

REVIEW PLAN
for
Indianapolis, White River (North), Indiana
Flood Damage Reduction Project
Phase 3B Construction Contract
Design and Construction Activities
Louisville District

October 2010



US Army Corps
of Engineers ®

REVIEW PLAN

*Indianapolis, White River (North), Indiana
Design and Construction Activities*

TABLE OF CONTENTS

1. PURPOSE AND REQUIREMENTS 1

2. PROJECT INFORMATION 2

3. AGENCY TECHNICAL REVIEW (ATR) 5

4. INDEPENDENT EXTERNAL PEER REVIEW (IEPR) 6

5. MODEL CERTIFICATION AND APPROVAL 7

6. REVIEW SCHEDULES AND COSTS 8

7. PUBLIC PARTICIPATION 9

8. PCX COORDINATION 9

9. MSC APPROVAL 9

10. REVIEW PLAN POINTS OF CONTACT 9

ATTACHMENT 1: TEAM ROSTERS 10

ATTACHMENT 2: ATR CERTIFICATION TEMPLATE 12

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1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan (RP) defines the scope and level of peer review for the design and construction activities of the Indianapolis, White River (North), IN Flood Damage Reduction Project.

b. References

- (1) Engineer Circular (EC) 1165-2-209, Civil Works Review Policy, 31 January 2010
- (2) Engineer Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006
- (3) Indianapolis, White River (North), IN Flood Damage Reduction Project, Project Management Plan

c. **Requirements.** This RP was developed in accordance with EC 1165-2-209, 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). It provides the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision, implementation, and operations and maintenance documents and work products. The EC outlines three levels of review: District Quality Control, Agency Technical Review, and Independent External Peer Review.

- (1) District Quality Control (DQC). DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc. It is managed in the home district. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they should not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Additionally, the PDT is responsible to ensure consistency and effective coordination across all project disciplines during project design and construction management. The Major Subordinate Command (MSC)/District Quality Management Plans address the conduct and documentation of this fundamental level of review. DQC is not addressed further in this review plan.
- (2) Agency Technical Review (ATR). ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assure that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel, preferably recognized subject matter experts with the appropriate technical expertise such as regional technical specialists (RTS), and may be supplemented by outside experts as appropriate.
- (3) Independent External Peer Review (IEPR). 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. For clarity, IEPR is divided into two types, Type I is generally for decision documents and Type II is generally for implementation documents.

A Type II IEPR (SAR) shall be conducted on design and construction activities for hurricane and storm risk management and flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life. This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities. External panels will review the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. The review shall be on a regular schedule sufficient to inform the Chief of Engineers of the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring good science, sound engineering, and public health, safety, and welfare.

2. PROJECT INFORMATION

- a. Project.** Indianapolis, White River (North) is a flood risk management project in northern Indianapolis, Indiana. The project authorization is the Flood Control Act (FCA) of 1936, as amended, Section 10 of FCA 1946, and subject to cost sharing provisions of the Water Resources Development Act of 1986. A General Revaluation Report (GRR), the project's Decision Document, was completed in September 1996 and included a recommended plan for construction of approximately 3 ½ miles of floodwall and earthen levee along the east bank of the White River. When completed, the project will protect over 1000 residential and 200 commercial structures from inundation by an annual 1 percent chance flood event (100-year flood). Due to funding constraints, the Louisville District divided the project alignment into three sections that are generally based upon geographical neighborhoods. However, all three sections of the alignment must be completed to achieve the project benefits within the designated areas of protection. Construction of the northern two sections, in the Broad Ripple and Warfleigh neighborhoods of Indianapolis, are now substantially completed. Louisville District's in-house design personnel recently completed draft plans and specifications for construction of the final Phase 3B section of floodwall and earthen levee within the South Warfleigh and Butler-Tarkington neighborhoods. As indicated below, the Phase 3B plans and specifications will undergo both an Agency Technical Review (ATR) and external Safety Assurance Review (SAR) prior to completion of the final contract solicitation documents. The Louisville District prepared an Environmental Impact Statement (EIS) for the project during preparation of the GRR. A Record of Decision was signed by the District Commander on September 8, 1997. During design of the project features, the PDT discovered geotechnical problems with construction of the floodwall along a downstream section of the alignment indentified in the recommended plan of the GRR. The District employed Lewis & Zimmerman Associates, Inc. to conduct a Value Engineering (VE) Study of the Phase 3B section in June 2009. As part of the study, the VE team considered various alternative alignments to avoid the section of poor foundation materials. Based upon the VE Study, the PDT established a new downstream alignment that did not change the properties protected by the floodwall and earthen levee. As a result, there is no need for Corps of Engineers to update its plan formulation of the project benefits. However, the Louisville District will soon circulate an Environmental Assessment of changes to the project for Agency and public review.
- b. General Site Location and Description.** The Indianapolis, White River (North) Flood Damage Reduction Project is located within the Consolidated City of Indianapolis, Marion County, Indiana. The entire project consists of construction of approximately 20,000 linear feet of floodwall and earthen levee, along the east bank of the White River, in the northern Indianapolis communities of Broad Ripple, Warfleigh and Butler-Tarkington. See the map below. This RP defines the scope of work for review of design and construction activities on Phase 3B of the project. The Phase 3B section will extend from Kessler Boulevard southward to high ground on Butler University property. The floodwall will cross the Indianapolis Department of Water Works Canal on a gated-structure that will be closed during significant flood events. The Phase 3B section will involve construction of

