DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NORTHWESTERN DIVISION
PO BOX 2870
PORTLAND OR 97208-2870

REPLY TO
ATTENTION OF

CENWD-RBT

02 JUN 2015

MEMORANDUM FOR Commander, Kansas City District (CENWK-PM-CJ /Scott Mensing)

SUBJECT: Review Plan (RP) Approval for the Kanopolis Dam Emergency Gate Replacement Project

1. References:

   a. Kanopolis Dam Emergency Gate Replacement Project Review Plan.

   b. EC 1165-2-214 Civil Works Review, 15 December 2012.

2. Reference 1.a. above has been prepared in accordance with reference 1.b. above.

3. The RP has been coordinated with the Business Technical Division, Northwestern Division, U.S. Army Corps of Engineers, which is the Review Management Organization for the plan. The Review Plan includes District Quality Control and Agency Technical Review.

4. I hereby approve this RP, which is subject to change as circumstances require, consistent with the study development process and the Project Management Business Process. Subsequent revisions to this RP or its execution will require written approval from this office.

5. For further information, please contact Mr. Douglas Putman, P.E. at (503) 808-3883.

Encl

JOHN S. KEM
BG, USA
Commanding

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, KANSAS CITY DISTRICT
635 FEDERAL BUILDING
601 E 12TH STREET
KANSAS CITY MO 64106-2824

REPLY TO
ATTENTION OF

CENWK-ED

17 April 2015

MEMORANDUM THRU: Northwestern Division Business Technical Division (CENWD-RBT/ Douglas Putman), 1201 NE Lloyd Blvd, Suite 400, Portland, OR 97232

FOR: Division Commander, Northwestern Division (CENWD-DE/BG John Kem), 1201 NE Lloyd Blvd, Suite 400, Portland, OR 97232

SUBJECT: Kanopolis Dam Emergency Gate Replacement Review Plan (P2#450625)

1. The review plan for the Kanopolis Dam Emergency Gate Replacement Project is enclosed for Northwestern Division's review and approval. The Review Plan was prepared in accordance with EC 1165-2-214 and utilizes the Risk Management Center's review plan template for agency technical reviews for implementation documents and other work products in accordance with the EC policy memo dated 15 December 2012.

2. Please contact Mr. Scott Mensing, Project Manager, at (816) 389-2321 or email at scott.p.mensing@usace.army.mil with questions or requests for additional information.

4/17/15

Encl

DAVID L. MATHEWS, P.E.
Chief, Engineering Division
Kansas City District

Review Plan
U.S. Army Corps of Engineers
Northwest Division
Kansas City District

Kanopolis Dam
Emergency Gate
Replacement

US Army Corps
of Engineers®

April 2015

1. PURPOSE AND REQUIREMENTS

1.1 PURPOSE

This Review Plan is intended to ensure a quality-engineering project is developed by the U.S. Army Corps of Engineers – Kansas City District (NWK) and is developed for the Kanopolis Dam Emergency Gate Replacement. This Review Plan was prepared in accordance with Engineering Circular (EC) 1165-2-214, “Civil Works Review Policy” and provides a value added process that assures the correctness of the information shown. It is imperative that vertical teaming efforts are proactive and well coordinated to assure collaboration of the report findings, conclusions, and recommendations, and that there is consensus at all levels of the organization with the recommended path forward. This Review Plan describes the scope of review for this project and is included in the Project Management Plan (P2 #450625). All appropriate levels of review are included in this Review Plan and identifies the 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.

1.2 GUIDANCE AND POLICY REFERENCES

- ER 5-1-11, USACE Business Processes
- EC 1165-2-214, Civil Works Review Policy, 15 DEC 2012
- ER 1110-2-1156, Safety of Dams – Policy and Procedure, 31 MAR 2014
- ER 1110-1-12, Quality Management, 31 MAR 2011

1.3 REQUIREMENTS

This Review Plan is developed in accordance with EC 1165-2-214, 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.

1.4 REVIEW MANAGEMENT ORGANIZATION

The U.S. Army Corps of Engineers – Northwest Division (NWD) is the Review Management Organization (RMO) for this project.

