



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1399

CESPD-PDC

2 November 2012

MEMORDANDUM FOR Commander, Sacramento District US Army Corps of Engineers,

Subject: Review Plan Approval For America River Watershed – Folsom Dam Modification
- Joint Federal Project Auxiliary Spillway Review Plan

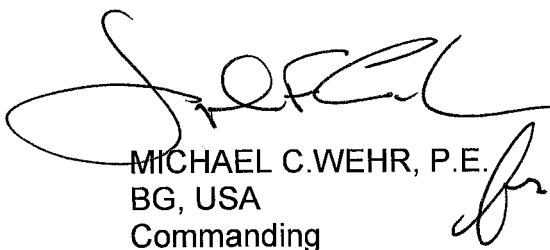
1. The attached Review Plan for the America River Watershed – Folsom Dam Modification - Joint Federal Project Auxiliary Spillway dated October, 2012 has been prepared in accordance with EC 1165-2-209. The Review Plan has been coordinated internally within the DST (per attached e-mail) and with the PCX. The Risk Management Center will serve as the Review Management Office.

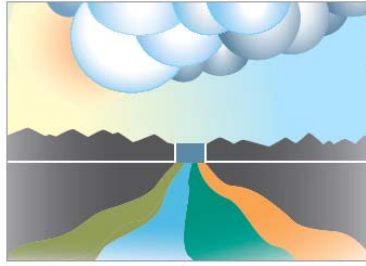
2. The Review Plan does include independent external peer review.

3. I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

4. For any additional information or assistance, contact Karen Berresford, District Support Team Lead, (415) 503-6557, Karen.G.Berresford@usace.army.mil.

Encl


MICHAEL C. WEHR, P.E.
BG, USA
Commanding

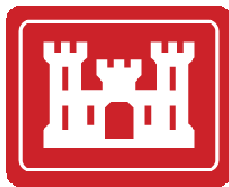


American River Watershed Project

FOLSOM DAM JOINT FEDERAL PROJECT

Auxiliary Spillway

REVIEW PLAN



**Sacramento District
U.S. Army Corps of Engineers**

October 2012

REVIEW PLAN CHANGE MANAGEMENT

Significant modifications to the Review Plan will be summarized in a brief change description and documented in the table below. This change management starts with the April 2012 Review Plan.

REVISION SERIAL #	SERIALIZED CHANGE DESCRIPTION TITLE	DATE APPROVED	APPROVED BY
April RP	Serves as the basis for Revision 1.		
1	Minor changes made to the RP based on comments received from the RMC on 30 May 12. Changes include: updated project description, updated experience for ATR members, and updated team rosters.	14 Aug 12	RMC
2	Minor changes made to the RP based on comments received from SPD on 3 Oct 12. Changes include: updating the ATR certification page, updating team member names in Appendix A-G, and changing the legal review requirement on page 10.		

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1. Introduction

A. Purpose

The Review Plan (RP) defines the scope and level of quality management activities for the Folsom Dam Joint Federal Project (JFP) Auxiliary Spillway, including:

- (1) Plans, specifications and design documentation report (DDR) for the Approach Channel, Downstream Chute and Stilling Basin (Phase IV).
- (2) Construction of the Approach Channel, Downstream Chute and Stilling Basin (Phase IV).
- (3) Environmental Impact Statement / Environmental Impact Report (EIS/EIR) for the Approach Channel (Phase IV).
- (4) Supplemental EA for the Phase IV staging area on the Folsom Prison Land.
- (5) O&M Manual.