3,602 feet of earthen levee, 4,217 feet of steel sheet pile I-wall, with concrete facing, gated-structure across Indianapolis Department of Water Works canal, four gatewell structures, four small submersible pump stations, and other miscellaneous features. The canal gated-structure will contain four sluice-type gates that are each 5 feet high by 9 feet wide. The sluice gates will be operated with a portable actuator and, except for maintenance and testing, remain in full open position during normal flows. As indicated, the project includes standard design features such as earthen levees and steel sheet pile I-walls. The Indianapolis Department of Water Works canal gated-structure is a somewhat unique construction for a flood risk management project. However, the Louisville District obtained several geotechnical borings, adjacent to and within the canal, to accurately determine subsurface conditions. In addition, Indianapolis Department of Water, the agency that operates and maintains the canal, provided hydrologic and hydraulics information to properly size the gate openings of the structure. The earthen levee, gated-canal structure and I-wall sections will adjoin together to form a continuous floodwall/levee system. The PDT designed interfaces between the various sections with sufficient redundancy, resilience and robustness in accordance with current design standards.

- c. Factors Affecting the Scope and Level of Review.** The Phase 3B design and construction activities involve life safety risks, investment in public monies, ground disturbance, permit requirements and other actions which indicates the draft plans and specifications should undergo an ATR. The Indianapolis, White River (North) Project is also a flood risk management project which requires a Type II – IEPR Safety Assurance Review in accordance with paragraph 12 of EC 1165-2-209.
- d. In-Kind Contributions.** The Non Federal Cost Share Sponsor for this project is the Consolidated City of Indianapolis, Marion County, Indiana. There are no in-kind services anticipated as part of the cost share.