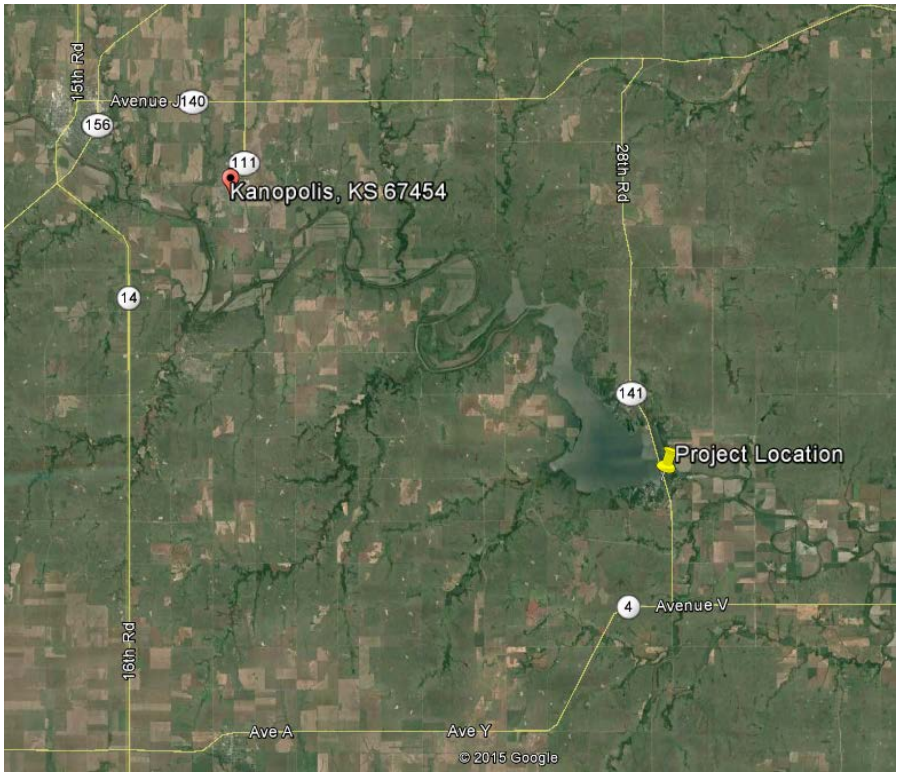
2. PROJECT DESCRIPTION AND INFORMATION

Kanopolis Dam is located on the Smokey Hill River, approximately 19 miles west and 16 miles south of Salina, Kansas. Closure of the dam was in 1947 and water storage began in 1948. Periodic Inspection Report No. 10, dated September 2011, found that "the current concrete filled emergency gate cannot be fully inspected as required by the current Hydraulic Steel Structures (HSS) criteria and has extensive leakage which does not allow maintenance of the service gates or slot to take place". The report recommends that a new emergency gate be constructed to provide a closure system that meets the HSS requirements of Engineering Regulation (ER) 1110-2-8157, resolves the leakage issue, and provides a means of maintaining the emergency gate.

The scope of this project is to design and construct a replacement emergency gate at Kanopolis Dam. The new emergency gate will meet all current guidance, regulations, and requirements, ensure the gate can be inspected, fit within the existing slot, and be within the weight limits of the existing crane. The emergency gate slot and embedded guides will not be repaired in conjunction with this project.

This project includes the generation of plans, specifications, design documentation, and updates to the existing Operations and Maintenance Manual and Record Drawings. The project will be ready to advertise upon completion of the plans and specifications. All items will be reviewed in accordance with this Review Plan.

Refer to Figure 1 below for a project location map.



