



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SOUTH ATLANTIC DIVISION
60 FORSYTH STREET, SW, ROOM 10M15
ATLANTA, GEORGIA 30303-8801

REPLY TO
ATTENTION OF:

CESAD-RBT

MEMORANDUM FOR COMMANDER, JACKSONVILLE DISTRICT

SUBJECT: Approval of Review Plan of the Design and Construction Phases of the Guajataca Dam Stage 2 Risk Reduction Measures and Stage 3 Rehabilitation Project, Quebradillas, Puerto Rico.

1. References:

a. Memorandum, CESAJ-EN-Q, 21 August 2018, subject as above (enclosed).

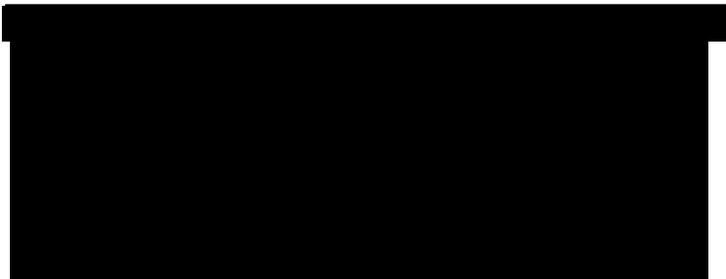
b. EC 1165-2-217, Water Resources Policies and Authorities: Review Policy for Civil Works, 20 February 2018.

2. The subject Review Plan (RP) submitted by the Jacksonville District via reference 1a has been reviewed by the South Atlantic Division (SAD) and is hereby approved in accordance with reference 1b.

3. SAD concurs with the District's RP recommendation that outlines the requirements for District Quality Control (DQC), Agency Technical Review (ATR), and Type II Independent External Peer Review (IEPR). Products to be reviewed include construction plans, specifications, and the design documentation report.

4. The District should take steps to post the approved RP to its web site and provide a link to CESAD-RBT. Before posting to the web site, the names of Corps/Army employees should be removed. Subsequent significant changes to this RP, such as scope or level of review changes, should they become necessary, will require new written approval from this office.

5. The SAD point of contact is





DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207-8915

AUG 21 2018

CESAJ-EN-Q

MEMORANDUM FOR Commander, South Atlantic Division (CESAD-RBT), 60 Forsyth Street SW, Room 10M15, Atlanta, GA 30303

SUBJECT: Approval of Review Plan of the Design and Construction Phases of the Guajataca Dam Stage 2 Risk Reduction Measures and Stage 3 Rehabilitation Project, Quebradillas, Puerto Rico

1. References.

a. EC 1165-2-217, Civil Works Review, 20 Feb 18.

b. Risk Management Center Endorsement of Guajataca Dam, Stage 2 Risk Reduction Measures and Stage 3 Rehabilitation Project, Review Plan, 1 Aug 18.

2. I hereby request approval of the enclosed Review Plan for the design and construction phases of the Guajataca Dam Stage 2 Risk Reduction Measures and Stage 3 Rehabilitation Project and concurrence with the conclusion that a Type II Independent External Peer Review (IEPR) of the subject project is required. The recommendation to perform a Type II IEPR is based on the EC 1165-2-217 Risk Informed Decision Process as presented in the Review Plan. Documents to be reviewed include plans, specifications, and design documentation. The Review Plan complies with applicable policy, provides for Agency Technical Review, and has been coordinated with the CESAD and RMC. It is my understanding that non-substantive changes to this Review Plan, should they become necessary, are authorized by CESAD.

3. The district will post the CESAD approved Review Plan to its website and provide a link to the CESAD for its use. Names of Corps/Army employees will be withheld from the posted version, in accordance with guidance.

4. If you have any questions regarding the information in this letter, please feel free to contact me or contact [REDACTED].