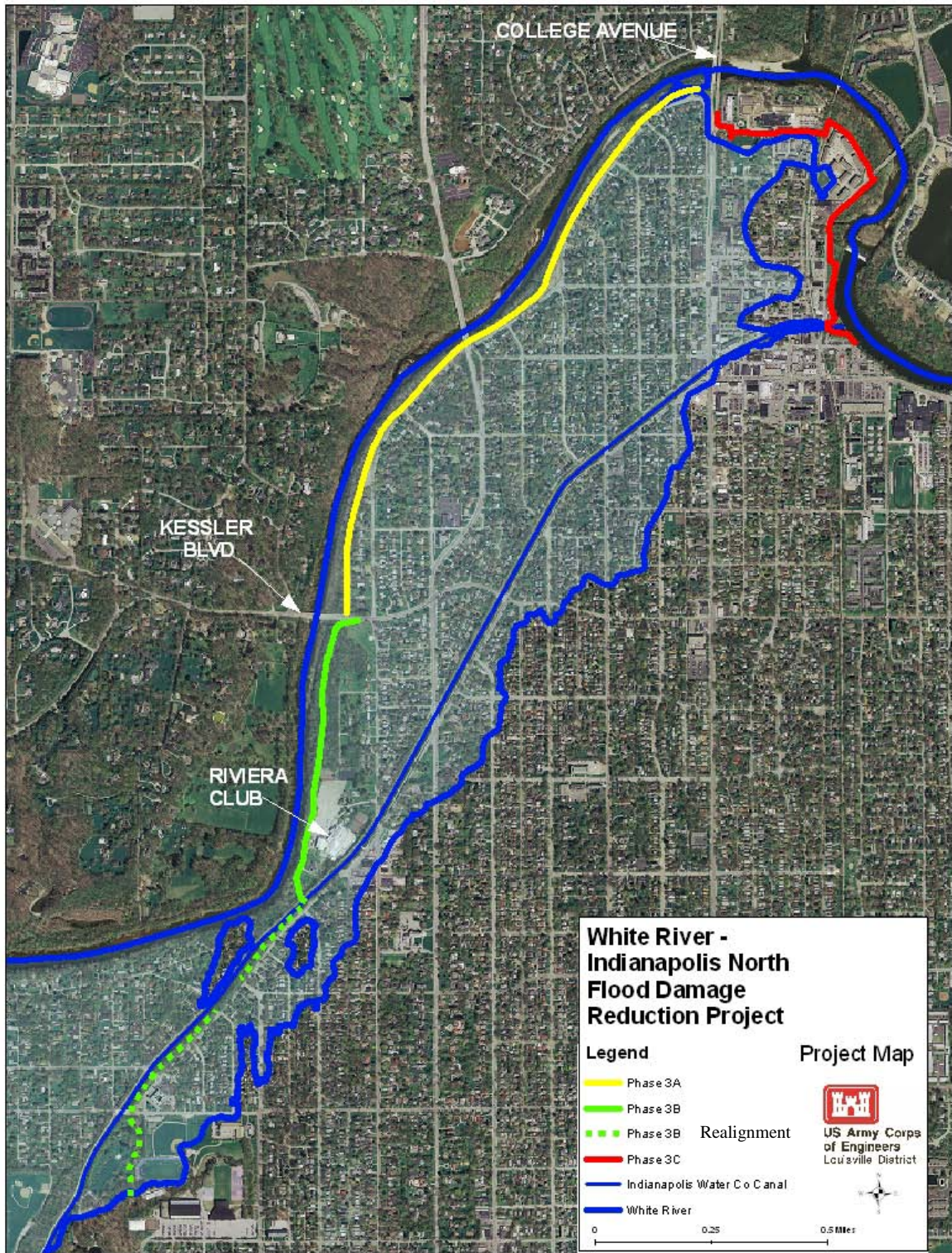


Figure 1

3. AGENCY TECHNICAL REVIEW (ATR)

- a. **General.** ATR will be managed and performed outside of the Louisville District. EC 1165-2-209 requires the MSC to serve as the RMO for flood risk management projects. There shall be appropriate coordination and processing through CoPs, applicable PCXs, and other relevant offices to ensure that a review team with appropriate independence and expertise is assembled and a cohesive and comprehensive review is accomplished. The ATR shall ensure that the product is consistent with established criteria, guidance, procedures, and policy. Prior to solicitation, District Counsel will review the documents for legal sufficiency. The ATR will assess whether the analyses and design documents are technically correct and comply with published USACE guidance. Members of the ATR team will be from outside the Louisville District. The ATR lead will be from outside the Great Lakes & Ohio River Division.
- b. **Products for Review.** The ATR team will be review the plans and specifications for the Phase 3B section of the Indianapolis, White River (North), Indiana Flood Damage Reduction Project.
- c. **Required ATR Team Expertise.** ATR teams will comprise Regional Technical Specialists and other senior level personnel with significant experience in design and construction of earthen levees, floodwalls and associated flood risk management features. The disciplines represented on the ATR team will reflect the significant disciplines involved in the engineering, design, and construction efforts. These disciplines include civil, geotechnical, structural, mechanical, electrical, hydraulics and hydrology, and cost engineering. To assure independence, an employee of the Kansas City District, USACE will serve as ATR team leader. A list of the ATR members and disciplines is provided in ATTACHMENT 1. The chief criterion for being a member of the ATR team is knowledge of the technical discipline and relevant experience.
- d. **Documentation of ATR.** DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should 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, ASA (CW)/USACE 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 must take to resolve the concern.

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 will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical coordination, and lastly the agreed upon resolution. The ATR team will prepare a Review Report which includes a summary of unresolved issues that will be raised to the vertical team for resolution. Review Reports will be considered an integral part of the ATR documentation.

ATR may be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. See ATTACHMENT 2 for template of the ATR certification.

4. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

- a. General.** WRDA 2007, Section 2035, Safety Assurance Review, requires a review of the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. This review will be on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety and welfare. Since sections of the Indianapolis, White River (North) Project were designed and constructed prior to implementation of EC 1165-2-209, a SAR will be conducted for design and construction of only the Phase 3B section. The SAR will provide verification that the Louisville District's PDT applied good science and sound engineering in design of the Phase 3B. SAR team members will also review the redundancy, robustness, and resiliency of the design and assure that design requirements, standards and assumptions are implemented throughout construction activities. The project features were designed in accordance with current Corps of Engineers' design standards, including new draft I-wall requirements. The PDT assumes it will provide a safe, long-term project by maintaining close adherence to those standards during both design and construction of the project features. As further safety measures, the local sponsor is required to perform inspections of the project, including continuous inspections during flood events. The Louisville District's Chief of Engineering Division, as the Engineer-In-Responsible-Charge, is responsible for ensuring the Type II review is conducted in accordance with EC 1165-2-209, and will fully coordinate the design and construction phases of the Phase 3B section with the Chief of Construction Division and the Project Manager.
- b. Decision on Type I IEPR.** A Type I IEPR will not be performed on the Phase 3B plans and specifications since the project's decision document was completed in September 1996 and the total project cost is under \$45,000,000. In addition, there were no requests by the Governor of Indiana and heads of Federal or state agencies to conduct a Type I IEPR, nor are there significant public issues or complex design methods that warrant review.
- c. Decision on Type II IEPR.** In accordance with EC 1165-2-209 a Type II IEPR (SAR) shall be conducted on design and construction activities for flood risk management projects. This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities.
- d. Products for Review.** A SAR will be performed on the design analyses and plans and specifications for construction of the Phase 3B section of the Indianapolis, White River (North) Flood Damage Reduction Project. The SAR team will also make site visits to the project near the midpoint of construction and prior to final inspection as reviews to ensure implementation of design requirements, standards and assumptions.
- e. IEPR Expert Reviewers.** Type II IEPR Expert Reviewers will be established in consultation with the MSC. The Louisville District will award a Delivery Order to an Architect-Engineer firm designated to conduct a SAR. Prior to award, the Contracting Officer shall verify the contractor has no potential conflicts with review of the Phase 3B design analyses and plans and specifications. Expert Reviewers will be selected based on their technical qualifications and experience. The Expert Reviewers should be independent of USACE and free of conflicts of interests. The Expert Reviewers will be able to evaluate whether the interpretation of analysis and conclusions based on analysis are reasonable. The Expert Reviewers will be given the flexibility to bring important issues to the attention of decision makers. However, the Expert Reviewers will be instructed to not make a

recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study. The Expert Reviewers may, however, offer their opinion as to whether there are sufficient analyses upon which to base a recommendation. The Expert reviewers will have experience in design and construction of projects similar in scope to the Indianapolis, White River (North), IN Flood Damage Reduction Project. Expert reviewers shall be registered professional engineers in the United States, or similarly credentialed in their home country. The expert reviewers must also have an engineering degree. A Master's degree in engineering is preferable, but not required, as hands-on relevant engineering experience in the listed disciplines is more important. Expert reviewers shall have a minimum of 15 years experience and responsible charge of engineering work. See ATTACHMENT 1 for the required experience in the required disciplines.

