.e., alternate solutions or analysis methods when the practitioners have already used appropriate methods to develop an adequate solution.
 - b. Any other issues that do not add value towards the planning decisions and recommendations, or do not make the recommended plan safe, functional, or more economical.

Source: EC 1165-2-217, 20 Feb 2018

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. These comments should be marked For Information Only.

ATR REVIEW GUIDANCE

Review Criteria:

- 1) Products will be reviewed against published guidance, including Engineering Regulations, Engineering Circulars, Engineering Manuals, Engineering Technical Letters, Engineering Construction Bulletins, Policy Guidance Letters, implementation guidance, project guidance memoranda, and other formal guidance memoranda issued by HQUSACE. Any justified and approved waivers should have been obtained from HQUSACE for any deviations from USACE guidance.

- 2) Key considerations include:
 - a. The project meets the customer's scope, intent and quality 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. If a non-Federal sponsor is involved, the sponsor is aware of its requirements and concurs with the proposed recommendation.
 - e. The recommended alternative is feasible and will be safe, functional, constructible, environmentally sustainable, within the Federal interest, and economically justified according to policy.
 - f. All relevant engineering and scientific disciplines have been effectively integrated.
 - g. Appropriate computer models and methods of analysis were used and basic assumptions are valid and used for the intended purpose.
 - h. The source, amount, and level of detail of the data used in the analysis are appropriate for the complexity of the project.
 - i. The project complies with accepted practice within USACE.
 - j. Content is sufficiently complete for the current phase of the project and provides an adequate basis for future development effort.
 - k. Project documentation is appropriate and adequate for the project phase.

ATR Comments:

- 5) Each review comment should be succinct and enable timely resolution of the concern. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment normally include:
 - a. The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures.
 - b. The basis for the concern – cite the appropriate law, AWA (CW)/USACE policy, guidance or procedure that has not been properly followed.
 - c. The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability.
 - d. The probable specific action needed to resolve the concern – identify the action(s) that must be taken to resolve the concern.

- 6) ATR comments should generally NOT include:
 - a. Attempts to enforce personal preferences over otherwise acceptable practices, i.e., alternate solutions or analysis methods when the practitioners have already used appropriate methods to develop an adequate solution.
 - b. Any other issues that do not add value towards the planning decisions and recommendations, or do not make the recommended plan safe, functional, or more economical.

Source: EC 1165-2-217, 20 Feb 2018

VE REVIEW GUIDANCE

Objectives:

- 1) Value Engineering Workshop: Document and/or verify functions, goals and objectives as defined by the project/program stakeholders, and to evaluate the draft construction documents and cost estimate to ensure they comply with functions, goals, and objectives.
- 2) Value Management (VM)/Value Engineering (VE) Study: Ensure Value Methodology techniques are integrated into the project delivery process to optimize overall value and ensure objectives and requirements of all stakeholders are identified and addressed. Perform the study in accordance with ER 11-1-321 Value Engineering (VE).
- 3) Value Methodology Process: The SAVE International 6 Step Process shall be used: Information Phase, Function Analysis Phase, Creative Phase, Evaluation Phase, Development Phase and Presentation Phase.
- 4) Potential Cost Avoidance/Savings: The VE team shall concentrate on increasing the maximum cost savings of the project while still incorporating all the necessary project requirements. Although cost savings is a primary goal of the VE Study, the VE team shall also place emphasis on the value (function verse cost) of each VE proposal including Life Cycle Cost Analysis (LCCA). Further analyze high-cost, low performance or high risk functions and the identification of alternative ways of improving value. In order to aid the decision making process, the VE Team shall prepare a table that includes quantitative costs, qualitative costs, and LCCA data for all the recommended VE proposals.
- 5) Reasonableness of VE Proposals: The VE alternatives proposed should have a reasonable chance of being accepted by the Project Delivery Team based upon the merits of the alternative within the context of established design objectives and the realistic life-cycle cost of the alternative. This entails comparing the proposed alternative fairly and the conceived design assuming the same design objectives and constraints, the same external factors influencing the design (design criteria), same unit costs in pricing, and life-cycle cost. In other words, the potential cost savings should not be predicated on or inflated based on unfair, unrealistic, or otherwise faulty comparisons.



