



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

CENWD-RBT

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

SUBJECT: Review Plan Approval for the MRLS R471-460 & L-455, St. Joseph, Missouri levee Units.

1. References:

a. Topeka, MRLS R471-460 & L-455, St. Joseph, Missouri levee Units 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 and the Risk Management Center, which is the Review Management Organization for the plan. The Review Plan includes District Quality Control, Agency Technical Review, and Type II Independent Peer 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  
RP Memo, 03 Mar 16

KELLETT.JOSEP  
H.P.1231299269

Digitally signed by  
KELLETT.JOSEPH.P.1231299269  
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,  
ou=USA, cn=KELLETT.JOSEPH.P.1231299269  
Date: 2016.04.29 12:07:22 -0700

Joe Kellett  
Chief, Regional Business Technical  
Northwestern Division, USACE



REPLY TO  
ATTENTION OF

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

CENWK-PM-CJ

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 Scott Spellmon), 1201  
NE Lloyd Blvd, Suite 400, Portland, OR 97232

SUBJECT: MRLS R471-460 & L-455, St. Joseph, Missouri Levee Units, Review Plan Submittal  
for Approval

1. The review plan for the MRLS R471-460 & L-455 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](mailto:scott.p.mensing@usace.army.mil) with questions or requests for additional information.

Encl

 3/3/14  
DAVID L. MATHEWS, P.E.  
Chief, Engineering Division  
Kansas City District



**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

5 April 2016

MEMORANDUM FOR: Commander, Kansas City District, ATTN: CENWK-PM-CJ

SUBJECT: Risk Management Center Endorsement – MRLS R471-460 & L-455, St. Joseph, Missouri Levee Units, Review Plan

1. The Risk Management Center (RMC) has reviewed the Review Plan (RP) for – MRLS R471-460 & L-455, St. Joseph, Missouri Levee Units, dated 23 March 2016, and concurs that this RP complies with the current peer review policy requirements outlined in EC 1165-2-214 “Civil Works Review Policy”, dated 15 December, 2012.
2. This review plan was prepared by Kansas City District, reviewed by NWD, and the RMC, and all 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 (rmc.review@usace.army.mil).
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 601-631-5896

Sincerely,

Dustin C. Herr, P.E.  
Review Manager  
Risk Management Center

CF:  
CEIWR-RMC (Mr. Snorteland)  
CENWD-DQM (Division Quality Manager)

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

**MRLS R471-460 & L-455  
St. Joseph, Missouri Levee Units**

**RMC Endorsement Date: 05 APR 2016**

**MSC Approval Date: TBD**

**Last Revision Date: 23 MAR 2016**



**US Army Corps  
of Engineers®**

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## **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). This Review Plan is developed for the MRLS R471-460 & L-455 flood risk reduction project located near St. Joseph, Missouri (herein referred to as the “Project”). This Review Plan is prepared in accordance with EC 1165-2-214, “Civil Works Review Policy”. The Review Plan provides a value added process that assures the correctness of the information shown. This Review Plan describes the scope of review for the overall, complete design and construction effort associated with the Project, and is included in the Project Management Plan (P2 #354366).

### **1.2 General Guidance and Policy References**

- EC 1165-2-214, Civil Works Review Policy, 15 December 2012
- ER 1110-1-12, Quality Management, 31 Mar 2011
- EM 1110-2-1913 Design, Construction, and Evaluation of Levees, 30 April 2000
- Project Management Plan (PMP)
- MRLS R471-460 & L-455 Feasibility Report and Environmental Assessment with Appendices, SEP 2006
- NWK BQP 7.3.01 Product Development Process In-House

### **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 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/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. The Review Plan identifies the most important skill sets needed for each review, the objective of the review, and the specific advice sought – thus setting the appropriate scale and scope of review for the Project. This Review Plan will be provided to PDT, DQC, ATR and IEPR Teams.

This Review Plan assumes all work will be completed by in-house resources. If portions of this Project are determined to be designed by an Architect-Engineer (A/E) contractor, the Review Plan will be updated accordingly to reflect the change.

### **1.4 Review Management Organization**

The USACE Risk Management Center (RMC) is the Review Management Organization (RMO) for this Project. Contents of this Review Plan are coordinated with the RMC and the Northwestern Division (NWD), the Major Subordinate Command (MSC). In-Progress Review (IPR) team meetings with the RMC, NWD, and HQ will be scheduled on an “as needed” basis to discuss programmatic, policy, and technical matters. NWK will assist the RMC with management of the ATR and IEPR reviews and development of the ATR and IEPR “charges”.