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) WRDA 2007 H. R. 1495 Public Law 110-114, 8 Nov 2007
- (4) EC 1165-2-209, Civil Works Review Policy, 31 Jan 2012
- (5) Army Regulation 15-1, Committee Management, 27 November 1992 (Federal Advisory Committee Act Requirements)
- (6) National Academy of Sciences, Background Information and Confidential Conflict Of Interest Disclosure, BI/COI FORM 3, May 2003

C. Review Requirements

The RP was developed in accordance with EC 1165-2-209 (dated 31 Jan 2012), which establishes the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision and implementation documents through independent review. The RP describes in general the scope of review for the remaining portions of the JFP, or more specifically, the scope of review for the design of the Approach Channel (which includes a temporary cutoff wall), Downstream Chute and Stilling Basin, the construction of those features, the Supplemental Environmental Impact Statement / Environmental Impact Report (EIS/EIR) for the Approach Channel, the Supplemental Environmental Assessment (EA) for the Phase IV staging area on the Folsom Prison land, and the O&M Manual for the Auxiliary Spillway. All appropriate levels of review (DQC, ATR, IEPR, and Policy and Legal Review) are addressed in the RP. Any levels deemed inapplicable will require documentation in the RP of the risk-informed decision not to undertake that level of review. Type I IEPR is conducted on project studies (i.e., decision documents) and is not considered applicable for this RP. Type II IEPR is conducted on design and construction activities (i.e., implementation documents) and accordingly is included in this RP. The RP identifies the most important skill sets needed in the reviews and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for each particular feature of the project.

D. Review Objectives

The objective of the RP is to ensure the JFP is designed and constructed to the highest quality standards. The Corps is committed to the very highest standards of quality in engineering products and design services rendered. This commitment manifests itself in the attitude of the staff at all levels of project involvement. Achievement of quality control is a management attitude activated by the application of established procedures and standards. The procedures, standards and lists outlined in the RP are based on industry practices, Corps planning, engineering and construction policies, and regulations found to be conducive to good quality control.

The purpose of the RP is to define and achieve the following goals and objectives:

- (1) Assure production of high quality engineering design and construction documents that comply with customer and Corps requirements and meet or surpass the customer's expectations all while remaining on schedule and within budget.
- (2) Consistently provide high quality planning services and products on schedule and within budget that comply with regulations, policies, guidelines, procedures, and client needs. Whether produced by in-house staff or contractors, ensure that all personnel recognize applicable lessons-learned and see that these are incorporated into the process.
- (3) Maintain and improve awareness by all planning, design and construction personnel of the need and responsibility for adhering to rigorous, upfront Quality Control (QC) procedures.
- (4) Produce effective and coordinated documentation.
- (5) Focus on doing the job effectively and efficiently, followed with a thorough yet efficient check and review system.
- (6) Define the roles, responsibilities, and the accountability of project team members for quality control.
- (7) Address cooperative efforts of Project Delivery Team (PDT) and Agency Technical Review (ATR) team members for accomplishing Seamless Review throughout the product development phase.
- (8) Define interagency coordination with respect to quality control.
- (9) Reduce construction cost growth by "acting" to control quality during the design phase rather than "reacting" to problems during construction.
- (10) Promote safety and the well-being of the public.

The Agency Technical Review under the RP does not replace the need for conducting design checks or supervisory review of products, as required by District Quality Control (DQC).

E. Quality Guidelines

Quality control is defined as the evaluation of technical products and processes to ensure that they comply with applicable laws, Corps planning, engineering and construction regulations and policies, sound technical practices, and customer requirements and expectations.

Commensurate with the high profile and risk (consequences of failure) associated with the JFP, review of the implementation documents and critical design features will receive a high level of

technical quality verification by each discipline. Products will be reviewed to ensure that the following objectives are met:

- (1) The plan is economically and technically feasible and environmentally acceptable; is compatible with existing projects; and will be safe, functional, and meet the project's authorized purpose and customer requirements.
- (2) The engineering concepts, assumptions and methods are appropriate and valid, and analyses are correct.
- (3) The design complies with engineering policy and accepted engineering practice both within the Corps and industry-wide.
- (4) The cost estimate, including escalation and contingencies, is reasonable.

In general, the following guidance will be followed for the technical review.