- e. **Documentation of IEPR.** Dr Checks review software will be used to document IEPR comments and aid in the preparation of Review Reports. Comments should address the adequacy and acceptability of the design analyses, engineering methods, and models used in design of the Phase 3B plans and specifications. IEPR comments should generally include the same four key parts as described for ATR comments in Section 3. A panel of experts provided by the SAR Contractor will be responsible for compiling and entering comments into DrChecks. The panel will also prepare Review Reports on design and construction activities of the Phase 3B section. Upon conclusion of each scheduled milestone, the panel lead will provide the Louisville District with a Review Report that fully describes any design or construction deviations. Those reports will accompany the panel's publication of the final report for the project. Each Review Report 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.

The final report shall include an introduction, composition of the review team, summary of the review during design, summary of the review during construction, any lessons learned in the process and/or design and construction, and appendices for conflict of disclosure forms and supporting analyses and assessments of the adequacy and acceptability of the methods, models, and analyses used.

5. MODEL CERTIFICATION AND APPROVAL

- a. **General.** The computational models to be employed in design of the Phase 3B section of the Indianapolis, White River (North) Project have either been developed by or for the USACE.

- b. **Models.** The models to be employed in the completion of this project are:

- MCACES 2nd Generation (MII) Version 3.01: Developed by Project Time and Cost, Inc. (PT&C), MII is a detailed cost estimating application used by the USACE and its A-E contractors for military, civil works and hazardous, toxic and radioactive waste (HTRW) projects. MII was first released in June 2003 and replaced the MCACES and MCACES for Windows programs.
- P2 Release 2.6 deployed November 12, 2009.
- HEC-FDA Version 1.2.4: This model, developed by the Corps' Hydrological Engineering Center (HEC), will assist the PDT in applying risk analysis methods of flood risk management studies as required by EM 1110-2-1419. This program:

- Provides a repository for both economic and hydrologic data required for the analysis
- Provides the tools needed to understand the results
- Calculates the expected damages per storm event
- Implements the risk-based analysis procedures contained in EM 1110-2-1619
- HEC-RAS Version 4.0 : The function of this model is to complete one-dimensional hydraulic calculations for a full network of natural and manmade channels. HEC-RAS major capabilities are:
 - Hydraulic analysis of a channel network
 - Calculation of Water Surface Elevations for full range of flood frequencies
 - Provides data files for input into the HEC-FDA program used in the economic analysis
- HEC-HMS, Version 3.2: By applying this model the PDT is able to:
 - Analyze a drainage basin
 - Calculate discharges to gravity outlets through the levee/floodwall
 - Perform storage routings at the line of protection to determine adequate culvert sizes
 - Evaluate pumping requirements
 - Determines the interior elevation at the line of protection for both the full range of frequencies and historical events
- Culvert Master by Bentley
 - Calculates discharge capacities of pipes based on the pipe size, slope, tailwater conditions, and allowable headwater elevation
- CWALSHT CASE Computer program X0031 Version 9 November, 2007 Calculates shear, moment and deflection values of sheet pile walls under various loading conditions to determine proper embedment lengths and section properties.
- SEEP/W and SLOPE/W – GeoStudio 2007 (Version 7.13, Build 4419) Copyright 1991-2008GEO-SLOPE International, Ltd.
 - SEEP/W Finite Element Software which calculates subsurface hydraulic gradients to determine necessity of toe drain system on landside of levee or wall system.
 - SLOPE/W Finite Element Software which calculates factors of safety against slope failure for undrained, drained, and rapid drawdown conditions of levees or riverbanks.
- ITT Flyps v3.1: Using this software to select the basis of design pump size requirement for each pump stations.

6. REVIEW SCHEDULES AND COSTS

- a. **ATR Schedule and Cost.** The estimated cost for ATR is \$40,000. ATR will occur at completion of the draft plans and specifications for the Phase 3B section of the project. The review is scheduled to begin on November 29, 2010 and be completed by January 14, 2011, including resolution of comments.
- b. **IEPR Schedule and Cost.** The estimated cost for Type II IEPR (SAR) ranges between \$25,000 and \$50,000. The SAR of the draft plans and specifications is currently scheduled to begin on February 14, 2011 and end on April 15, 2011. The initial SAR activities will be performed after completion of the ATR. The SAR team will also make site visits to the project near the midpoint of construction and prior to final inspection of the contract work. Following each site visit, the team will provide the Louisville District with a Review Report that fully describes any deviations to the design requirements, standards and assumptions during construction of the project features.
- c. **Model Certification/Approval Schedule and Cost.** Not Applicable

7. PUBLIC PARTICIPATION

During preparation of the GRR, the Louisville District held numerous project scoping meetings with the public between March 1993 and April 1996. The draft GRR and draft EIS were circulated for Agency and public review in July and August of 1996. Since execution of the Project Cooperation Agreement between the Department of the Army and Consolidated City of Indianapolis, Marion County, Indiana on December 6, 2000, Louisville District and City of Indianapolis personnel held Public Meetings in March 2000, June 2002, January 2003 and March 2006 to inform businesses and local residents about the project design and upcoming construction activities. In addition, Corps and City personnel held other meetings with businesses regarding design of project features and coordination with construction contractors. Prior to solicitation of the contract work, Corps and City will also hold another public meeting to inform business owners and resident about the upcoming Phase 3B construction activities.

