



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
SOUTH ATLANTIC DIVISION
60 FORSYTH STREET SW, ROOM 10M15
ATLANTA, GA 30303-8801

13 DEC 2012

CESAD-RBT

MEMORANDUM FOR COMMANDER, Wilmington District (CESAW-TS-E/
GREG L. WILLIAMS)

SUBJECT: Approval of Review Plan for District Prepared Plans and Specifications and Design Documentation Report for Switchgear Relocation, Phipott Powerhouse, Henry County, Virginia

1. References:

a. Memorandum, CESAW-TS-E 3 December 2012, Subject: Approval of Review Plan for Plans and Specifications and Design Documentation Report for Switchgear Relocation, Phipott Powerhouse, Henry County, Virginia (Enclosure).

b. EC 1165-2-209, Civil Works Review Policy, 31 January 2010.

2. The enclosed Review Plan for the Plans and Specifications for the Switchgear Relocation, Phipott Powerhouse Project has been reviewed by this office. As a result of this review, minor changes were coordinated with your staff. The enclosed Review Plan with the coordinated changes incorporated is hereby approved in accordance with references 1.b above.

3. We concur with the conclusion of the District Chief of Engineering that Type II Independent External Peer Review (Type II IEPR) is not required for this switchgear relocation project. The primary basis for our concurrence that a Type II IEPR is not required is that the failure or loss of the new switchgear building will not pose a significant threat to human life.

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

5. The SAD point of contact is Mr. James Truelove, CESAD-RBT, 404-562-5121.

Encl

DONALD E. JACKSON, JR.
COL, EN
Commanding



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

CESAW-TS-E

03 December 2012

MEMORANDUM FOR Commander, US Army Corps of Engineers, South Atlantic Division (CESAD-RBT), ATTN: Jim Truelove, CESAD-RBT, Rm 10M15, 60 Forsyth Street, SW, Atlanta, Georgia 30303-8801

SUBJECT: Approval of Review Plan for Plans and Specifications and Design Documentation Report for Switchgear Relocation, Philpott Powerhouse, Henry County, Virginia

1. References

a. EC 1165-2-209, Civil Works Review Policy, 31 Jan 2010

2. I hereby request approval of the enclosed Review Plan for the Plans and Specifications and Design Documentation Report for Switchgear Relocation, Philpott Powerhouse, Henry County, Virginia. The Review Plan complies with applicable policy and includes our DQC and ATR plans for this project.

3. The District will post the Corps of Engineers, South Atlantic Division (CESAD) approved Review Plan to its website and provide a link to the CESAD for its use. Names of Corps/Army employees are withheld from the posted version, in accordance with guidance.

Encl

STEVEN A. BAKER
Colonel, EN
Commanding

REVIEW PLAN

**Philpott Powerhouse
Henry County, Virginia**

**Switchgear Relocation
Plans and Specifications**

Wilmington District

November 2012

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



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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of review activities for Switchgear Relocation at Philpott Powerhouse, Henry County, Virginia. The design, plans and specifications for this project were prepared by the Hydroelectric Design Center (HDC) and the Wilmington District (SAW). SAW prepared design documentation, plans and specifications for the new building, retaining wall and site work. HDC prepared design report, plans and specifications for the electrical demolition and installation of new switchgear equipment. This review is for the documents that SAW prepared. 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, 31 March 2011
- (3). ER 1100-2-1156, Safety of Dams – Policy and Procedures, 31 August 2011
- (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

a. Project Description – Switchgear Relocation, Philpott Powerhouse. Plans and specifications for supply of:

- (1) supply of four 13.8KV Circuit Breakers
- (2) supply of 750 KV A station transformer, and associated Arc Flash proof cabinets

[Note: above work and review plans responsibility of HDC; below work by SAW]

- (3) design, plans and specifications and construction of new switchgear building to house the new switchgear. Plans and specifications for site preparation and construction of new concrete retaining wall, electrical ductbank, new building concrete foundation, new building.

The Switchgear Relocation at Philpott Powerhouse is funded with O&M funds and Southeastern Power LLC.

b. Project Background. The Philpott Project is located in Virginia on the Smith River, which is a tributary of the Roanoke River. The Powerhouse and Switchyard were constructed in the early 1950' s, and the power systems in the plant are essentially original. It is remotely operated from the J.H. Kerr Powerhouse Control Room but has on-site maintenance staff. The original design of the plant included utilizing the control room as the location of the station service switchgear. Over the life of the plant, new control and communication equipment has been added to the control room, and it has been utilized as general purpose crew office and meeting area. Industry experience in recent decades has led to improvements in safety standards, which illuminate a need to add safeguards in the control room for personnel safety.

The Philpott Station Service system is derived from the 13.8 kV Main Switchboard Bus. The Main Switchboard Bus includes four 13.8 kV circuit breakers, one generator circuit breaker for each of the two main units, one circuit breaker for the outgoing feeder to the Main Transformer, and one circuit breaker for the Station Service Transformer. This transformer feeds the 480 Volt Station Service Switchgear. A third generating unit, known as the Secondary Generator, provides power directly to the 480 Volt switchgear. Most of the raceway from the switchgear, all of which is located in the control room, leaves the top of the equipment and is routed above a suspended ceiling. The Main Transformer is supplied from the Main Switchgear by cables which are routed through a cable tunnel and a duct bank to the transformer. The space within the powerhouse is constrained, and there is no other large room suitable for the switchgear or control equipment.