- a) Quality Management Plan for Sacramento District
- b) ER 1110-1-12, Engineering and Design Quality Management
- c) ER 1110-1-8159, Engineering and Design Dr Checks
- d) ER 1110-2-1150, Engineering and Design for Civil Works
- e) ER 1105-2-100, Planning Guidance Notebook
- f) EC 1165-2-203, Implementation of Technical Policy Compliance Review
- g) CESP R 1110-1-8, Quality Management Plan
- h) CESP R-ED, Quality Management Plan
- i) ER 1110-1-12, Quality Management for Engineering and Design
- j) ER 200-2-2, Procedures for Implementing NEPA
- k) ER 1165-2-501, Civil Works Ecosystem Restoration Policy
- l) EC 1165-2-209, Civil Works Review Policy
- m) ER 11-1-321, Value Engineering
- n) ER 415-1-11, Biddability, Constructability, Operability and Environmental Review

2. Project Description

A. Project Authority

Study of the American River Watershed by the Corps was authorized in the Flood Control Act of 1962 (Public Law 87-874) with direction from Congress given to the Corps to survey for flood control and allied purposes. More specific direction from Congress was provided in Section 101(a) (6) of the Water Resources Development Act of 1999 (WRDA 1999) (Public Law 106-53), in Section 128 of the Energy and Water Development Act of 2006 (Public Law 109-103) for modifications of Folsom Dam related to flood damage reduction, and in Section 3029 of the Water Resources Development Act of 2007 (Public Law 110-114).

B. Project Objectives

Folsom Dam and Reservoir are located approximately 20 miles northeast of Sacramento near the City of Folsom. Folsom Reservoir has a capacity of 977,000 acre-feet, a surface area of 11,450 acres, and a watershed of approximately 2,100 square miles. The north and south forks of the American River join in the body of the reservoir. Folsom Dam was originally authorized in 1944 for flood control but was reauthorized in 1949 as a multi-purpose facility. USACE constructed Folsom Dam and transferred it to Reclamation for coordinated operation as an integral part of the Central Valley Project (CVP). Construction of the dam began in October 1948 and was completed in May 1956.

The goal of JFP is to reduce hydraulic risk to Folsom Dam (able to pass the 2001 PMF) and limit downstream flood damages by not exceeding the objective flow of 160,000 cfs with 0.5% probability in any one year.

The JFP accomplishes these goals by constructing an auxiliary gated spillway 48 feet lower than the existing main dam crest gated spillway, thus allowing more water to be safely released earlier in a storm event and leaving more storage capacity in the reservoir to hold back the peak inflow as it arrives later in the storm event. The JFP auxiliary spillway will be located southwest of the existing main concrete dam. Principle features of the new auxiliary spillway include: (1) an approximately 1,100 foot-long approach channel beginning in Folsom Reservoir; (2) a concrete control structure, including six submerged tainter gates; (3) a spillway chute approximately 3,000-foot long; and (4) a stilling basin which acts as an energy dissipation structure prior to discharges converging with the American River below the main concrete dam. The control structure will operate in conjunction with existing spillway gates on Folsom Dam to manage flood flows from Folsom Reservoir.

The JFP auxiliary spillway is being constructed by both USACE and Reclamation in five construction phases plus a commissioning and transfer phase. The targeted completion of the project is October 2017. Folsom Dam operates as part of comprehensive flood risk management system for the Sacramento region and further downstream.

- Phase 1 - Initial spillway excavation (Completed by USBR in September 2011).
- Phase 2 - Completion of spillway excavation (Completed by USBR in January 2011).
- Phase 3 is the gated control structure (Under construction by USACE. Completion Early 2015. Addressed by previous reviews).
- Phase 4 includes completion of the lower spillway and stilling basin downstream of the control structure and incidental portions of the upstream work and completion of the excavation and lining of the upstream approach to the control structure. (In Design by USACE)
- Phase 5 includes site restoration and turnover (Will be completed by USACE. Design has not started work as of July 2012. Phase 5 will finish prior to October 2017)

The project management structure, including the Oversight Management Group, is provided in Appendix A. An aerial view of the project features is shown in Figure 1.

Figure 1. Project Features.