Encl



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
RISK MANAGEMENT CENTER
12596 WEST BAYAUD AVE., SUITE 400
LAKEWOOD, CO 80228

REPLY TO
ATTENTION OF

CEIWR-RMC

1 August 2018

MEMORANDUM FOR: Commander, Jacksonville District, ATTN: CESAJ-EN-Q

SUBJECT: Risk Management Center Endorsement –Guajataca Dam, Stage 2 Risk Reduction Measures and Stage 3 Rehabilitation Project, Review Plan

1. The Risk Management Center (RMC) has reviewed the Review Plan (RP) for – Guajataca Dam, Stage 2 Risk Reduction Measures and Stage 3 Rehabilitation Project, dated 16 July 2018, and concurs that this RP complies with the current peer review policy requirements outlined in EC 1165-2-217 “Review Policy for Civil Works”, dated 20 February, 2018.
2. This review plan was prepared by Jacksonville District, reviewed by the RMC, and all RMC review comments have been satisfactorily resolved. For this project a Type II IEPR will be performed.
3. The RMC endorses this document to be approved by the MSC Commander. Upon approval of the RP, please provide a copy of the approved RP, a copy of the MSC Commander’s approval memorandum to the RMC Senior Review Manager [REDACTED].
4. Thank you for the opportunity to assist in the preparation of this RP. Please coordinate all aspects of the Agency Technical Review and the Independent External Peer Review (as appropriate) efforts defined in the RP. For further information, please contact me at [REDACTED].

Sincerely,

[REDACTED]

CF:
CEIWR-RMC ([REDACTED])
CESAD-DQM (Division Quality Manager)

**Review Plan
U.S. Army Corps of Engineers
South Atlantic Division
Jacksonville District**

Guajataca Dam

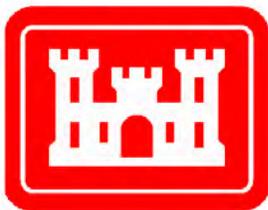
**Stage 2 Risk Reduction Measures and
Stage 3 Rehabilitation Project**

Quebradillas, Puerto Rico

MSC Approval Date: Pending

Last Revision Date: N/A

THE INFORMATION CONTAINED IN THIS REVIEW PLAN IS DISTRIBUTED SOLELY FOR THE PURPOSE OF PREDISSEMINATION PEER REVIEW UNDER APPLICABLE INFORMATION QUALITY GUIDELINES. IT HAS NOT BEEN FORMALLY DISSEMINATED BY THE U.S. ARMY CORPS OF ENGINEERS. IT DOES NOT REPRESENT AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.



**US Army Corps
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1. Purpose and Requirements

a. Purpose

This Review Plan (RP) is intended to ensure a quality-engineering project is developed by the Corps of Engineers. This review plan has been developed for Stage 2 Risk Reduction Measures and Stage 3 Rehabilitation of the Guajataca Dam in Puerto Rico. Stage 1 was already implemented and consisted of emergency stabilization of the damaged service spillway channel and drawdown of the lake level. Stages 2 and 3 consist of the interim risk reduction measures and long term rehabilitation of Guajataca Dam, respectively. This RP describes the scope of the review and will be included in the Project Management Plan upon approval.

b. Guidance and Policy References

- EC 1165-2-217, Civil Works Review Policy, 20 February 2018
- ER 1110-1-12, Quality Management, 31 Mar 2011
- ER 1110-2-1156, Safety of Dams – Policy and Procedure, 31 Mar 2014
- ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999
- ER 415-1-11, “Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review”, 1 January 2013
- ER 10-1-51, Organizations and Function, Roles and Responsibilities – Dam Safety Modification Mandatory Center of Expertise, 29 June 2012
- 02611-SAJ EN Quality Control of In-House Products: Civil Works, 4 December 2017
- Enterprise Standard (ES)-08025, Government Construction Quality Assurance Plan and Project/Contract Supplements
- Enterprise Standard (ES)-08026, Three Phase Quality Control System
- EM1110-1-1904 Settlement Analysis
- ER1110-2-1806 Earthquake Design and Evaluation for Civil Works Projects, 31 May 2016
- EC1110-2-6001 Seismic Analysis of Embankment Dams (latest DRAFT) , 27 May 2011 or latest version
- EM1110-2-1901 Seepage Analysis and Control for Dams
- EM1110-2-1902 Slope Stability
- EM1110-2-2300 General Design and Construction Considerations for Earthen and Rock-Fill Dams
- EM1110-2-6051 Time-History Dynamic Analysis of Concrete Hydraulic Structures 22 December 2003
- EC1110-2-6000 Selection of Dynamic Earthquake Ground Motions 24 August 2009
- EM1110-2-6050 Response Spectra and Seismic Analysis for Concrete Hydraulic Structures 30 June 1999
- Project Management Plan, Guajataca Dam

c. Requirements

This review plan was developed in accordance with EC 1165-2-217, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control (DQC)/Quality Assurance (QA), Agency Technical Review (ATR), Independent External Peer Review (IEPR), Biddability, Constructability, Operability, Environmental, and Sustainability Review (BCOES), and Policy and Legal Compliance Review. The RP identifies the most important skill sets needed in the reviews and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the individual project. This Review Plan will be provided to PDT, DQC, ATR and IEPR Teams.