3. REVIEW REQUIREMENTS

3.1 DISTRICT QUALITY CONTROL

District Quality Control (DQC) consists of peer reviews, interdisciplinary reviews, in-progress reviews, and chiefs' reviews. Peer reviews will be conducted by an engineering peer within each discipline for all design products. Disciplines include structural and mechanical design, hydraulic and hydrologic engineering, cost estimating, dam safety, water management, and lake operations. DQC will be conducted on calculations, conceptual analysis, system designs, decision documentation, risk determinations, completeness of the plans and specifications, ensure all aspects of the project are included in the documentation, etc. Interdisciplinary reviews will be conducted by the PDT to ensure cross coordination between disciplines. All team members will review all products to ensure it accurately accounts for all discipline specific aspects and the documents collectively correlate with each other.

The Dam Safety Program Manager (DSPM) will provide a review of all submittal packages and be invited to all pertinent project meetings to ensure he is fully aware of the improvements and decision process. The DSPM will determine if and when the Dam Safety Committee needs to be briefed on the proposed improvements.

Select section, branch, and division level chiefs in Engineering, Operations, Construction and Project Management will review the documentation, analysis, and decision-making process in the documentation to verify the plans, specifications, and design documentation are correct and accurately reflect current policy and guidance in accordance with Engineering Regulation (ER) 415-1-11.

3.2 AGENCY TECHNICAL REVIEW

An Agency Technical Review (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 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.

The four key parts of a quality review comment will normally include:

- The review concern. Identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
- The basis for the concern. Cite the appropriate law, policy, guidance, or procedure that has not been properly followed;

- 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
- The probable specific action needed to resolve the concern. Identify the action(s) that the reporting officers must take to resolve the concern.

At the conclusion of the 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:

- Identify the document(s) reviewed and the purpose of the review;
- 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;
- Identify and summarize each unresolved issue (if any); 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.

3.2.1 ATR Team Expertise

The ATR team shall be chosen based on each individual's qualifications and experience with similar projects. Specifically for this project, the reviewers are familiar with the design and fabrication of emergency and/or service gates under the USACE Hydraulic Steel Structures (HSS) design, fabrication and inspection program. Therefore, this ATR team shall consist of a structural and mechanical engineer. All members are required to have a minimum of five years of experience in design of similar projects, be a licensed engineer, and registered in CERCAP.

The draft charge questions for the ATR team are: Does the implementation documents adhere to the USACE Hydraulic Steel Structures (HSS) design, fabrication and inspection program requirements as described in ETL 1110-2-584 Design of Hydraulic Steel Structures and EM 1110-2-6054 Evaluation and Repair of Hydraulic Steel Structures and is the replacement gate safe, reliable, low maintenance, serve its intended purpose, and allow the system to operate as originally intended?

The ATR for this project is to be conducted by the St. Paul District (MVP). The reviewers are identified and listed below. The ATR will be in compliance with EC 1165-2-214. Comments from the ATR team will be captured, resolved, and backchecked via DrChecks. After resolution of the comments, and in accordance with NWK BQP 7.3.01,

an ATR Certification will occur. Certification requires that the reviewers have witnessed the resolution of their comments sufficiently and accurately addressed on the contract documents. Disputes and significant unresolved ATR concerns will be handled in accordance EC 1165-2-214. A site vist will not be scheduled for the ATR team.

The ATR reviewers from MVP include the following:

- ATR Lead/Mechanical Engineer – Tim Paulus, P.E.
- Structural Engineer – Kent Hokens, P.E.
- ATR Coordinator – Mike Dahlquist, P.E.

3.2.2 ATR Lead

The ATR team lead shall be a senior professional with extensive experience in preparing Civil Works documents and conducting ATRs. The lead shall have the necessary skills and experience to lead a virtual team through the ATR process.

The ATR lead for this review is Tim Paulus. Tim is a licensed mechanical engineer at MVP and has extensive experience designing and reviewing projects of similar nature and magnitude. Tim will also serve as the mechanical engineering reviewer.

3.3 INDEPENDENT EXTERNAL PEER REVIEW DETERMINMATION

An Independent External Peer Review (IEPR) is required for some 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 1165-2-214, is made as to whether an IEPR is appropriate.

Kanopolis Dam is classified as a Dam Safety Action Classification (DSAC) 4. An overview of the noted risks include erodibility in the spillway, seepage through the abutments, embankment, and foundation, and erosion at the toe along Sand Creek. No significant risks are noted regarding the water control tower, emergency gates, or service gates.