8. PCX COORDINATION

This review plan will be coordinated with the MSC and the Flood Risk Management PCX.

9. MSC APPROVAL

The Great Lakes and Ohio River Division is responsible for approving the review plan. Approval is provided by the MSC Commander. The commander's approval should reflect vertical team input (involving district, MSC, PCX, and HQUSACE members) as to the appropriate scope and level of review for the project. Like the PMP, the review plan is a living document and may change as the study progresses. Changes to the review plan should be approved by following the process used for initially approving the plan. In all cases the MSCs will review the decision on the level of review and any changes made in updates to the project.

10. REVIEW PLAN POINTS OF CONTACT

Questions and/or comments on this review plan can be directed to the following points of contact:

- Louisville District Project Manager
- Louisville District Project Engineer
- Great Lakes and Ohio River Division
- Risk Management Center

ATTACHMENT 1: TEAM ROSTERS

TABLE 1: Product Delivery Team		
Functional Area	Name	Office
Project Manager		CELRL-PM-C
Project Engineer/Civil Design		CELRL-ED-T-C
Real Estate		CELRL-RE-C
Contracting		CELRL-CT-C
Public Affairs		CELRL-PA
Economics		CELRL-PM-P
Cost Engineering		CELRL-ED-C
Hydrology and Hydraulics		CELRL-ED-T-H
Architectural		CELRL-ED-D-A
Structural		CELRL-ED-D-S
Geotechnical		CELRL-ED-T-G
Mechanical Engineer		CELRL-ED-D-M
Electrical Engineer		CELRL-ED-D-M
HTRW		CELRL-ED-E-E
Engineering Management		CELRL-ED-M-A
Construction		CELRL-CD-K-M-I
Archeology		CELRL-PM-P
Environmental		CELRL-PM-P

TABLE 2: District Quality Control Team		
NAME	DISCIPLINE	OFFICE
	Civil Design	CELRL-ED-T-C
	Cost Engineering	CELRL-ED-C
	Hydrology and Hydraulics	CELRL-ED-T-H
	Geotechnical	CELRL-ED-T-G
	Architectural	CELRL-ED-D-A
	Structural	CELRL-ED-D-S
	Mechanical	CELRL-ED-D-M
	Electrical	CELRL-ED-M-A
	Environmental	CELRL-ED-E-E

NAME	DISCIPLINE	OFFICE
	Team Leader	CENWK-ED-DT
	Civil Design	TBD
	Cost Engineering	TBD
	Hydrology and Hydraulics	TBD
	Geotechnical	TBD
	Structural	TBD
	Mechanical	TBD
	Electrical	TBD

NAME	DISCIPLINE	EXPERIENCE
TBD	Geotechnical Engineer	Recognized expert in the field of geotechnical engineering analysis, design and construction of levees on alluvial foundations with extensive experience in subsurface investigations in urban settings, soil mechanics, retaining wall design, seepage and slope stability evaluations, erosion protection design and construction, and earthwork construction. The Geotechnical Engineer shall be a licensed professional engineer.
TBD	Structural Engineer	Recognized expert in the field of structural engineering analysis, design, and construction of environmental and hydraulic structures. Working familiarity with ACI 350 and the pertinent Corps Engineering Manuals is required. Shall have a proven track record of design of structures used in flood damage reduction systems. The Structural Engineer shall be a licensed professional engineer.

Vertical Team

The Vertical Team consists of members of the HQUSACE and Great Lakes & Ohio River Division Offices. The Vertical Team plays a key role in facilitating execution of the project in accordance with the PMP. The Vertical Team is responsible for providing the PDT with Issue Resolution support and guidance as required. The Vertical Team will remain engaged seamlessly throughout the project via monthly teleconferences as required and will attend In Progress Reviews and other key decision briefings as required. The District Liaison, Adrienne K. Gordon, CELRD-PDR, is the District PM's primary Point of Contact on the Vertical Team.

ATTACHMENT 2: ATR CERTIFICATION TEMPLATE

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Phase 3B plans and specifications for the Indianapolis, White River (North), IN Flood Damage Reduction Project. Notice is hereby given that (1) a Quality Assurance review has been conducted as defined in the Quality Assurance Plan and (2) an agency technical review that is appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the project’s Quality Management Plan. During the agency technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the result, including whether the product meets the customer’s needs consistent with law and existing Corps policy. The review also assessed the DQC documentation and made the determination that the DQC activities employed appear to be appropriate and effective. The agency technical review was accomplished by a Louisville District independent review team. All comments resulting from QA and ATR have been resolved.

(Signature) _____
QA Review Team Leader

(Date) _____

(Signature) _____
Project Manager

(Date) _____

CERTIFICATION OF QUALITY ASSURANCE REVIEW AND AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:
(Describe the major technical concerns, possible impact, and resolution)

As noted above, all concerns resulting from agency technical review of the project have been fully resolved.