## 2. PROJECT DESCRIPTION AND INFORMATION

### 2.1 Project Description

The MRLS R471-460 & L-455 project consists of improvements to two levee units located on opposite banks of the Missouri River near St. Joseph, Missouri. Unit R471-460 is located on the right bank of the Missouri River and protects the cities of Elwood and Wathena, Kansas, as well as the Rosecrans Memorial Airport and Missouri Air National Guard facilities. Unit L-455 is located on the left bank of the Missouri River and protects portions of the city of St. Joseph, Missouri. Both units also protect significant agricultural property and unincorporated areas. The two existing levee units were designed and constructed in the 1960's to work as a system to provide flood risk management along the Missouri River.

Unit R471-460 was overtopped and breached by the Missouri River in 1993, prompting the local sponsors to request a feasibility study for evaluation of the project. In 1999, the Federal Emergency Management Agency (FEMA) formally decertified Unit R471-460, finding that it was unable to provide the minimum base flood damage risk reduction (1.0% annual event with 90% assurance). In 2007, NWD and HQUSACE concluded that the necessary improvements are to be considered a hydraulic design deficiency and approved the Feasibility Report.

The improvements consist primarily of a raise to both levee units to ensure the R471-460 levee unit is certifiable and able to be reaccredited by FEMA, underseepage improvements (including berms and relief wells) to account for impacts of the levee raise, improvements to existing drainage structures to ensure they are structurally adequate to accept the levee raise, and construct new drainage structures on the Brown's Branch tributary and Union Pacific Railroad crossing. The planned levee raise on R471-460 will impact approximately 14 miles of the existing levee system and the levee is projected to be raised up to four feet. The planned levee raise on L-455 impacts approximately one half of a mile of the existing levee and the levee is projected to be raised approximately 12 to 18 inches. Underseepage improvements are necessary to account for the additional levee height on R471-460 (underseepage currently not planned for L-455) and updates to USACE guidance pertaining to underseepage analysis. Underseepage berms are planned for all areas that have available real estate and vary in width from 150 feet (NWK minimum width) to over 400 feet. Relief wells are planned in areas where the necessary real estate is not available, specifically adjacent to Browning Lake. Approximately 40 relief wells are planned for this area (abandonment and replacement of 20 existing relief wells and approximately 20 new relief wells).