**ATTACHMENT 5: CROSS-DISCIPLINE (PRODUCT) CERTIFICATION TEMPLATE
COMPLETION OF QUALITY CONTROL REVIEW**

**QC Certification of Lewisville {PRODUCT NAME}
Corrected Final Design (100%)**

[INSERT DATE]

As the lead designer for the Amistad Dam Safety Modification Study, I certify the following work shown herein was completed using the appropriate USACE guidance or industry standard if applicable. I certify the work is based on:

- Appropriate assumptions, methods, procedures, computations (including quantities) and materials used in the analyses
- Evaluation of alternative designs, if applicable
- Appropriate data and level of data
- Reasonable results that meet the customer's needs consistent with law and existing USACE policy.

I certify that the write-up, computations, drawings, and specifications meet the customer requirements shown herein. For items previously designed by others and included as the design basis shown herein, I certify that I have verified the work for adequacy, completeness, and accuracy.

Brian L. Dillard, P.E. Lead Engineer CESWT-DSD *Insert Digital Signature*

As the Reviewer/Checker I have performed QC and concur with the findings of the Lead Engineer for the Amistad Dam Safety Modification Study.



ATTACHMENT 6: BCOES/VE CERTIFICATION TEMPLATE

to view attachments, use Adobe "paperdip" (left)

SWD BCOES REVIEW STATEMENT
DRAFT FOR SWD REVIEW 20140805

1. PROJECT INFORMATION

Authorized Proj Name: _____ BCOES Certification Required (DATE): _____

Solicitation Number: _____ Electronic location of DOCUMENTS used in BCOES review (hyperlink, address, etc): _____

Program Type: _____ P2 #: _____ ENGR Lead: _____

Delivery Method: _____ Design Method: _____ PW/OM Name: _____

ATTACH: BCOES DrChecks Backcheck Rpt*1 ATP/OPSEC Support Doc*2 ITR/ATR Certification*3 Quality Cert*4 Energy/Sustainability Certification*4.1 Field Office Review Certification (FORC)*4.2

Comment Explanation: (incl reason for non-attachments): _____

Value Engineering*5

I, _____, 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 OMB Circular A-131: A VE study is not required for this project as its contract value is less than \$2M. OR On _____ a VE Study, having applicability to the subject solicitation was either COMPLETED or WAIVED by the appropriate authority. All VE proposals indicating potential savings of over \$1,000,000 have been resolved with approval of the MSC Commander. Evaluations and decisions are provided in the attached VE _____

Certified by PW/OM: _____ Date: _____ Concurred by VE Officer: _____ Date: _____

Required (mandatory for MILCON)

Project Scope*6

As required by Memorandum, ODUSD(I&E), 24 June 2013, subject: Authorized Scope of Work for Military Construction Projects, the undersigned certify that the scope of each distinct facility or item of infrastructure included in the design documents and request for proposal provides for the authorized and is at or below the scope of work, as represented in Block 9 of the DD Form 1391 authorized by Congress. The undersigned further certify that the Government's requirements as described and represented in the design documents and request for proposal will provide for a complete and usable facility or facilities.

Certified by CH of Military Project Management: _____ Date: _____ Certified by CH of Engineering: _____ Date: _____

Required (mandatory for MILCON)

UXO/MM*7

I, _____, have completed a review & verification of munitions response site inventory, applicable historical records and archives on _____

(select) The site is clear of military munitions/unexploded ordnance OR The site could potentially have present military munitions/UXO hazards; and therefore, the planning has been completed to explosives safety hazards by (select) separate pre-award munitions response project OR Inclusion of munitions an explosives of concern (MEC) construction requirements in contract clause.

(attach) UXO/MM support document.

Verified by Authorized Personnel: _____ Date: _____

Certification

BCOES FINAL CERTIFICATION STATEMENT*8 The Bid or RFP Package has been reviewed for Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) requirements in accordance with ER 415-1-11. The undersigned certify that all appropriate BCOES review has been conducted and resulting review comments have been incorporated into the Solicitation Package (IFB, RFP, etc) or otherwise satisfactorily resolved. Comments, evaluations, and backchecks are documented in the attached DrChecks Backcheck Summary Report.