d. Review Management Organization

The Risk Management Center (RMC) shall be the RMO for Stage 2 and Stage 3 of the project. Contents of this RP have been coordinated with the RMC and South Atlantic Division (SAD), the Major Subordinate Command (MSC). In-Progress Review (IPR) team meetings with SAD and Headquarters (HQ) will be scheduled on an as-needed basis to discuss programmatic, policy, and technical matters. The SAD Dam Safety Program Manager will be the POC for vertical team coordination. This RP will be updated for each new project phase. As RMO, the RMC is responsible for assembling the ATR Team and completing the ATR in accordance with this review plan and USACE guidance. Jacksonville District 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. Background

Guajataca Dam is a hydraulic-fill embankment dam located in northwest Puerto Rico about six miles south of Quebradillas municipality along Rio Guajataca. Built in the 1920s, Guajataca Dam is about 1,037 feet long and impounds approximately 34,300 acre-feet of water at capacity. The outlet for the dam consists of an intake tower, diversion outlet, horseshoe-shaped tunnel and gate chamber with two 4-foot by 4-foot pressure gates. The outlet works release water to the canal outlet or the river outlet. The canal outlet supplies water for public irrigation and water supply, and the river outlet releases water to Rio Guajataca. An emergency service spillway to the left of the left abutment consists of a 250-foot long semicircular ogee-crest spillway that flows down an uncontrolled trapezoidal channel 750 feet long.

In the 1980s, the dam was modified to address several issues. The dam moved about 6.6 feet downstream with a crest loss of 4.9 feet since the original construction. To address the movement, a berm was added to the downstream face of the dam to slow the movement. The emergency spillway crest and portions of the upper spillway slabs were

replaced in the 1980s to address damage from movements in the dam and increase its discharge capacity.

As a result of Hurricane Maria in September 2017, the reservoir rose above maximum operating elevation and the service spillway was engaged. Due to the condition of the spillway during the high flow and the displacement of the riprap stilling basin from this flow, the spillway and embankment portion around the spillway were heavily eroded. Stage 1 emergency revetment measures, including the placement of sandbags and concrete barricades, were used to slow the progression of erosion, mitigate the damage to the embankment, and slow the flow of water. The goal for the proposed work is to provide short-term repairs to the service spillway and embankment (Stage 2) and long-term rehabilitation to the dam and its appurtenant structures (Stage 3). The intent of Stage 3 is to repair the dam to meet current dam safety standards.

b. Guajataca Contract Descriptions

The following are descriptions of the contracts for the Guajataca Dam rehabilitation efforts:

Contract 1 (Stage 2): Replace the existing Gate C, stem, and stem guides at the intake tower.

Contract 2 (Stage 2): Replace the existing hydraulic lines, hydraulic pump, and power unit for the high pressure gates that control flow for water supply and reservoir discharge to the river.

Contract 3 (Stage 2): Grout, anchor, and seal the cracks in the existing damaged spillway. Shotcrete and anchor the exposed slopes of the eroded hole downstream of the damaged spillway. Reconnect the water supply conduit using an inverted siphon. Stabilize the slopes along the access road and near the intake tower.

Contract 4 (Stage 2): Perform additional spillway construction. Construct a stilling basin and an insill, along with a scour cutoff wall downstream of the concrete spillway, which will reduce water velocities and dissipate energy.

Contract 5 (Stage 3): Rehabilitate the Guajataca Dam and appurtenant features, including landside stabilization, dam and intake tower seismic retrofitting, horseshoe-shaped tunnel rehabilitation, and bridge reconstruction.

3. District Quality Control

a. Requirements

All implementation documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo a DQC. A DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the PMP. DQC will be performed on the P&S and DDR in

accordance with CESAJ Engineering Division Quality Management System (EN QMS). The EN QMS defines DQC as the sum of two reviews, Discipline Quality Check and Review (DQCR) and Product Quality Control Review (PQCR).

b. Documentation

DQCRs occur during the design development process and are carried out as a routine management practice by each discipline. Checklists are utilized by each discipline to facilitate the review and to document the DQCR review comments. Certification of the Discipline Quality Check and Review is signed by the Branch Chief certifying that the DQCR on all design analyses and products have been completed in accordance with the EN QMS process prior to release from the Branch.