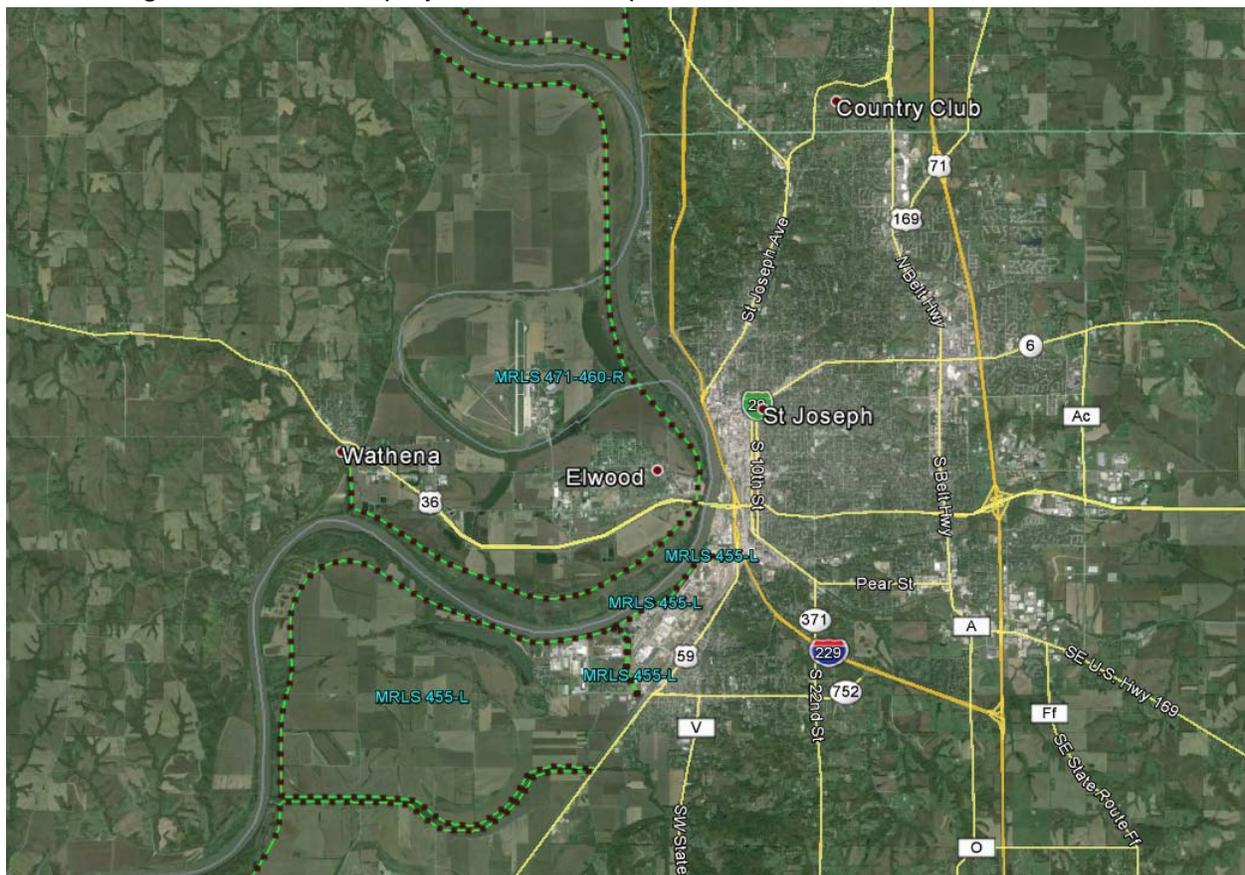
Superiority will be provided to the left bank over the right bank due to the significant potential for consequences located within the L-455 leveed area. The impact area of R471-460 includes large agriculture fields, the Rosecrans Memorial Airport, and the cities of Elwood and Wathena, Kansas. The impacted area of L-455 includes the city of St. Joseph, Missouri and a large commercial and industrial area.

Structural improvements include the in situ strengthening of five existing drainage structures, the full replacement of one drainage structure. Improvements also consist of a new drainage

structure at the confluence of the Missouri River and Brown's Branch and the conversion of an existing earthen gap to a stoplog structure.

This design and construction effort includes the generation of multiple sets of construction drawings, specifications, design documentation reports, and updates to the existing Operations and Maintenance Manual and Record Drawings. The intent is to complete the design effort for the complete and overall project upfront and then compile construction drawings and specifications for each subsequent construction contract determined by available funding. The project is planned to be constructed in four (4) construction contracts. All items will be reviewed in accordance with the guidance included herein.

Refer to Figure 1 below for a project location map.



## 2.2 Project Sponsor

The Project is supported by three non-federal local sponsors – the South St. Joseph Levee District, the Elwood-Gladden Drainage District, and the St. Joseph Airport Levee District.

## 3. DISTRICT QUALITY CONTROL

### 3.1 Requirements

All implementation documents (including supporting data, analyses, environmental compliance documents, etc.) will undergo a DQC. DQC consists of peer reviews, interdisciplinary reviews,

in-progress reviews, and chiefs' reviews. Peer reviews will be conducted by an engineering peer selected by the applicable Section Chief within each discipline for all design products and will be in accordance with Chapter 3 of ER 1110-1-12. The term "peer review" for the purpose of this document is synonymous with the "quality checks and reviews" as defined in ER 1110-1-12. DQC will be conducted at each major milestone on alternatives considered, calculations, analysis, system designs, decision documentation, risk determinations, completeness of the plans and specifications, means and methods for construction, incorporation of lessons learned, and ensure all aspects of the project are included in the documentation. 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.

Interdisciplinary reviews will be conducted by the PDT to ensure cross coordination between disciplines. Interdisciplinary reviews ensure the work developed by one discipline does not conflict or interfere with the work of another discipline. See Chapter 3 of ER 1110-1-12. As each submittal is prepared, each PDT member will review the product before independent technical review or agency technical review is performed. This is mandatory before the final submittal. The term "interdisciplinary review" for the purpose of this document is synonymous with the internal portion of the "PDT Review" defined in Chapter 3 of ER 1110-1-12.