The emergency gate replacement project is not considered a flood risk management project, but is considered non-routine maintenance. Furthermore, the project does not include the use of innovative materials or techniques, does not present complex challenges, does not contain precedent-setting methology, or present conclusions that differ from prevailing practices. The project does not include any unique construction sequencing or scheduling challenges. The project does require the removal, replacement, and construction of a new emergency gate that must be robust, resilient, and provide a secondary line of protection to the exsiting service gates. The new emergency gate will better the reliability and redundancy to the existing system.

The project does include low life safety risks associated with inspection and certification of hydraulic steel structures. The condition of the existing emergency gate cannot be confirmed due to the inability to inspect the interior of the gate. As a result the emergency gate cannot be certified to allow personnel behind the emergency gate to inspect the upstream face of the service gates. This restriction greatly limits NWK's ability to assess and ensure reliable operation of critical dam safety features. Additionally the emergency gate has reached the end of its service life.

The probability of a failure during construction of this project is unlikely. However, if a failure were to occur, the severity could be critical. The tower includes two service gates that will remain in operation and functional during construction. Construction is anticipated to occur during low pool stages and during winter months, hence reducing the risk of gate operations during construction. There is a very low risk that construction problems occur during the gate replacement process. The specifications will be set to ensure the new gate will fit prior to removal of the existing gate. The population at risk is very low and maximum flow through the emergency gate is likely to be confined to the existing channel and floodplain. The duration without a functioning emergency gate is anticipated to be two days. Therefore, the total risk to the threat to human life is low.

The NWK Chief of Engineering has determined that a Type II IEPR is not necessary for this project. The decision process is document in Attachment 2 of this Review Plan.

3.4 POLICY AND LEGAL COMPLIANCE REVIEW

All documents will be reviewed throughout the project for their compliance with current law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. 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.

4. REVIEW SCHEDULE AND COSTS

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.

4.1 ATR COST

The anticipated cost for the ATR is $10,000. The team is limited to two members, with one acting as both the lead and a reviewer, to help reduce project costs.

4.2 REVIEW SCHEDULE

Peer reviews, ATRs, and BCOES reviews will be completed at the 65% and 95% submittals and all comments will be closed out with the final 100% submittal. The current schedule for the reviews is listed below. The project must be ready to advertise by 30 SEP 2015 and one of the primary designers will be on leave JUL 2015. The schedule has been setup to accommodate these constraints. The Project Delivery Team (PDT) and ATR team have agreed to this schedule.

Task	Days	Review Start	Review Complete
65% Design			
Peer Reviews	5	6/15/2015	6/19/2015
BCOES Reviews (Including IPR)	5	6/22/2015	6/26/2015
65% Submittal	0	6/26/2015	6/26/2015
65% ATR	10	6/29/2015	7/10/2015
95% Design			
Peer Reviews	2	8/24/2015	8/25/2015
BCOES Reviews (Including IPR)	3	8/26/2015	8/28/2015
95% Submittal	0	8/28/2015	8/28/2015
95% ATR	10	8/31/2015	9/11/2015
100% Design			
100% Submittal	0	9/18/2015	9/18/2015
ATR Comment Closeout	5	9/21/2015	9/25/2015
Final BCOES Review	8	9/21/2015	9/30/2015
Ready to Advertise	0	9/30/2015	9/30/2015

5. PUBLIC PARTICIPATION

As required by EC 1165-2-214, the approved Review Plan will be posted on the District public website (http://www.nwk.usace.army.mil/Missions/CivilWorks/CivilWorks Programs and Projects/CivilWorksReviewPlans.aspx). Information will be conveyed to the public through the use of press releases and media interviews, as necessary, and through the use of posting information to the Kansas City District's website. There is no formal public review planned for the plans and specifications under development .