(1) Concerns.

- i. **Reliability.** The equipment is original to the plant, and is nearing the end of its serviceable life. Most of the power equipment has a nominal service life of approximately 50 years. The exception to this is the station service transformer. Dry type power transformers typically have a service life of 30-50 years, and present testing technology is limited in being able to determine remaining life. Consequently, the station service transformer can be expected to fail without any advance warning,

and the likelihood of this increases over time. The switchgear also can be expected to have increasing maintenance and reliability concerns as it ages.

- ii. **Safety.** There are three major areas of concern for safety of this installation. The first relates to standards that have been developed since this plant was constructed in the 1950' s. Industry experience with accidents and failures has led to changes in the standards under which the equipment is constructed, as well as additional personnel safety standards. Paramount among these is the new arc flash mitigation standards. The second area of concern is the fact that there is medium voltage electrical power equipment in the same space as normal office related activity. This exposes staff to noise, vibration, and other effects of switchgear operation. The third area of concern is that the transformer, a likely source of problems, is in the same room as staff performing normal duties. Any transformer problem will likely result in a large volume of combustion products and there is no barrier between the office area and the transformer.
- iii. **Maintainability.** Electrical equipment requires regular maintenance. At present, whenever work is accomplished on the switchgear, the entire control room becomes a work area for that activity. Application of electrical work safety rules, which are continuing to increase in scope and scale, will dictate that all other activities be curtailed. Obviously, this impacts the other uses of this multi-purpose room.
- iv. The path forward and recommended scope of work consists of construction of a new switchgear building exterior to the powerhouse. The location of the site would be approximately 60 linear feet downstream of the main power transformer. Excavation of the hill side would be required for a suitable foundation and building. In addition to that a concrete retaining wall similar to the transformer contract wall would also be part of the site preparation. This would consist of constructing a small switchgear building in the selected location and placing the new four 13.8 kV breakers, and the station service transformer in it. The existing control boards and enclosure for the main bus would be retained in the Control Room. The 480 volt switchgear would be replaced with NFP A 70E compliant modern arc flash resistant equipment and be placed in the control room adjacent to the control board. This would free up significant floor space in the control room and provide a better floor utilization, while resolving the safety, reliability, and maintainability concerns with the existing equipment.

3. DISTRICT QUALITY CONTROL

District Quality Control and Quality Assurance activities for implementation documents (DDR and P&S) are stipulated in ER 1110-1-12, Engineering & Design Quality Management. The subject project DDR and P&S will be 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 DrCheckssm model review documentation database. DrCheckssm is a module in the ProjNetsm suite of tools developed and operated at ERDC-CERL (www.projnet.org).

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

- Identify the document(s) reviewed and the purpose of the review;
- Disclose the names of the reviewers, their 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.

NOTE: The layout of the cable trench and end of conduit locations for the new switchgear equipment to be placed in the new prefabricated metal building was provided by HDC. The development of the foundation design and electrical concrete ductbank has been coordinated with HDC PDT throughout the design period. HDC has provided the cross-section design of the concrete ductbank, conduit size and nomenclature of each conduit in the ductbank. An HDC structural engineer has evaluated the core drilling through the powerhouse concrete foundation wall for the cables/conduits that will feed into the concrete ductbank. Further review by HDC will be coordinated prior to BCOE Review

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 have at least 10 years experience that encompass geologic and geotechnical analyses that are used to support the development of Plans and Specifications for design of retaining walls and building foundations.

Civil/Structural Engineering. The team member should have at least 10 years of civil/structural project experience that includes design of retaining walls, building foundations, electrical ductbanks and specifications for prefabricated metal buildings.

ATR Team Leader. The ATR Team Leader should have at least 10 years experience with design of prefabricated buildings and retaining walls 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 Switchgear Relocation 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 construction of a 20'x35' prefabricated building, retaining wall, electrical ductwork and associated site work. Failure or loss of the new switchgear building will not pose a significant threat to human life.

(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.

No redundancy requirement is associated with design of this project.

(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 new switchgear building and site work does not use any engineering models.

7. BUDGET AND SCHEDULE

a. Project Milestones.

Completion of Pre-Final Submittal – 2 NOVEMBER 2012

District Quality Control – 5 NOVEMBER to 16 NOVEMBER 2012

ATR Review – 3 DECEMBER to 14 DECEMBER 2012

BCOE Review – 3 DECEMBER to 14 DECEMBER 2012

Advertisement – 7 JANUARY 2013

b. ATR Estimated Cost. The ATR will be conducted 3 DECEMBER to 14 DECEMBER 2012. It is envisioned that each reviewer will be afforded 24 hours review plus 4 hours for coordination. The estimated cost range for the ATR Review team is \$10-15,000.