C. Work Products

The RP covers the design documentation and the cost estimate for the Corps portion of the JFP. The products developed and certified under the RP are as follows: (1) General Design Documentation Report (DDR); (2) feature-specific DDRs, including those for the Approach Channel, Downstream Chute and Stilling Basin; (3) plans and specifications; (4) MCACES cost estimate; (5) EIS/EIR for the Approach Channel; (6) Supplemental EA for the Phase IV staging area on the Folsom Prison land; and (7) Operation & Maintenance Manual.

D. Project Non-Federal Sponsors

State of California
Central Valley Flood Protection Board
3310 El Camino Ave., Room LL40
Sacramento, CA 95821
Phone: (916) 574-0609
Fax: (916) 574-0682

Sacramento Area Flood Control Agency
1007 Seventh Street, 7th Floor
Sacramento, CA 95814
Phone: (916) 874-7606
Fax: (916) 874-8289

3. Scope of Review

The scope of this RP includes the plans and specifications being developed for the JFP Auxiliary Spillway, specifically for the approach channel, downstream chute and stilling basin, and the Supplemental Environmental Impact Statement / Environmental Impact Report (EIS/EIR) for the Approach Channel, the Supplemental Environmental Assessment for the Phase IV staging area on the Folsom Prison land, and the O&M Manual for the Auxiliary Spillway. The levels of peer review required are DQC (District Quality Control), ATR (Agency Technical Review), and Type II IEPR (also known as Safety Assurance Review (SAR)).

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). ATR is undertaken to “ensure the quality and credibility of the government’s scientific information” in accordance with EC 1165-2-209 (dated 31 Jan 2012). The Type II IEPR (SAR) is conducted to examine resiliency, robustness, and redundancy of the project and to “consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health, safety, and welfare.”

A. District Quality Control

All work products and reports, evaluations, and assessments shall undergo the necessary and appropriate District Quality Control/Quality Assurance (DQC). This review is managed by the home district in accordance with the Major Subordinate Command (MSC) and district Quality Management Plans. The DQC includes seamless quality checks and reviews, supervisory reviews, and Project Delivery Team (PDT) reviews including input from the Local Sponsor. To ensure specific discipline efforts are on target with regard to compliance with policy and criteria and an acceptable level of quality, sub-products will be technically coordinated and reviewed before they are integrated into the overall project. DQC was conducted prior to the 35% and 65% reviews and will be conducted prior to the 95% review period for each feature. In addition, DQC will be conducted prior to Biddability, Constructability, Operability and Environmental (BCOE) reviews. QA review will be administered by the appropriate discipline section chiefs.

B. Agency Technical Review

According to EC 1165-2-209, Agency Technical Review (ATR) is mandatory for all decision and implementation documents and is undertaken to “ensure the quality and credibility of the government’s scientific information.” 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 a project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. Dr. Checks (the online comment review application) will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. During the review, ATR reviewers will ensure that their comments are satisfactorily answered. The ATR team will prepare a Review Report which includes a summary of each unresolved issue. Plans and specifications are implementation documents; therefore ATR is required for this project.

Due to the nature of the designs of the Approach Channel, Downstream Chute and Stilling Basin, it was determined that several fields of expertise were required for ATR review activities. These fields include geotechnical, geology, concrete materials, air and water quality, hydraulic, structural, construction, marine structures, as well as cost engineering (requiring coordination with DX), which will be performed at the appropriate design reviews. ATR will include a review of construction phasing, site access requirements, and constructability.

Consistency checks between planning, environmental and engineering concerns/documents will be included in all reviews by the ATR and will be a responsibility of the review members. The ATR will also examine relevant DQC records and provide written comment on the adequacy of the DQC effort.

C. Independent External Peer Review

EC 1165-2-209 requires that a Type II IEPR (also known as a Safety Assurance Review (SAR)) shall be conducted for any project addressing hurricane and storm risk management or flood risk management, or any other project where the Federal action is justified by life safety, or where failure of the project would pose a significant threat to human life. The SAR team is an independent external panel that conducts reviews at various work phases, and is to be reviewed by the Review Management Organization (RMO), which is currently the Risk Management Center (RMC), and the final approval authority is the SPD Commander. The SAR shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health, safety, and welfare.