In-Progress Reviews will be conducted at all major milestones, decision points, changes in scope, etc. The technical lead will brief engineering management at the Division level on the Project status.

Branch Chiefs' check will be scheduled and performed prior to design packages being distributed to external reviewers and non-Federal sponsors. The schedule will allow for a minimum of two (2) days for the appropriate Branch Chief(s) to review the design package for quality and completeness relative to the scheduled design phase. The responsible Branch Chief will evaluate the design package relative to the Quality Metrics included within NWK BQP 7.3.01. This information will be shared with the technical lead and the project manager. The respective NWK Quality Control Program Manager will apply the Quality Metrics to rate the overall quality of the product. The quality ratings will be utilized during the design AAR. The quality ratings will also be stored by each Quality Control Program Manager to track quality improvement opportunities.

Select section, branch, and division level chiefs in Engineering, 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 prior to advertisement for construction (BCOES Review). A BCOES review will be conducted at the 95% submittal and prior to advertisement, at minimum.

The PDT will visit the site and conduct a review comparing the completed plans with the current site characteristics. While intermediate site visits will be done throughout product development, the final plan-in-hand review will be completed as close to the advertisement date as possible.

This review is to determine if any significant changes to the site have occurred such as topographic or utility alterations. ER 1110-1-12.

The Project, including design, construction and OMRR&R aspects, will be coordinated with the NWK Levee Safety Program. The Levee Safety Program Manager (LSPM) 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.

### **3.2 Documentation**

DQC reviews will be documented in accordance with NWK BQP 7.3.01. Peer Reviewers will document all reviews in accordance with applicable checklists and will initial off on all calculations. The technical lead will ensure each peer reviewer completes the Peer Review Certification form, applicable Chiefs complete the District Quality Control Certification, and the BCOES Certification is executed prior to advertisement. All applicable forms are included in NWK BQP 7.3.01.

## **4. AGENCY TECHNICAL REVIEW**

### **4.1 Requirements**

The Agency Technical Review (ATR) will be conducted in accordance with EC 1165-2-214 on all design documentation, including the design documentation report and calculations, construction drawings, and specifications. All design products and those issued for construction will receive an ATR. This project is scheduled to have at least four construction contracts. Each contract will include a specific set of construction drawings and project specifications. Each set will include an ATR prior to solicitations.

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, completed robust DQC, 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 goal is to have early involvement with the ATR team, especially when key decisions are being made. The ATR Lead should be invited virtually to all 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 should be shared early on to have the best chance of being adopted by the PDT. Most of the ATR effort should be accomplished midway through the design effort; after completion of design the ATR effort will check that the effort agreed to at mid-point was accomplished. This is consistent with the requirement that the ATR members will not be involved in the day-to-day production of the project/product. A site visit will not be scheduled for the ATR Team.

### **4.2 Documentation of ATR**

DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments will be limited

to those that are required to ensure adequacy of the product. The ATR will also be in accordance with NWK BQP 7.3.01. The four key parts of a quality review comment will 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.

#### **4.3 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.

#### **4.4 Required ATR Team Expertise and Requirements**

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 following provides an estimate of the disciplines and experience required for the ATR team. The ATR team will be chosen based on each individual’s qualifications and experience with similar projects. All EC reviewers will be certified in CERCAP: [https://team.usace.army.mil/sites/ERDC-CRREL/PDT/atr\\_certification/default.aspx](https://team.usace.army.mil/sites/ERDC-CRREL/PDT/atr_certification/default.aspx). The ATR will be completed by U.S. Army Corps of Engineers – Memphis District (MVM). The final ATR members will be approved by the NWK Quality Control Program Manager prior to starting each review. The ATR team will be led by Mr. Jordan Bledsoe, P.E., whom will be mentored by Mr. Donald (Shane) Callahan, P.E.

ATR Lead. The ATR team lead is a senior licensed professional engineer 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.

Geotechnical Engineer. Reviewer shall be a licensed professional engineer and have a minimum of 10 years of experience in the field of geotechnical engineering, analysis, design,

and construction of levees, levee raises, and flood risk management systems. The geotechnical engineer will have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion protection design, earthwork construction, and relief wells.