The PQCR shall ensure consistency and effective coordination across all disciplines and shall assure the overall coherence and integrity of the products. Review comments and responses for this review will be documented in DrChecks. The PQCR shall be QC certified by the Engineering Technical Lead (ETL), all applicable Section and Branch Chiefs, and the Division Chief. This PQCR certification signifies that all DQCR Certifications are complete, as well as the PQCRs.

4. Agency Technical Review

a. Requirements

Agency Technical Review (ATR) is undertaken to ensure consistency with established criteria, guidance, procedures, and policy in accordance with EC 1165-2-217, ER 10-1-51 and ER 1110-1-12. ATR is mandatory for all implementation documents (including supporting data, analyses, environmental compliance documents, etc.). The ATR will assess whether the analyses presented are technically correct, went through robust DQC, and comply with published USACE guidance. The ATR will also assess whether the document explains the analyses and results in a reasonably clear manner for the public and decision makers. The PDT shall obtain ATR agreement on key data such as hydraulic and geotechnical parameters early in the design process. The goal is to have early involvement of the ATR team, especially when key decisions are made. The ATR Lead shall be invited virtually to key PDT meetings, in order to understand the design efforts and to know when to engage other ATR members for key decisions. Value-added Lessons Learned from the ATR team shall be shared early on to have the best chance of being adopted by the PDT. A site visit will be required by the ATR team for each of the contracts. For Stage 3, the RMO shall coordinate with the Dam Safety Modification Mandatory Center of Expertise (DSMMCX) for the assignment of ATR review members.

b. Documentation of ATR

DrChecks review software will be used to document all ATR comments, responses and associated resolutions throughout the review process. Comments will be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

- (1) The review concern – identify the 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 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; and
- (4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

c. Comment Resolution

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. The ATR documentation in DrChecks includes the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, 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.

d. Products to Undergo ATR

An ATR will be performed on the contract drawings, specifications, and DDR (which will include all relevant design information) for each contract, as noted in the schedule included in Section 8.

e. Required ATR Team Expertise and Requirements

An ATR will be conducted for each contract by individuals and organizations that are external to the Jacksonville District. The ATR Team Leader will be a USACE employee outside the South Atlantic Division. As stipulated in ER 1110-1-12, ATR members are sought from the following sources: regional technical specialists (RTS); appointed subject matter experts (SME) from other districts; senior level experts from other districts; Center of Expertise staff; experts from other USACE commands; contractors; academic or other technical experts; or a combination of the above. The ATR team will be chosen based on each individual’s qualifications and experience with similar projects.

All ATR reviewers will be certified in CERCAP:

https://team.usace.army.mil/sites/ERDC-CRREL/PDT/atr_certification/default.aspx.

Not all disciplines listed below will be required for each contract: Refer to table below for ATR members needed for each contract.

ATR DISCIPLINES	Contract 1 – Gate Repairs	Contract 2 - Hydraulic Power Unit Replacement	Contract 3 – Risk Reduction Measures	Contract 4 – Spillway and Channel Reinforcement	Contract 5 - Guajataca Dam Rehabilitation
H&H	YES	NO	YES	YES	YES
Geotechnical	NO	NO	YES	YES	YES
Structural	NO	NO	YES	YES	YES
Mechanical	YES	YES	NO	NO	YES
Civil	NO	NO	YES	YES	YES
Electrical	NO	YES	NO	NO	YES
Geology	NO	NO	NO	NO	YES
Instrumentation	NO	NO	NO	NO	YES
Dam Operations	NO	NO	NO	NO	YES

The ATR Team will be comprised of team members with the following knowledge, skills, abilities, and experience levels.

ATR Lead. The ATR team lead shall be a senior professional outside the home MSC with extensive experience in preparing Civil Works documents and conducting ATRs. The ATR Team Leader shall have 10 or more years of experience with Civil Works Projects and have performed ATR Team Leader duties on complex civil works projects. The ATR Team Leader can also serve as one of the review disciplines.

