REVIEW PLAN

For

Plans and Specifications

For

Esplanade Repairs, Lock & Dam No. 1
Cape Fear River Above
Bladen County, North Carolina

Wilmington District

September 2011

APPROVED – 20 September 2011

US Army Corps
of Engineers ®

TABLE OF CONTENTS

1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of review activities for Esplanade Repairs at Lock & Dam No. 1 on the Cape Fear River, Bladen County, North Carolina. Lock & Dam No. 1 is the first in a series of three locks and dams on the Cape Fear River above Wilmington, North Carolina and provides an 8-foot navigation channel from Wilmington to Fayetteville, North Carolina. The esplanade, which is a concrete paved staging area next to the lock is settling. The settling of the esplanade pavement on the downstream end of the esplanade is severe with settlement measured to 15-inches. This work will replace the esplanade pavement and make repairs to the lock wall and wing wall to prevent seepage and loss of material through cracks and joints in the lock wall and wing wall. Review activities consist of District Quality Control (DQC) and Agency Technical Review (ATR). The Documents to be reviewed are Plans and Specifications and a Design Documentation Report (DDR).

b. References.

(1). ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999
(2). ER 1110-1-12, Engineering and Design Quality Management, 21 Jul 2006
(3). EC 1165-2-209, Civil Works Review Policy, 31 January 2010

c. Requirements. This review plan 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). The EC 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 the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). It is managed in the home district and may be conducted by staff in the home district as long as they are not doing the work involved in the study, or overseeing contracted work that is being reviewed. 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. Additionally, the PDT is responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before approval by the District Commander. The Major Subordinate Command (MSC)/District quality management plans address the conduct and documentation of this fundamental level of review.

(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 assures that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists (RTS), etc.), and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the parent MSC.

(3) Type II 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. In accordance with Section 2035 of Water Resources Development Act (WRDA) of 2007 and EC 1165-2-209, a Type II IEPR Safety Assurance Review 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 existing and potential hazards pose a significant threat

to human life prior to initiation of physical construction and periodically thereafter until construction activities are completed. IEPR should occur 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.

d. Review Management Organization (RMO). The South Atlantic Division (SAD) is designated as the RMO responsible for managing the review activities described in this Review Plan.

2. PROJECT INFORMATION AND BACKGROUND

Lock and Dam No. 1 is located on the Cape Fear River in Bladen County, NC about 39 miles upstream of Wilmington. The construction of the lock and dam was completed in 1915. Three locks and dams were built as part of the Cape Fear River above Wilmington, NC Federal project. The purpose of these locks and dams was to provide for commercial navigation between Wilmington and Fayetteville, NC.

Lock and Dam No. 1 is a rock filled timber crib structure with a 1-foot thick concrete cap. The dam crest is 275 feet long, and the base on the dam is about 50 feet wide. The upstream face of the dam is essentially vertical, but the downstream face has a slope of about 25% from the crest of the dam to the downstream pool surface. The lock chamber is 200 feet long by 40 feet wide. The dam crest is elevation +11.0 feet [NGVD 29(Mean Sea Level, MSL)]. The water level below the dam is 0.0 feet MSL at low water. There is about 2-foot lunar tide at the facility. Under low flow conditions, there is generally about 11 feet of head difference between the upstream and downstream water levels.

Lock and Dam No. 1 was elevated by three feet in 1933. The purpose for the increase in height was to improve the navigation channel depth between Lock and Dam No. 1 and Lock and Dam No. 2. The existing esplanade pavement at the time of the raise was left in place and covered with soil and a new 6-inch concrete pavement. The esplanade repairs will remove both concrete pavements.

The project was authorized by 2011 O&M funds.

a. Project Description-Lock and Dam No. 1 Esplanade Repairs. Repairs to the esplanade at Lock and Dam No. 1 will include: 1) demolition and removal of existing concrete pavements and concrete deadman anchors for the wing wall, 2) excavate soil to a depth of 23-feet along the land side of the lock wall and temporarily stockpile, 3) construct temporary shoring for the wing wall, 4) treatment of lock wall including grout injection of cracks and joints of the lock wall, waterproofing the excavated side of the lock wall, and installing a sheet drain to capture water that seeps through the wall and/or groundwater and direct it to a toe drain along the base of the wall 5) backfill and compact soil, 6) install a new anchor system for the wing walls, 7) resurface the esplanade with 6 inches of aggregate base course and 2 inches of asphalt pavement. Repairs also include relocation of a power pole, electrical lines and water lines that exist around the esplanade.

b. Project Background. The 2010 Periodic Inspection of Lock and Dam No. 1 noted the settling of the esplanade and recommended that the esplanade be replaced or repaired. The downstream portion of the esplanade has settled several inches in the last two decades. This settlement is likely a result of water seeping through the slab joints and thru/under the lock walls and the upstream abutment. During the inspection of the lock walls, water appears to be passing thru/under the right lock wall near where the severe settlement of the esplanade starts. It is also possible that water is passing thru/under other portions of the lock wall and the upstream abutment wall. A probe was used to check in several locations to determine if there is still fill

below the esplanade. In several locations the probe, which is 4 feet long, can be completely inserted below the concrete slab of the esplanade. These areas likely have large voids as the soil fill has seeped out from under the esplanade. In September of 2010, borings were performed in the esplanade. These borings showed almost no compaction underneath the slabs using Standard Penetration Test with uncorrected blow counts. In addition, the downstream lock wall exhibited water flowing through the large cracks. This water likely contains sediment from under the esplanade. In general, the concrete on the upstream and center portion of the esplanade appears to be in fair condition. There is some minor cracking and settlement for these areas.