Hydraulic Engineer. Reviewer shall be a licensed professional engineer and have a minimum of 10 years of experience in the analysis and design of hydraulic structures related to levees including the design of drainage structures. The hydraulic engineer will be knowledgeable and experienced with the routing of inflow hydrographs through major river systems, USACE application of risk and uncertainty analyses in flood risk reduction studies, and standard USACE hydrologic and hydraulic computer models used in drawdown studies, hydrologic modeling and analysis for levee safety investigations.

Structural Engineer. Reviewer shall be a licensed professional engineer and have a minimum of 10 years of experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies, and external stability analysis including foundations of large drainage structures on major river systems. The structural engineer will have specialized experience in the design, construction and analysis of concrete drainage structures, closure structures, and designing and constructing modifications to existing drainage structures.

#### **4.5 Completion and Certification of the ATR**

At the conclusion of the design 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 will:

- 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.

ATR will 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. A Sample Completion of ATR and Certification of ATR are included in Attachment A.

## **5. INDEPENDENT EXTERNAL PEER REVIEW/SAFETY ASSURANCE REVIEW**

### **5.1 Requirements**

An Independent External Peer Review (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 included to confirm an IEPR is appropriate for this project. The IEPR panel 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. This peer review evaluates the clarity of hypotheses, the validity of the research design, and the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall products.

Type II IEPR, or Safety Assurance Review (SAR), per EC 1165-2-214 are managed outside the USACE and are conducted on design and construction activities for flood risk management 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 will consider the adequacy, appropriateness, and acceptability of the design activities in assuring public health safety and welfare.

This project requires a Type II IEPR on all design and construction products. The plan for this project is to complete the overall design effort to a 95% level and generate construction drawings and specifications specific to each construction contract from the overall design effort. Type II IEPRs will be conducted on all aspects of the project – the overall design effort and each construction package. All attempts will be made to keep the IEPR panel consistent over the life of the project.

### **5.2 Decision on Type II IEPR**

A Type II IEPR will be 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 as to whether IEPR is appropriate based on the factors to consider for conducting a Type II IEPR review that are outlined in EC 1165-2-214, Appendix E, Section 2 (a) thru (c).

This Project includes life safety risks. The existing system is in jeopardy of overtopping. During the 2011 flood event, the R471-460 unit experienced loading at, or greater than, 75% of the levee height (approx. three feet below the levee crest) for a full month compared to only one week above that level during 1993. 2011 floodwaters were within two feet of the unit's crest for nine days and peaked at 18 inches below the units crest. Unit L-455 was loaded at greater than 50% of its height in 2011 for more than three weeks and floodwaters peaked at approximately four feet below the unit crest, approximately two feet lower than the 1993 peak.

Geotechnical Engineer. Panel member shall be a registered professional geotechnical engineer from an Architect-Engineer or consulting firm, a public agency, or academia with 15 years of demonstrated experience in the specific field of levees and flood risk reduction engineering in evaluating, designing, and constructing federal flood damage reduction projects; and with a minimum MS degree or higher in engineering. Active participation in related profession societies is encouraged. The Geotechnical panel member should be a recognized expert in levees and channels. Geotechnical panel member shall have at least 15 years or more experience in the general field of geotechnical engineering; experience in subsurface investigations; field & laboratory testing and the determination of in-situ material properties; soil compaction and earthwork construction; soil mechanics; seepage and piping; landslide and slope stability evaluations; bearing capacity and settlement; dewatering and excavation in an active stream channels; design and construction of foundations on alluvial soils; foundation inspection and assessment; erosion protection design; levee and stream bank protection including soil cement, grouted riprap and stone protection, sheet piling, and retaining wall design; drilling and blasting; preparing plans and specifications for USACE projects, and knowledge of USACE design and construction procedures and policies. 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 and alluvial soils.

Hydrology and Hydraulic Engineering. Panel member shall be a registered professional engineer from an Architect-Engineer or consulting firm, a public agency, or academia with 15 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 MS 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 including the design of hydraulic structures such as outlet works, flood control channels and levees, diversion channel design, and flashy streams features. 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. In regard to hydrologic analysis, the H&H panel member must possess a thorough understanding of the dynamics of open channel flow systems, floodplain hydraulics, and interior flood control systems. 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, and HEC-RAS) used in hydrologic modeling and analysis for flood studies. 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. The H&H panel member shall have experience in evaluating risk reduction measures for flood damage reduction projects.