(Signature) _____
Chief, Engineering Division

(Date) _____

(Signature) _____
Chief, Construction Division

(Date) _____

DRAFT

Date

MEMORANDUM FOR: Commander, U.S. Army Corps of Engineers, Louisville
District ATTN: CELRL-PM-C, P. O. Box 59, Louisville, KY 40201-0059

SUBJECT: Review Plan Approval for Indianapolis, White River (North), IN Flood
Damage Reduction Project, Phase 3B Design and Construction

The attached Review Plan for design and construction of the Phase 3B section of the Indianapolis, White River (North), IN Flood Damage Reduction Project has been prepared in accordance with EC 1165-2-209.

The Review Plan has been coordinated with the District Liaison. For further information, please contact Director of the Risk Management Center. The Review Plan includes a safety assurance independent external peer review.

I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with design and construction execution procedures in the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

REQUIREMENT	REFERENCE	EVALUATION
h. Does it address if the project likely involves significant threat to human life (safety assurance)?	EC 1165-2-209 Appendix E, Para 1a	h. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
i. Does it adequately address redundancy, resilience, or robustness between structures, materials, members, and project phases?	EC 1165-2-209, Appendix E, Para 6f(2)	i. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
j. Does it contain project features and/or components that effectively work as a system?	EC 1165-2-209, Appendix E, Para 6f(3)	j. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
k. When non-Federal interest undertakes a Federal project design, does it require the use of NAS reviewers and encourage Outside Eligible Organization management when a non-Federal interest designs, implements, or alters a non-Federal project?	EC 1165-2-209, Para 13.	k. Yes <input type="checkbox"/> No <input type="checkbox"/> NA l. Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> m. Yes <input type="checkbox"/> No <input type="checkbox"/> n. Yes <input type="checkbox"/> No <input type="checkbox"/> o. Yes <input type="checkbox"/> No <input type="checkbox"/> Comments: Item l. Project has decision document
l. Does it contain a unique project authorized and appropriated or approved without a decision document? <i>If "No", go to Question v. If "Yes", continue to Question m.</i>	EC 1165-2-209, Appendix E, Para 6g	
m. Does it include the models used to assess hazards that are appropriate?	EC 1165-2-209, Appendix E, Para 6g(1)	
n. Does it state assumptions made for the hazards that are appropriate?	EC 1165-2-209, Appendix E, Para 6g(2)	
o. Does it provide the quality and quantity of surveys, investigations, and engineering for the design sufficient to support the models and assumptions made for determining the hazards?	EC 1165-2-209, Appendix E, Para 6g(3)	

REQUIREMENT	REFERENCE	EVALUATION
p. Does it include an analysis adequately addressing the uncertainty given the consequences associated with the potential for loss of life for this project type?	EC 1165-2-209, Appendix E, Para 6g(4)	p. Yes <input type="checkbox"/> No <input type="checkbox"/>
q. Does it address project features that adequately address redundancy, resilience, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?	EC 1165-2-209, Appendix E, Para 6g(5)	q. Yes <input type="checkbox"/> No <input type="checkbox"/>
r. Does it propose a reasonably appropriate alternatives to be considered?	EC 1165-2-209, Appendix E, Para 6g(6)	r. Yes <input type="checkbox"/> No <input type="checkbox"/>
s. Does it address a reasonably comprehensive environmental assessment?	EC 1165-2-209, Appendix E, Para 6g(7)	s. Yes <input type="checkbox"/> No <input type="checkbox"/>
t. Does it assess the recommended alternatives from the perspective of systems?	EC 1165-2-209, Appendix E, Para 6g(8)	t. Yes <input type="checkbox"/> No <input type="checkbox"/>
u. Does it include systematic aspects being considered from a temporal perspective, including the potential effects of climate change?	EC 1165-2-209, Appendix E, Para 6g(8)	u. Yes <input type="checkbox"/> No <input type="checkbox"/>
v. Does the RP assumptions remain valid through construction?	EC 1165-2-209, Appendix E, Para 6h(1)	v. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
w. Does it maintain the conditions assumed during design and validated during construction?	EC 1165-2-209, Appendix E, Para 6h(2)	w. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
x. Does it address project monitoring that will adequately reveal any deviations from assumptions made for performance?	EC 1165-2-209, Appendix E, Para 6h(2)	x. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
y. Does it involve innovative materials or techniques, a design requiring redundancy, resilience, robustness, or has unique construction sequencing?	EC 1165-2-209, Appendix E, Para 2a, 2b,& 2c.	y. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Comments:		

REQUIREMENT	REFERENCE	EVALUATION
z. Does it include documentation of risk-informed decisions on which levels of review are appropriate.	EC 1165-2-209, Appendix B, Para 4b	z. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
aa. Does it contain a summary of the CW implementation products required?	EC 1165-2-209 Para 7.a.	aa. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
bb. Does it address the following:		bb. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
i. Does it describe the scope of review for the phase of work (for example, Feasibility, PED, Construction, BCOE reviews, etc)?	EC 1165-2-209 Appendix B Para 4g	(i) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (ii) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (iii) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
ii. Does it list the review teams who will perform the DQC activities?	EC 1165-2-209 Appendix B Para 4c	cc. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> (i) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> (ii) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
iii. Does it provide a schedule showing when the DQC activities will be performed?	EC 1165-2-209, Para 15a	dd. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
cc. Does it assume an ATR is required and if an ATR is not required does it provide a risk based decision of why it is not required?		ee. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
If an ATR is required the RP will need to address the following questions:		Comments: Item cc.i. Since the District established an independent ATR team prior to publication of EC, it proposes to proceed with an in-house ATR.
i. Does it identify the ATR lead from outside the MSC?	EC 1165-2-209 Para 9c	
ii. Does it provide tasks and related resource, funding and schedule showing when the ATR activities will be performed?	EC 1165-2-209 Appendix C Para 3e	
dd. Does it reflect Corps vertical team input (involving district, MSC, RMO, and RIT members)?	EC 1165-2-209, Appendix B, Para 7a	
ee. Does it identify milestones to perform reviews and site visits?	EC 1165-2-209, Appendix E, Para 5	