Factors to consider for conducting a Type II review of a project or components of a project are:

- (1) The project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices.
- (2) The project design requires redundancy, resiliency, and robustness.
 - a) Redundancy is the duplication of critical components of a system with the intention of increasing reliability of the system, usually in the case of a backup or failsafe.
 - b) Resiliency is the ability to avoid, minimize, withstand, and recover from the effects of adversity, whether natural or manmade, under all circumstances of use.
 - c) Robustness is the ability of a system to continue to operate correctly across a wide range of operational conditions (the wider the range of conditions, the more robust the system), with minimal damage, alteration or loss of functionality, and to fail gracefully outside of that range.
- (3) The project has unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems.

The Sacramento District Chief of Engineering is responsible for coordinating with the RMO, attending SAR review panel meetings, communicating with the agency or contractor that is selecting panel members, and for coordinating the approval of the final report with the MSC Chief of Business Technical Division.

After receiving the report from the peer review panel, the District Chief of Engineering, with full coordination with the Chiefs of Construction and Operations, shall consider all comments contained in the report and prepare a written response for all comments and note concurrence and subsequent action or non-concurrence with an explanation. The District Chief of Engineering shall submit the panel's report and the District's responses shall be submitted to the MSC for final MSC Commander approval. The report and responses will be made available to the public on the District's website.

A SAR will be conducted after the 65% design is complete. This panel will review the DDR, plans, and specifications for the 65% design, the 95% design, as well as review on-going construction operations. The most recent design activities with assumptions and preliminary conclusions will be presented to the SAR for review and comment.

D. Constructability Review

In addition to the required DQC, ATR, and SAR reviews, the Sacramento District conducts Constructability Review Conferences (CRC) at various work phases. This review is not intended to replace the reviews that are required by ER 1165-2-209, but is an additional review conducted at the discretion of the Sacramento District. The CRC performs a substantive review of the plans and specifications with respect to constructability and cost. The CRC met to review the 65% design of the Downstream Chute and Stilling Basin and the 65% review of the Approach Channel. The CRC is scheduled to meet again during the 95% review of the Approach Channel and the Downstream Chute and Stilling Basin.

E. Policy Compliance and Legal Review

The JFP plans and specifications will be reviewed for compliance with law and policy by the Corps legal team. The EIS/EIR will be reviewed for compliance with law and policy by the Corps and the State of California.

F. Value Engineering and Physical Models

Value engineering studies have been conducted on the project as required by ER 11-1-321. An initial study was conducted on the feasibility design by the Office of the Chief of Engineers, Value Engineering Study Team (OVEST) in April 2006. A second study was conducted on the 35% design of the overall project by Value Management Strategies (VMS) in September 2008.

The MCACES estimate was reviewed at the 35% stage by an outside A/E firm. A physical model of the Control Structure excavation was built by Reclamation and used to aid in visualizing potential issues and concerns.

Hydraulic physical models have also been built and tested, with their development and results undergoing ATR and SAR reviews. The following hydraulic models have been completed:

- (1) A 1:30 scale model of the control structure, approach channel and a short segment of the spillway chute were modeled at the Utah Water Research Laboratory (UWRL) located in Logan, Utah. Work on the model started in 2006 and was completed in 2009. Several substantial changes to the control structure made the desired hydraulic performance viable and more efficient.
- (2) A 1:26 scale model of the spillway chute, stepped spillway and stilling basin were modeled at the St. Anthony Falls Laboratory (SAFL) located in Minneapolis, Minnesota. Work on the model started in 2007 and was completed in 2008. The design of the stepped spillway was validated, and the stilling basin geometry was modified to better improve the performance of the stilling basin.
- (3) A 1:48 scale model of the confluence area where the discharges from the main dam and auxiliary spillway combine in the American River was modeled by the Bureau in their hydraulics laboratory located in the Technical Service Center (TSC) in Denver, Colorado. Work on the model started in 2007 and was completed in 2010. The model provided information for release scenarios, velocities in the American River, stilling basin performance when the walls are overtopped during high discharges, and overall performance in the American River.
- (4) Two cavitation studies for the baffle blocks and stepped spillway were modeled by the Bureau in their hydraulics laboratory located at TSC. Work on the cavitation models started in 2008 and was finished in 2009. The performance of the stepped spillway was validated and a specially-shaped baffle block, called a super-cavitating baffle block, that allows cavitation to form in the water without damage to the block was configured.