Hydrology and Hydraulics. One or two team members will be required to review the hydraulic design, hydraulic modeling, and hydrologic modeling associated with dam outlet works (high and low pressure gates/valves) and spillway design, infilling plans, dam breach and inundation maps, water control plan, regulation schedules and the OMRR&R Manual. The team member(s) shall be registered professionals with 10 or more years of experience in conducting and evaluating hydrologic and hydraulic analyses for water supply and flood risk management projects including dams and other large public works projects with multiple serial and parallel outlet type structural systems. Experience with HEC and ERDC 2D hydraulic modeling and performance of RMC-type risk assessments is required (experience with 3D is a potential need, so access to 3D expert is preferred). Experience with USACE Dam Safety Program is required (ER 1110-2-1156).

Geotechnical Engineering. The team member shall be a registered professional engineer and have 15 or more years of experience in geotechnical engineering. Team member shall also have a combination of formal training and at least 5 years of experience in geotechnical earthquake engineering for civil works projects. Experience needs to include geotechnical evaluation of flood risk management structures. Experience needs

to encompass: static and dynamic slope stability evaluation; evaluation of the seepage through embankments and under seepage through the foundation of flood risk management structures, including earthen dams; evaluation of grout curtains and cutoff walls, embankments, outlet works, filters and drainage features, and other pertinent dam features; engineering, design and construction of dam excavations and treatments; and settlement evaluations. Experience with USACE Dam Safety Program is required. For Stage 3, team member shall have seismic experience.

Structural Engineering. The team member shall be a registered professional engineer and have 10 or more years of experience in structural engineering. Experience needs to include engineering, concrete dams and flood risk management projects. Experience needs to encompass other features such as control houses, conveyance culverts, gates, and spillways. The engineer shall have extensive experience and be proficient in performing stability analysis using limit equilibrium analysis and arch dam design. Experience with USACE Dam Safety Program is required. For Stage 3, team member shall have seismic experience.

Geologist: The team member shall be a registered professional geologist and have 10 or more years of experience in engineering geology. Relevant experience shall include assessing seepage and piping through and beneath dams constructed on or within various geologic environments, including but not limited to solution prone rock formations, fractured and faulted rock; identification of geological hazards, exploration techniques, field and laboratory testing, and instrumentation. Experience needs to also include the design and construction of dams, mixed bedrock, overburdened abutments, and the design and construction of grout curtains and cutoff walls. Experience with USACE Dam Safety Program is required.

Mechanical Engineering. The team member shall be a registered professional engineer and shall have 10 or more years of experience in mechanical engineering. Experience needs to include engineering and design of flood risk management project features such as water control structures, related systems and components.

Electrical Engineering. The team member shall be a registered professional engineer and shall have 10 or more years of experience in electrical engineering. Experience needs to include engineering and design of flood risk management project features such as water control structures, related systems and components.

Civil Engineering. The team member shall have 10 or more years of experience in the design, layout, and construction of flood control structures including dams. The Civil Engineer shall have demonstrated knowledge regarding hydraulic structures, use of temporary cofferdams and dewatering systems, erosion control, earthwork, concrete placement, design of access roads, and relocation of underground utilities. Experience with USACE Dam Safety Program is desired.

Instrumentation Engineering. The team member shall have 10 or more years of experience in instrumentation and project system/process control systems. Experience

needs to include engineering and design and project startup operations for flood risk management projects including dams with features such as control rooms/houses, flood warning systems, project monitoring instrumentation, and related systems and components. Experience with USACE Dam Safety Program and the USACE Dam and Levee Instrumentation Committee (DLIC) is desired.

Dam Operations Reviewer. The Dam Operations Reviewer should have 10 or more years of experience in Dam Operations activities such as managing project O&M activities, developing O&M procedures and reviewing O&M manuals for end user requirements for projects consisting of dams. Experience with USACE Dam Safety Program is desired.

f. Completion and Certification of the ATR

At the conclusion of each ATR effort, 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 document. It will certify that the issues raised by the ATR team have been resolved (or elevated for resolution to the vertical team). The Completion and Certification should be completed based on the work reviewed for the project. A Sample Completion of ATR and Certification of ATR are included in Attachment 1.

5. Independent External Peer Review/Safety Assurance Review

a. 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 from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted.

Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or 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 construction activities prior to initiation of physical construction and, until construction 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. A site visit will be required by the IEPR team for each of the contracts.

b. Decision on Type II IEPR

A risk-informed decision was made as to whether an IEPR is appropriate based on the factors to consider for conducting a Type II IEPR review that are outlined in EC 1165-2-217. The district chief of engineers made a risk-informed decision that this project does pose a significant threat to human life (public safety due to damage sustained to the service spillway and embankment during a high water event caused by Hurricane Maria). For a Type II IEPR the selection of IEPR review panel members will be made up of independent recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of expertise suitable for the review being conducted. 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.

c. Products to Undergo Type II IEPR

A design phase and construction phase Type II IEPR will be required for each of the two risk reduction measures contracts involving spillway construction (Contracts 3 and 4) and the Guajataca Dam Rehabilitation contract (Contract 5). For the design phase, the IEPRs will cover Plans, Specifications, DDR, and any relevant design documents for each of the contracts.

d. Required Type II IEPR Panel Expertise

The following is a description of the Type II IEPR panel members and the types of expertise that shall be represented on the review panel. All panel members shall be recognized experts in their field and have specialized experience pertaining to the work being performed on this project. Not all disciplines listed below will be required for each contract. Refer to table below for IEPR members needed for each contract.

IEPR DISCIPLINES	Contract 3 – Risk Reduction Measures	Contract 4 – Spillway and Channel Reinforcement	Contract 5 - Guajataca Dam Rehabilitation
H&H	YES	YES	YES
Geotechnical	YES	YES	YES
Structural	YES	YES	YES
Mechanical	NO	NO	YES
Civil	YES	YES	YES
Geology	NO	YES	YES

The IEPR Teams will be comprised of team members with the following knowledge, skills, abilities, and experience levels.

Team Leader. The Team Leader shall have 15 or more years of experience with Civil Works Projects and have performed Team Leader duties on complex civil works projects. The Team Leader can also serve as one of the review disciplines.

Hydrology and Hydraulics (H&H). The H&H Independent Expert shall be a registered professional from academia, a public agency, or an Architect-Engineer or consulting firm with 15 or more years of experience. The Hydraulic Engineer shall have experience in hydraulic engineering with an emphasis on dams and other large public works projects with multiple serial and parallel outlet type structural systems. The Hydraulic Engineer shall also have experience in the analysis and design of hydraulic structures related to water supply and flood control reservoirs, including the design of hydraulic structures such as spillways, outlet works (high and low pressure gates/valves), and stilling basins. The Hydraulic Engineer must have demonstrated knowledge and experience with computer numerical modeling (HEC and ERDC software) and the application of data from physical model testing (journals, research, etc) to the design of spillways, stilling basins and scour protection, and in the ability to coordinate, interpret, and explain computed results with other engineering disciplines, particularly structural engineers, geotechnical engineers, and geologists. In regard to hydrologic analysis, the Hydraulic Engineer must demonstrate knowledge and experience with the routing of inflow hydrographs through multipurpose water supply and flood control reservoirs utilizing multiple discharge devices, including sluice gates and non-gated/gated spillways. The Hydraulic Engineer shall be familiar with Corps application of risk and uncertainty analyses in studies as found in Corps Regulation ER 1110-2-1156 and have a familiarity with standard Corps hydrologic and hydraulic computer models used in drawdown studies, dam break inundation studies, hydrologic modeling and analysis for dam safety investigations. Experience with Federal Dam Safety Programs and participation in related professional societies is required.

Geotechnical Engineer. The Geotechnical Engineering Independent Expert should be a registered professional engineer from academia, a public agency, or an Architect-Engineer or consulting firm with 15 years of experience in the field of geotechnical engineering. Team member shall also have a combination of formal training and at least

5 years of experience in geotechnical earthquake engineering for civil works projects. Experience needs to include geotechnical evaluation of flood risk management structures. Experience needs to encompass: static and dynamic slope stability evaluation; evaluation of the seepage through embankments and under seepage through the foundation of flood risk management structures, including earthen dams; evaluation of grout curtains and cutoff walls, embankments, outlet works, filters and drainage features, and other pertinent dam features; engineering, design and construction of dam excavations and treatments; and settlement evaluations. Experience with USACE Dam Safety Program is necessary. Experience with Federal Dam Safety Programs and participation in related professional societies is required.