REQUIREMENT	REFERENCE	EVALUATION
ff. Does it establish a milestone schedule aligned with critical features of the project design and construction?	EC 1165-2-209, Appendix E, Para 6c	ff. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
gg. Does it include periodic reviews of the design and construction activities?	EC 1165-2-209, Para 12(c)	gg. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
hh. Does it include an ATR ensuring the appropriate problems and opportunities have been address?	EC 1165-2-209, Appendix C, Para 3a	hh. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
ii. Does it include ATR timing, ATR team, ATR review criteria, ATR process, and ATR comments?	EC 1165-2-209, Appendix C, Para 3(d)-(g)	ii. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
jj. Does the RP address the requirement to document ATR comments using DrChecks?	EC 1165-2-209, Para 7.d.(1)	jj. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
kk. Does it include a Statement of Technical Review and Certification of ATR?	EC 1165-2-209, Appendix C, Para 3.j.(7)	kk. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
ll. Does it include a A-E Contractor Statement of Technical Review and certification of ATR?	EC 1165-2-209, Appendix C, Para 3.j.(7)	ll. Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
mm. Does it include a Policy Compliance and Legal Review?		mm. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
nn. Does it address coordination with the Cost Engineering Directory of Expertise (DX) located in Walla Walla District?	EC 1165-2-209, Para 9c.(1)(d).	nn. Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
oo. Does the RP present the tasks, timing and sequence (including deferrals), and costs of reviews?	EC 1165-2-209, Appendix B, Para 4c	oo. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
pp. Does it include the cost for the RMO to administer and manage the review and cost of the independent review?	EC 1165-2-209, Para 17.	pp. Yes <input type="checkbox"/> No <input type="checkbox"/>
rr. Does it include cost estimates for the peer reviews?	EC 1165-2-209, Appendix E, Para 6c	NA
		qq. Yes <input type="checkbox"/> No <input type="checkbox"/>
		rr. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
		<p>Comments: Item ll. ATR to be performed by Corps' personnel. Therefore, A-E certification statement not required.</p> <p>Item nn. District proposes review by in-house Subject Matter Expert during ATR.</p>

REQUIREMENT	REFERENCE	EVALUATION
<p>ss. Does the review plan establish a milestone schedule aligned with the critical features of the project design and construction?</p>	<p>EC 1165-2-209, Para 7.a.(2)(d)</p>	<p>ss. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
<p>tt. Does it provide an opportunity for public comment?</p>	<p>EC 1165-2-209, Appendix B, Para 4d</p>	<p>tt. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
<p>uu. Does it indicate how and when there will be opportunities for public comment on the decision document?</p>	<p>EC 1165-2-209, Appendix B, Para 4e</p>	<p>uu. Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p>
<p>vv. Does it indicate when significant and relevant public comments will be provided to reviewers before they conduct their review?</p>	<p>EC 1165-2-209, Appendix B, Para 4h</p>	<p>vv. Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p>
<p>ww. Does it address whether the public, including scientific or professional societies, will be asked to nominate potential external peer reviewers?</p>	<p>EC 1165-2-209, Appendix B, Para 4h</p>	<p>ww. Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p>
<p>xx. Does it list the names and disciplines of the Project Delivery Team (PDT)?*</p> <p><i>*Note: It is highly recommended to put all team member names and contact information in an appendix for easy updating as team members change or the RP is updated.</i></p>	<p>EC 1165-2-209, Appendix B, Para 4h</p>	<p>xx. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>yy. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>zz. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>aaa. (i) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Comments:</p>
<p>yy. Does it use DrChecks to document all ATR comments, responses and associated resolutions accomplished throughout the review process?</p>	<p>EC1165-2-209, Para 7d(1)</p>	
<p>zz. Does it list the District Chief of Engineers as responsible for this review and coordinate with the Chief of Construction, Chief of Operations, and the project manager?</p>	<p>EC 1165-2-209, Appendix E, Para 1b</p>	
<p>aaa. Does it assume a Type II IEPR is required?</p>	<p>EC 1165-2-209, Para 12a</p>	