No additional physical models are planned at this time.

G. Past Review Process

The JFP design commenced prior to adoption of EC-1165-2-209. A full review was implemented at the 35% design level (starting in July 2008), consisting of: DQC, including PDT review and supervisory QA; ATR, then known as independent technical review, or ITR; and an independent panel of experts, termed a Consultant Review Board, or CRB.

USBR had established a Consultant Review Board (CRB), a panel of experts for their Safety of Dams program, which had been in place for the design and construction of Phases 1 and 2 of JFP (the excavation of the downstream chute and stilling basin). With the purpose of continuity, the Corps and Reclamation collaborated on selecting a similar panel of renowned private consultants that would serve as the Corps' CRB. Two members of the original CRB were retained, while three were substituted to represent disciplines specific to the Corps' body of work.

This CRB panel spanned the fields of geology and rock slope stability, structural engineering, hydraulics and hydrology, and construction, and was comprised of:

- (1) Chester Watts, Ph.D, Professor, Radford University (Geology);
- (2) Dick Goodman, Ph.D., Emeritus Professor, University of California, Berkeley (Rock Stability);
- (3) Yusof Ghanaat, Ph.D, Quest Structures (Structural Engineering);
- (4) John Cassidy, Ph.D., independent (formerly of Bechtel) (Hydraulics and Hydrology); and
- (5) Joe Ehasz, URS (Washington Group) (Construction).

A CRB conference was held at the 35%, 65%, and 95% design phase for the Phase III Control Structure, and included presentations from the design team, round table discussions, numerous site visits, and a formal report with conclusions and recommendations.

The CRB conducted a review of the S-1 shear zone, which travels through the foundation of the control structure, in February 2012. This was the final review the CRB will be a part of. It is anticipated that the CRB panel members will remain available and eligible to be included in the SAR team to be formed. The independent nature of selecting and managing SAR members is discussed below. If any CRB member is not selected as a member of the SAR, the Corps will consider contracting with them separately for continued consultation on the JFP.

4. Review Team

A. Project Delivery Team

The JFP Project Manager and Project Delivery Team (PDT) leader is Elizabeth Salyers, (916) 557-5114.

Up until March 2012, the Downstream Chute and Stilling Basin's Engineering Division Lead Engineer was Cecily Nolan, Design Branch, (916) 557-7472. The Approach Channel's Engineering Division Lead Engineer was Jeffrey Wisniewski, Design Branch, (916) 557-7973. In March 2012, the Downstream Chute and Stilling Basin and the Approach Channel were combined into one group lead by Jeffery Wisniewski. Due to the complexity of the project and the involvement of numerous design disciplines, design leads for Civil, Structural, Geotechnical, and Constructability have been assigned responsibility for developing certain work products.

Appendix B will provide a complete directory of PDT members and identifies discipline, work product responsibility, and the discipline leads.

The lead engineer, in consultation with the project manager and design leads, is ultimately responsible for any engineering/design scopes of work. The planning coordinator, in consultation with the project manager, will be responsible for any planning scopes of work.

The state and local sponsors are each providing representatives to participate as part of the PDT and are included in Appendix B.