Structural Engineering. Panel member shall be a registered professional civil engineer from an Architect-Engineer or consulting firm, a public agency, or academia with 15 or more years of demonstrated experience, with a minimum MS degree or higher in engineering. Active participation in related profession 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 drainage and closure structures. The Structural panel member should be a recognized expert in stability analysis and structural design and construction. 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 levee safety assurance policy and guidance. The Structural panel member shall have experience in evaluating risk reduction measures for flood risk management projects.

#### **5.4 Documentation of Type II IEPR**

The Type II IEPR will be managed by an A/E firm which meets the criteria set forth in EC 1165-2-214. DrChecks 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.

Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. Type II IEPR comments should generally include the same four key parts as described for ATR comments in Section 4. An 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 will:

- 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.

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). The Review Report will be provided to the RMO and MSC with USACE responses and all other materials related to the review.

#### **6. NON-FEDERAL SPONSOR REVIEW**

In accordance with the Project Partnership Agreement (PPA) with the non-Federal sponsors, the non-Federal sponsors are given the opportunity to review and comment on the design documentation report, plans, specifications, and OMRR&R roles and responsibilities at all major milestones. Comments will be completed in Dr.Checks. The technical lead will compile all comments and responses and include them with the BCOES Certification review.

## **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, ATR, and IEPR augment and complement the policy review processes by addressing compliance with pertinent published Army policies.

## **8. REVIEW SCHEDULE AND COSTS**

### **8.1 Schedule of Reviews**

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 plan is to complete the entire design effort by the end of FY17. This will include completion of the design DQC, ATR, and IEPR processes. Upon completion of the design effort, the second construction contract will be generated from the completed design. The second construction contract is dependent upon available funding in FY17. Each construction contract will include a new contractual front end and will be routed through DQC and ATR for BCOES certification. Final construction contracts will not IEPR unless significant changes occur that would require additional review support. NWK is responsible for communicating these changes internally and vertically to determine if additional reviews are warranted.

The Project included a recent Engineering Documentation Report (EDR) that is considered a 35% design effort. The EDR was reviewed by an ATR team from the St. Paul District (MVP), underwent DQC, and was approved by the NWK District Engineer and endorsed by the MSC. The EDR is the basis for the final, overall design effort.

DQC, ATR, and a non-Federal sponsor review will occur at the 65% submittal, draft 95% submittal. All previous comments will be backchecked with the final 95% submittal. Note that the design effort will not be considered 100% until the contractual front ends are included and the final plans and specifications are generated. Upon completion of each construction package, one final DQC and ATR will be completed prior to BCOES certification.

Type II IEPRs will be conducted on all aspects of the project – the overall design effort and each construction package. Each construction package will be compiled as construction funding is made available for the subsequent construction package. The design effort will be reviewed prior to the generation of the first construction package.

### **8.2 Reviews Cost**

The estimated cost for the ATR is approximately \$250,000. The estimated cost for the IEPR Type II is approximately \$300,000 – 400,000.

## 9. PUBLIC PARTICIPATION OF REVIEW PLAN

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/CivilWorksProgramsandProjects/CivilWorksReviewPlans.aspx>). The public will have 15 days to provide comments on the documents; after all comments have been submitted, the 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 NWD. The MSC Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving NWK, NWD, and the 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, NWK is responsible for keeping the Review Plan up to date and communicate changes vertically. Changes to the Review Plan 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) will 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 and linked to the HQUSACE webpage. The latest Review Plan should also be provided to the RMO and NWD.

## 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.

## 12. REVIEW PLAN POINTS OF CONTACT

NAME	TITLE	ORGANIZATION	EMAIL/PHONE
Scott Mensing, P.E.	Project Manager	CENWK-PM-CJ	scott.p.mensing@usace.army.mil (816) 389-2321

### 13. ATTACHMENT 1: COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for MRLS R471-460 and L-455. 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<sup>sm</sup>.

_____ Name ATR Team Leader Office Symbol/Company	_____ Date
_____ Name Project Manager Office Symbol	_____ Date
_____ Nathan Snorteland Director CEIWR-RMC	_____ 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.

_____ Name Chief, Engineering Division Office Symbol	_____ Date
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15. ATTACHMENT 4: REVIEW PLAN REVISIONS

<b>Revision Date</b>	<b>Description of Change</b>	<b>Page / Paragraph Number</b>