CONDITIONAL BCOES CERTIFICATION STATEMENT*9: Based on attached conditional statement, concur with: _____ (attach) SOLICITATION PRIOR TO BCOES FINAL CERTIFICATION. Bids will not be opened or proposal evaluations started until completion of BCOES certification and incorporation of changes in bid package by amendments. Requires, as a minimum, PM, CH Engr, CH Constr signatures. AWARD PRIOR TO BCOES FINAL CERTIFICATION. Awarding prior to completion of BCOES certification and incorporation of changes in bid package. Changes will be addressed post-award. (SIGS?) Determination and findings (to be signed by the contracting officer)

BCOES WAIVER*10: Project characteristics and circumstances cited in the attached waiver Determination and findings (to be signed by the contracting officer)

CERTIFICATION FOR CUSTOMER DEVELOPED PRODUCTS*11 (in which USACE contract support is requested). This product was completed and reviewed in accordance with all applicable quality control procedures. The product was developed in compliance with all applicable criteria and in sufficient detail and quality for contract award. Review of assumptions, methods, procedures, material, and alternatives evaluated has been completed. All reviewer comments have been resolved. As a minimum to be signed by PM, CH Engr, CH Constr, Resident Engr.

Certifier Comments (identify your cmts w/your initials): _____

CH, Operations*12: _____ Date: _____

CH, Planning/ Environmental*13: _____ Date: _____ PWOM: _____ Date: _____

CH, Real Estate*14: _____ Date: _____ Resident Engr: _____ Date: _____

A Real Estate Status Sheet is required and is attached*15. CH, Engineering: _____ Date: _____

CH, Construction: _____ Date: _____ CH Constr Date of Signature becomes the date of the BCOES Certification*16.

* Required DrChecks ER 415-1-11(6)f 1 Jan 2013; *2 per SWD OPOD 2014-03 (Integrating Antiterrorism (AT) and Operations Security (OPSEC) into the USACE Acquisition Process); *3*4 Recommend attachment to BCOES (*3, *4 certifications are a requirement per ER 1110-1-12 (3.6.5.7/5.8/F) Change 1/2); 4.1 Certification a requirement of ECB 2013-25 (5.0, POA recommendation to add. 4.2 Requirements by Field Office during BCOES consistent with ER 415-1-11 (POA recommendation to add) *5 Required in BCOES cert (ER 415-1-11 (6.R)); *6 Required in BCOES certification (ECB 2014-1 15 Jan 2014 Authorized Scope of Work for Military Construction (MILCON) Projects); *7 Required in BCOES cert (UXO SWG OPOD??); *8 per ER 415-1-11 (A.1); *9 Conditional Certification may also be referred to as "Written Advance Concurrence" *9*10 required approval/documents for conditional and waiver cert (ER 415-1-11 (9.i)) *10 waiver for small (low risk) projects (see ER 415-1-11 (6.i) for threshold and example); *11 (INWQ) guidance when technical product not prepared by in-house or AE firms managed by USACE. Needs SWD review; *12*13 Signature req'd on Final Cert for CW projects (per ER 415-1-11 (7.c. 9.g and (9.f)); *14 Signature req'd for projects involving acquisition of real estate interest (ER 415-1-11, para 9.e); *15 required attachment for CW projects (GMS ES 08020 BCOE 21 Nov 2011). *16 An additional review is required when design has been completed and reviewed, but release to prospective bidders has been held in abeyance for a period of time exceeding 6 months from the end of the last BCOES review (ER 415-1-11, para 6.d).



ATTACHMENT 7: ATR CERTIFICATION TEMPLATE
COMPLETION OF AGENCY TECHNICAL REVIEW

This Statement of Technical Review has been completed by the ATR for the Lewisville Dam Safety Modification Project in Denton County, Lewisville, TX, see attached summary of unresolved issues and future commitments, the Charge questions, a brief resume of ATR reviewers, and a printout of all DR Checks comments with resolution. The ATR was conducted as defined in the project's Review Plan to comply with requirements of EC 1165-2-217. During the ATR, 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 results, including whether the product meet's the customer's needs consistent with law and existing USACE policy. The ATR also assessed the Quality Control (QC) documentation and made the determination that the QC activities employed appear to be appropriate and effective. All comments resulting from the ATR have either been resolved or have been elevated and are attached. All comments in DR Checks are closed.

Five sets of horizontal lines for signature and date, each with the word 'Date' centered below the line.

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: Describe the major technical concerns and their resolution.

As noted above, all concerns resulting from the ATR of the project have been fully resolved or have been elevated and documented with this certification.

Signature line for Brian Giacomozzi, P.E., Chief, Engineering and Construction Division, Fort Worth District, and a corresponding date line.



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of Engineers®

Fort Worth District