REQUIREMENT	REFERENCE	EVALUATION
<p>bbb. If a Type II IEPR is required the RP will need to address the following questions:</p> <p>i. <i>Does it state that for a Type II IEPR, it will be contracted with an A/E contractor?</i></p> <p>ii. Does it state for a Type II IEPR, that 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?</p> <p>ccc. If a Type II IEPR is not required does it provide a risk based decision of why it is not required?</p> <p>ddd. Does it establish the RMO as the responsible agent for ensuring IEPR panels are established in accordance with EC 1165-2-209?</p> <p>eee. Does it provide a succinct description of the primary disciplines and competencies or expertise needed, as defined by the RMO, for each panel member (not simply a list of disciplines)?</p> <p>fff. For review teams led by and composed of other government employees, does it indicate that panel compositions consisting of one person are appropriate, competent, and qualified reviewers?</p> <p>ggg. For review teams led by and composed of contractors, does it indicate that USACE personnel established the IEPR panel?</p> <p><i>If "Yes", local counsel should be consulted.</i></p>	<p>EC 1165-2-209 Appendix B Para 4k (4)</p> <p>EC 1165-2-209 Para 10 & Appendix B, Para 4k(4)</p> <p>EC 1165-2-209, Para 15a & Para 7</p> <p>EC 1165-2-209, Appendix E, Para 7a(1)</p> <p>EC 1165-2-209, Appendix E, Para 7a(2)</p> <p>EC 1165-2-209, Appendix E, Para 7b(2)</p> <p>EC 1165-2-209, Appendix E, Para 7c(1)</p>	<p>(i) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>(ii) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>ccc. Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p> <p>ddd. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>eee. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>fff. Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p> <p>ggg. Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p> <p>Comments: Item ggg. The A-E service contractor will select the panel based upon discipline and experience criteria provided by the Corps.</p>

REQUIREMENT	REFERENCE	EVALUATION
<p>hhh. Does it indicate that contracting officers are aware of potential conflicts when the review team is led by and composed of contractors?</p> <p>iii. If the reviewers are listed by name, does the RP describe the qualifications and years of relevant experience of the ATR team members?</p> <p>JJJ. Has the approval memorandum been prepared and does it accompany the RP?</p>	<p>EC 1165-2-209, Appendix E, Para 7c(2)</p> <p>EC 1165-2-209, Appendix B, Para 7</p>	<p>hhh. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>iii. Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p> <p>jjj. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Comments:</p>

Appendix A – CW Products and Type of Reviews

There are few absolutes in terms of review and those tend towards higher levels of review rather than lower. All Civil Works products shall get district quality control. All decision and implementation documents shall undergo Agency Technical Review. The law states when peer review is mandatory. Beyond this, the EC requires a risk informed decision be made on each individual study/project to determine the appropriate level of review. This determination will first be made as part of the review plan, which is part of the PMP. But the determination may change based upon changes the product undergoes during its development.

CW Planning Products	Required Review	LRD Requirement
Reconnaissance Report	DQC	
Feasibility Study	DQC, ATR, IEPR Type I	
General Reevaluation Report	DQC, ATR, IEPR Type I	
Limited Reevaluation Report	DQC, ATR, IEPR Type I	
Continuing Authorities Project	DQC, ATR, IEPR Type I	
Major Rehab Report (Hydropower, Navigation)	DQC, ATR, IEPR Type I	
Dredge Material Management Plan	DQC, ATR	
Shoreline Management Plan (w/EIS)	DQC, ATR	
Shoreline Management Plan (w/o EIS)	DQC	
Master Plan (w/EIS)	DQC, ATR	
Master Plan Update (w/o EIS)	DQC	
Operational Management Plan	DQC	
Annual Work Plan	DQC	
Hydrology Certification	DQC, ATR	

CW Engineering Products	Required Review	LRD Requirement
Engineering Studies (EDR's, DDR's, etc)	DQC, ATR, SAR	
Cost Engineering Products	DQC, ATR* (risk based decision)	
Engineering Appendices for FS w/life safety	DQC, ATR, SAR	
Engineering Appendices for FS w/o life safety	DQC, ATR	
Operation and Maintenance Manuals w/life safety	DQC, ATR, SAR, Policy Review	
Operation and Maintenance Manuals w/o life safety	DQC, ATR	
Major Maintenance Reports	DQC, ATR	
PL 84-99 Project Information Reports	DQC, ATR* (risk based decision)	
PL 84-99 Rehab Plans and Specs	DQC, ATR, SAR* (risk based decision)	
Plan and Specs for Levee and Dam Projects	DQC, ATR, SAR	
Purchase Orders	DQC, ATR* (risk based decision)	
Field Investigations	DQC, ATR* (risk based decision)	
Plan and Specs w/life safety	DQC, ATR, SAR	
Construction w/life safety	SAR (assumes DQC, ATR and IEPR were done in PED)	
Plans and Specs w/o life safety	DQC, ATR	
Issue Evaluation Studies	DQC, ATR	
Engineering Investigations	DQC, ATR	

Operations Engineering Products	Required Review	LRD Requirement
Operation and Maintenance Manuals w/o life safety**	DQC, ATR	
Major Maintenance Reports	DQC, ATR	
Plan and Specs for Levee or Dam Projects	DQC, ATR, SAR	
Purchase Orders	DQC, ATR* (risk based decision)	
Field Investigations	DQC, ATR*(risk based decision)	
Construction w/o life safety		
Plan and Specs w/o life safety	DQC, ATR	
Engineering Investigations	DQC, ATR	
Routine Maintenance/Replacement-in-kind	DQC***	

* These lists are included as general information. They are neither comprehensive nor absolute.

** Routine maintenance work typically does not require any DQC because the DQC occurs during the development/update of the O&M manual.

*** Routine maintenance or Replacement–In-Kind that follows industry standards does not require DQC.