3. DISTRICT QUALITY CONTROL

District Quality Control and Quality Assurance activities for implementation documents (DDRs and P&S) are stipulated in ER 1110-1-12, Engineering & Design Quality Management. The subject project DDR and P&S will prepared by the Wilmington District using the SAW procedures and will undergo DQC. DQC Certification will be verified by the Agency Technical Review Team.

4. AGENCY TECHNICAL REVIEW

a. Scope. Agency Technical Review (ATR) is undertaken to "ensure the quality and credibility of the government's scientific information" in accordance with EC 1165-2-209 and ER 1110-1-12. An ATR will be performed on the P&S and DDR intermediate and pre-final submittals.

ATR will be conducted by individuals and organizations that are external to the Wilmington District. The ATR Team Leader is a Corps of Engineers employee outside the South Atlantic Division. The required disciplines and experience are described below.

ATR comments are documented in the DrChecks^{sm} model review documentation database. DrChecks^{sm} is a module in the ProjNet^{sm} suite of tools developed and operated at ERDC-CERL (www.projnet.org).

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

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

b. ATR Disciplines. As stipulated ER 1110-1-12, ATR members will be sought from the following sources: regional technical specialists (RTS); appointed subject matter experts (SME) from other districts; senior level experts from other districts; Center of Expertise staff; experts from other USACE commands; contractors; academic or other technical experts; or a combination of the above. The ATR Team will be comprised of the following disciplines; knowledge, skills and abilities; and experience levels.

Geotechnical Engineering and Engineering Geology. The team member should be a registered professional with experience that encompass geologic and geotechnical analyses that are used to support the development of Plans and Specifications for navigation structures.

Civil/Structural Engineering. The team member should be a registered professional engineer with civil/site work project experience that includes maintenance of mass concrete navigation structures.

Cost Engineering. The Cost Engineering Expert should be a registered professional with a minimum 10 years demonstrated experience in the preparation of cost estimates, cost risk analyses and cost engineering. Team member should be familiar with similar projects across US.

ATR Team Leader. The ATR Team Leader should have experience with Navigation Projects and have performed ATR Team Leader duties. ATR Team Leader may be a co-duty to one of the review disciplines.

5. INDEPENDENT EXTERNAL PEER REVIEW

a. General. EC 1165-2-209 provides implementation guidance for both Sections 2034 and 2035 of the Water Resources Development Act (WRDA) of 2007 (Public Law (P.L.) 110-114). The EC addresses review procedures for both the Planning and the Design and Construction Phases (also referred to in USACE guidance as the Feasibility and the Pre-construction, Engineering and Design Phases). The EC defines Section 2035 Safety Assurance Review (SAR), Type II Independent External Peer Review (IEPR). The EC also requires Type II IEPR be managed and conducted outside the Corps of Engineers

b. Type I Independent External Peer Review (IEPR) Determination. A Type I IEPR is associated with decision documents. No decision documents are addressed/covered by this Review Plan. A Type I IEPR is not applicable to the implementation documents covered by this Review Plan.

c. Type II Independent External Peer Review (IEPR) Determination (Section 2035). This esplanade repair project does not trigger WRDA 2007 Section 2035 factors for Safety Assurance Review (termed Type II IEPR in EC 1165-2-209) and therefore, a review under Section 2035 is not required. The factors in determining whether a review of design and construction activities of a project is necessary as stated under Section 2035 along with this review plans applicability statement follow.

(1) The failure of the project would pose a significant threat to human life.

This project will include removal of existing concrete pavement, excavation on the land side of the lock wall, waterproofing the land side of the lock wall, installation of a geotextile sheet drain, backfilling, construction of anchor wall for wing wall, construction of new asphalt pavement and grout injection of cracks in the lock wall. Failure or loss of the esplanade will not pose a significant threat to human life. An IEPR was not required for the Fish Passage project at Lock and Dam No. 1. The Fish Passage project review plan was submitted to SAD in May 2010 and is currently under contract.

(2) The project involves the use of innovative materials or techniques.

This project will utilize methods and procedures previously used by the Corps of Engineers on other similar works.

(3) The project design lacks redundancy.

The esplanade repairs are in accordance with EM 1110-2-2504 Engineering and Design DESIGN OF SHEET PILE WALLS, EM 1110-2-2502 Engineering and Design RETAINING AND FLOOD WALLS and EM 1110-2-2602 Engineering and Design PLANNING AND DESIGN OF NAVIGATION LOCKS. The manuals do not address the concept of redundancy for esplanade design.

(4) The project has a unique construction sequencing or a reduced or overlapping design construction schedule.

This project's construction does not have unique sequencing or a reduced or overlapping design.

6. MODEL CERTIFICATION AND APPROVAL

This Esplanade Repairs Project does not use any engineering models that have not been approved for use by USACE.

7. BUDGET AND SCHEDULE

a. Project Milestones.

Completion of Pre-Final Submittal – 8 SEPTEMBER 11

District Quality Control – 9 SEPTEMBER 11

BCOE Review – 23 SEPTEMBER 11 to 6 OCTOBER 11

ATR Review – 23 SEPTEMBER 11 to 6 OCTOBER 11

Advertisement – 10 NOVEMBER 11

b. ATR Estimated Cost. The ATR will be conducted 12 SEPTEMBER 11 to 23 SEPTEMBER 11. It is envisioned that each reviewer will be afforded 24 hours review plus 4 hours for coordination. The estimated cost range is $10-15,000.