Geologist Independent Expert. The Geologist Independent Expert shall be a registered professional geologist from academia, a public agency, or an Architect-Engineer or consulting firm with 15 or more years. The Geologist shall be proficient in assessing seepage and piping through and beneath dams constructed on or within various geologic environments, including but not limited to rock formations, fractured & faulted rock. The Geologist shall be familiar with identification of geological hazards, exploration techniques, field & laboratory testing, and instrumentation. The Geologist shall be experienced in the design of grout curtains and cutoff walls and must be knowledgeable in grout theology, concrete mix designs, and other materials used in foundation seepage barriers. The Geologist must possess additional proficiency in uplift pressures, rock mechanics, rock strength parameters development, and specialized techniques specific to grouting. Experience with Federal Dam Safety Programs and participation in related professional societies is required.

Structural Engineer. Panel member shall be a registered professional engineer with 15 or more years of experience in the field of structural engineering. This panel member shall have experience in the design and construction of dams and / or major hydraulic control structures. Specialized experience shall include mass and conventionally reinforced concrete structures.

Mechanical Engineering. The Mechanical Engineering Independent expert shall be a registered professional from academia, related public agency or an Architect-Engineer or Consulting Firm with a minimum of 15 years of experience in mechanical engineering possessing extensive experience in machine design, machine rehabilitation, and familiarity with the design of mechanical systems and controls for dams, including but not limited to gates, valves, and piping.

Civil Engineering. The Civil Engineering Independent Expert shall be a professional from academia, a public agency, or an Architect-Engineer or consulting firm with 15 years of experience in the design, layout, and construction of flood control structures including dams. The Civil Engineer shall have demonstrated knowledge regarding hydraulic structures, design of temporary cofferdams and dewatering systems, erosion control, earthwork, concrete placement, design of access roads, and relocation of underground utilities. Panel member should be familiar with similar projects across US. Experience

with Federal Dam Safety Programs and participation in related professional societies is desired.

e. Documentation of Type II IEPR

The Type II IEPR will be managed by an organization which meets the criteria set forth in EC 1165-2-217. DrCheckssm review software may be used to document the Type II IEPR comments and aid in the preparation of the Review Report but is not required.

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 RMO 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 RMO for concurrence. The revised submittal will be provided to the RMO with the USACE response and all other materials related to the review.

6. Biddability, Constructability, Operability, Environmental, and Sustainability Review

The value of a BCOES review is based on minimizing problems during the construction phase through effective checks performed by knowledgeable, experienced personnel prior to advertising for a contract. Biddability, constructability, operability, environmental, and sustainability requirements must be emphasized throughout the planning and design processes for all programs and projects, including during planning and design. This will help to ensure that the government's contract requirements are clear, executable, and readily understandable by private sector bidders or proposers. It will also help ensure that the construction may be done efficiently and in an environmentally sound manner, and that the construction activities and projects are 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 and maintenance organization after construction is complete. BCOES Reviews will be conducted on each contract. Requirements and further details are stipulated in ER 1110-1-12, ER 415-1-11, and SAJ EN QMS 02611.



7. Policy and Legal Compliance Review

All implementation documents will be reviewed throughout the project for their compliance with law and policy. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies.

8. Review Schedule and Costs

a. Schedule of Reviews

Design phase project milestones are provided in the table below.

CONTRACT	Activity	Preparer	Date
Contract 1: Gate Repairs	PED	SAJ	FY18
	Final DQCR		Jan 2018
	Final PQCR		Apr 2018
	ATR		Apr 2018
	BCOES		Apr 2018
	Advertise		Apr 2018
	Award		Jun 2018
Contract 2: Hydraulic Power Unit Replacement for High Pressure Gates	PED	SAJ	FY18
	Final DQCR		Jan 2018
	Final PQCR		Jan 2018
	ATR		May 2018
	BCOES		May 2018
	Advertise		Jul 2018
	Award		Aug 2018
Contract 3: Risk Reduction Measures	PED	SAJ	FY18
	Final DQCR		Jan 2018
	Final PQCR		Jan 2018
	ATR		Mar 2018
	IEPR		Mar 2018
	BCOES		May 2018
	Advertise		May 2018
	Award		Jun 2018
Construction IEPR		TBD	



Contract 4: Spillway and Channel Reinforcement	PED	SAJ	FY18
	Final DQCR		Apr 2018
	Final PQCR		May 2018
	ATR		Jun 2018
	IEPR		Jun 2018
	BCOES		Jun 2018
	Advertise		Jun 2018
	Award		Jul 2018
	Construction IEPR		TBD
Contract 5: Guajataca Dam Rehabilitation	PED	SAJ	FY18-FY21
	Intermediate DQCR		TBD
	Intermediate PQCR		TBD
	Intermediate ATR		TBD
	IEPR		TBD
	Intermediate BCOES		TBD
	Final DQCR		TBD
	Final PQCR		TBD
	Final ATR		TBD
	BCOES		TBD
	Advertise		TBD
	Award		TBD
	Construction IEPR		TBD

b. ATR Cost

The ATR for each of the contracts is estimated to cost between \$30,000 and \$50,000.

c. IEPR Cost

The cost for each of the required IEPRs will range from approximately between \$40,000 and \$50,000.