B. Peer and Seamless Reviews

During project development, seamless review by the ATR is encouraged for all aspects of the project. The PDT members will initiate seamless reviews at appropriate times in order to reach a common understanding with their ATR counterparts, thereby minimizing significant comments/impacts during final agency technical review. Although several of the technical disciplines working on the JFP are assigned to the American River Section, the Section Chiefs representing each of the technical disciplines will provide in-progress design checks, advice, and supervisory review (as well as Quality Assurance) of the products.

C. Agency Technical Review

The Agency Technical Review (ATR) team members will be listed in Appendix C. Engineering Circular 1165-2-209 states, "ATR teams will be comprised of senior USACE personnel, preferably recognized subject matter experts with the appropriate technical expertise such as regional technical specialists, and may be supplemented by outside experts as appropriate. ATR will be conducted by a qualified team outside of the home district that is not involved in the day-to-day production of a project/product." Therefore, the ATR will be coordinated outside the Sacramento District. Its members will be selected from outside the district and will represent disciplines that have a major part in the design of the project features. Dr. Checks will be used for managing and documenting the ATR comments, evaluations, and back checks as well as the resolution of controversial comments, if any.

- (1) **Review Team Members.** The ATR reviewers must have a minimum of ten years of experience in the discipline, have a professional license or equivalent qualifying experience, and not be involved in the design or supervision of the project. For the disciplines that play a crucial part in the project, Subject Matter Experts (SMEs) are preferred for filling the ATR roster. The following disciplines will be represented on the ATR: geotechnical, geology, concrete materials, civil, environmental, hydraulic, structural, construction, marine structures, air and water quality, and cost engineering. The ATR roster will be provided in Appendix C and will be updated, if necessary, to reflect any changes.
- (2) **Review Team Leader.** The ATR Leader will be Matt Hanson, NWP/Portland, (203) 808-4934. EC 1165-2-209 states, "to assure independence, the leader of the ATR team shall be from outside the home MSC." NWP is outside SPD, the home MSC for SPK. EC 1165-2-209 also states, "the ATR shall be managed and performed outside of the home district." The review team leader is responsible for assembling the team – which will be exclusive of SPK and may include AE contractors for specific disciplines or tasks, as necessary – as well as coordinating all activities of the review. The review team leader will communicate with the ATR team members to make sure they know their responsibilities and objectives. The ATR team leader will monitor the products and ATR comments, the PDT responses, and the reviewer's back-check of responses. The ATR team leader will eliminate any conflicting comments and will consolidate similar or related comments. In the event of a disagreement on a comment or issue that cannot be resolved between the reviewer and the designer, the ATR team leader and the PDT design lead will review the situation and determine the fate of the comment.

- (3) **A-E Firms and Outside Design Agencies.** In order to maintain design responsibility, outside design organizations such as A-E firms and the USBR will be responsible for the QC of their own work. Each organization's work products will be independently-reviewed under their respective QC procedures, and each organization will provide QC certification for their respective sub-products to the Lead Engineer (Jeffrey Wisniewski) for the Corps' Engineering Division, or to Miki Fujitsubo, Lead Planning Coordinator for the Corps' Planning Division. The A-E Quality Control Plans will be submitted and approved prior to commencing design work. Dr. Checks will be used to manage and document QC comments. The Corps will make Dr. Checks available to A-E Firms and outside design agencies for the reviews. An A-E firm, URS, has already been contracted for the design of the approach channel work and temporary upstream cutoff wall and reviews will be included in the ATR activities.

D. Safety Assurance Review

During design and construction, a panel of experts will be assembled and will be in place to ensure the highest level of technical excellence, and provide comments and guidance as outlined in Paragraph 3(C) above. The advice of technical experts is utilized by the Corps on projects of exceptional size or complexity, containing unique features, and of particular importance to public safety. Independent External Peer Review (IEPR) is made up of "independent, recognized experts from outside of the USACE." Having the characteristics specified in EC 1165-2-209, this project falls under the requirements of a Type II IEPR of Safety Assurance Review (SAR). A contractor will be used to assemble and oversee each panel, including the selection of qualified panel members, to ensure independence.