6. REVIEW PLAN APPROVAL AND UPDATES

The MSC for this project is NWD. The MSC Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input as to the appropriate scope and level of review for the study. Like the PMP, the Review Plan is a living document and may change as the study progresses. NWK 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. Significant changes to the Review Plan (such as changes to the scope and/or level of review) will be 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 Kansas City District's webpage and linked to the HQUSACE webpage. The latest Review Plan will also be provided to the MSC.

ATTACHMENT 1

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the construction documents for the Kanopolis Dam Emergency Gate Replacement project. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. 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 meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

Tim Paulus, P.E.
ATR Team Leader
CEMVP-EC-D

Date

Scott Mensing, P.E.
Project Manager
CENWK-PM-CJ

Date

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.

David L. Mathews, P.E.
Chief, Engineering Division/Dam Safety Officer
CENWK-ED

Date

ATTACHMENT 2

DOCUMENTATION OF TYPE II IEPR RISK-INFORMED DECISION

This attachment documents the vertical team's risk informed recommendation to not conduct Type II IEPR.

The following table, based on the US Army Field Manual 5-19, *Composite Risk Management*, was used to assess each identified risk.

Risk Assessment Matrix

	Risk Probability			
Risk Severity	**Frequent**	**Likely**	**Seldom**	**Unlikely**
Catastrophic	Extremely High	Extremely High	High	Medium
Critical	Extremely High	High	Medium	Low
Marginal	High	Medium	Medium	Low
Negligible	Medium	Low	Low	Low

The following table details the risks, frequency, severity, risk assessment, and how the risk contributes to the IEPR decision. The risks were developed by reviewing the IEPR triggers from EC 1165-2-214.

Based on the below assessment, it is the risk-informed decision of the vertical team that a Type II IEPR is not required for this project.

TODAY'S DATE	17-Apr-15	KANOPOLIS DAM EMERGENCY GATE REPLACEMENT			RISK MATRIX
UPDATED	17-Apr-15				
BY WHOM	SPM				
RISK IDENTIFICATION		PROBABILITY	SEVERITY	TOTAL RISK	MITIGATION/PREVENTION
Does the project address hurricane and storm risk management and flood risk management.		UNLIKELY	NEGLIGIBLE	LOW	This project is not a storm or flood risk management project. It is an operations improvement.
Does the project include a Federal action justified by life safety.		UNLIKELY	MARGINAL	LOW	The project does include low life safety risks associated with inspection and certification of hydraulic steel structures. The condition of the existing emergency gate cannot be confirmed due to the inability to inspect the interior of the gate. As a result the emergency gate cannot be certified to allow personnel behind the emergency gate to inspect the upstream face of the service gates. This restriction greatly limits NWK's ability to assess and ensure reliable operation of critical dam safety features. Additionally the emergency gate has reached the end of its service life.
Does a failure in the project pose a signficant threat to human life.		UNLIKELY	CRITICAL	LOW	The probability of a failure during this project is unlikely. However, if a failure were to occur (i.e. a failure during the actual gate replacement process), the severity could be critical. The service gates will not be modified during construction and will be fully operational. Construction is anticipated to occur during low pool stages reducing the risk to operate the emergency gate during construction. The area downstream of Kanopolis Dam have a very low population and any flow that could flow through the emergency gate would probably be held within the existing channel and floodplain. The actual gate replacement process is anticipated to take approximately two days. Therefore, the total risk to the threat to human life is low.
Does the project involve the use of innovative materials or techniques where the engineering is based on novel methods, present complex challenges for interpretations, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices.		UNLIKELY	NEGLIGIBLE	LOW	This project does not contain any innovative or complex design or construction methods.
Does the project require redundancy, resiliency, and robustness.		PROBABLE	MARGINAL	MEDIUM	The project does require the removal, replacement, and construction of a new emergency gate that must be robust, resilient, and provide a secondary line of protection to the exsiting service gates. However, the post-project conditions will not differ from existing conditions as this replacement is for maintenance purposes only.
Does the project include unique construction sequencing or a reduced or overlapping design and construction schedule.		UNLIKELY	NEGLIGIBLE	LOW	This project does not include any unique construction sequencing or scheduling.