9. Public Participation of Review Plan

As required by EC 1165-2-217, the approved Review Plan will be posted on the Jacksonville District public review plan website at <http://www.saj.usace.army.mil/Missions/CivilWorks/ReviewPlans.aspx>. Any comments will be provided to the technical reviewers. This is not a formal comment period and 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.

10. Review Plan Approval and Updates

The MSC for this is the South Atlantic Division. The MSC Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving the Jacksonville District, MSC, and the RMO) as to the appropriate scope and level of review for the study and endorsement by the RMO. 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 will be documented in an Attachment 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 RMO 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 Commander's approval memorandum, will be posted on the Jacksonville District public review plan website at <http://www.saj.usace.army.mil/Missions/CivilWorks/ReviewPlans.aspx> and linked to the HQUSACE webpage. The latest Review Plan should also be provided to the RMO and home MSC.

11. 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 DQC, ATR, and IEPR (if required). The following engineering models are anticipated to be used:

MODEL
Bentley Microstation V8i, Bentley Systems Inc, 2010
Bentley InRoads Microstation V8i, Bentley Systems, Inc.
HEC-UNET v4.0, USACE Hydraulic Engineering Center
HEC-HMS v4.2.1
HEC-RAS v.5.0.3
HES-ResSim v.3.1
HY-8
AdH
SMS v.10.1
GIS (ESRI ArcMap)
STWAVE Full Plane (Version 5.0)
STWAVE Half Plane (Version 4.0)
ACES (Version 4.03)
Bretschneider
Compaq Visual Fortran (Professional Edition 6.1.0)
SEEP/W, GeoStudio 2012 Version 8.0.9.6484
SLOPE/W, GeoStudio 2012 Version 8.0.9.6484
STAADPro v8.0
Ram Element Version 10.7

ATTACHMENT 3: PARTIAL LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms	Defined
AFB	Alternatives Formulation Briefing
ATR	Agency Technical Review
BCOES	Biddability, Constructability, Operability, Environmental, and Sustainability Review
CAP	Continuing Authorities Program
CERCAP	Corps of Engineers Reviewer Certification and Access Program
CY	Cubic Yards
DDR	Design Documentation Report
DSMMCX	Dam Safety Modification Mandatory Center of Expertise
DQC	District Quality Control
DQCR	Discipline Quality Control Review
EC	Engineering Circular
EA	Environmental Assessment
ER	Engineering Regulation
ERDC-CERL	Engineer Research and Development Center – Construction Engineering Research Laboratory
ESA	Endangered Species Act
ETL	Engineering Technical Lead
FDEP	Florida Department of Environmental Protection
FONSI	Findings of No Significant Impacts
FSCA	Feasibility and Cost Sharing Agreement
FY	Fiscal Year
GRR	General Reevaluation Report
IEPR	Independent External Peer Review
LPP	Locally Preferred Plan
MCX	Mandatory Center of Expertise
MLLW	Mean Low Low Water
MSC	Major Subordinate Command
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
ODMDS	Ocean Dredged Material Disposal Site
OMB	Office of Management and Budget
OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
P&S	Plans and Specifications
PED	Preconstruction Engineering and Design
PDT	Project Delivery Team
PM	Project Manager
PMP	Project Management Plan
PPA	Project Partnering Agreement



Acronyms	Defined
PQCR	Product Quality Control Review
QA	Quality Assurance
QCP	Quality Control Plan
QMP	Quality Management Plan
QMS	Quality Management System
RMC	Risk Management Center
RMO	Review Management Organization
RP	Review Plan
RTS	Regional Technical Specialist
SAJ	South Atlantic Jacksonville District Office
SAD	South Atlantic Division Office
SAR	Safety Assurance Review (also referred as Type II IEPR)
SME	Subject Matter Expert
USACE	U.S. Army Corps of Engineers
WRDA	Water Resources and Development Act



ATTACHMENT 4: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number