The appropriateness, in composition and scope, of the Type II IEPR ultimately falls under the Review Management Organization (RMO). For Type II IEPR of the Folsom JFP Auxiliary Spillway the RMO is the USACE Risk Management Center (RMC) led by Nathan Snorteland, the RMC Director, (571) 232-9189.

The Corps will input all of the SAR team member's comments into Dr. Checks after the review conference.

The SAR team shall be composed of licensed engineers with experience in dam design and large construction projects. The members will represent the following disciplines (at a minimum). The final make-up, in size and composition, will be established by the contractor.

- (1) Geotechnical or geological engineering specialist(s), preferably with expertise in rock slope stability, with a minimum 25 years of experience in design, inspection and construction of levee or dam projects. The member(s) shall be registered Professional Engineers (PE) and preferably a registered Geotechnical Engineers (GE), or equivalent qualifying experience, with a minimum of 3 completed dam projects.
- (2) Civil/construction engineer(s) with significant experience with civil works construction quality assurance and control with a minimum 20 years of experience in flood control projects, including dams or levees. The member(s) shall have significant experience in the

- construction and/or remediation of dams. The member shall be a registered Professional Engineer (PE) or equivalent qualifying experience.
- (3) Hydraulic engineering specialist(s) with a minimum 20 years of experience in hydraulic and hydrological modeling for flood control projects on major river systems. The member(s) shall be a registered Professional Engineer (PE) or equivalent qualifying experience.
 - (4) Structural engineering specialist(s) with a minimum 20 years of experience in complex and hydraulic structures, including dynamic modeling. The member(s) shall be a registered Professional Engineer (PE) or equivalent qualifying experience.
 - (5) Concrete materials specialist(s) with a minimum 20 years experience in evaluating and developing materials for heavy civil projects, with a minimum of 3 completed dam projects.
 - (6) The sixth member shall be an environmental and NEPA specialist with 10 years of West Coast experience in analyzing and developing mitigation measures for potential effects on hydrology, fisheries and air quality as related to construction activities for large civil works projects. The member shall have worked on a minimum of 3 completed large civil works projects on the West Coast, preferably within California with 10 years. The reviewer shall have experience in evaluating and conducting NEPA impact assessments, including cumulative effects analyses, for complex multi-objective public works projects with competing trade-offs. The member shall have a minimum MS degree or higher in an appropriate field of study. Experience shall encompass determining the scope and appropriate methodologies for impact assessment and analyses for a variety of projects and programs with high public and interagency interests and having project impacts to nearby sensitive habitats.

A list of the SAR team members will be included as Appendix D.

E. Constructability Review Team

The constructability review team is an independent review to minimize potential change orders and schedule delays during construction by improving the constructability, bidability, and efficiency of the proposed construction. These reviews focus on large strategic issues to affect a more efficient construction process and shorter construction duration.

The Constructability Review Conference (CRC) team members are listed in Appendix F.

F. Vertical Review Team

The Vertical Review Team consists of the Regional Integration Team at HQUSACE and the District Support Team at SPD. A list of the team members is attached as Appendix G.

5. Public Comment

To ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the Federal Government, this Review Plan will be published on the district's public internet site following approval by SPD at <http://www.spk.usace.army.mil/>. The opportunity for public comment remains open as there is no formal comment period and no set closure date at this time. If and when comments are received, the PDT will consider them and

decide if revisions to the review plan are necessary. The public is invited to review and submit comments on the plan as described on the web site.

6. Documentation

The work products will be reviewed using an interdisciplinary team approach. The products will be reviewed for scope and adequate level of detail; compliance with guidelines, policy, and customer needs; and consistency, accuracy, and comprehensiveness. Review comments will be identified with author and affiliation, and are expected to be constructive and relevant to the product. Review comments will contain the following elements: (a) a clear statement of the concern, (b) the basis for the concern, (c) the significance of the concern, and (d) the specific actions needed to resolve the concern. Reviewers must identify any significant deficiency; however, comments should be limited to those required to ensure adequacy of the product in meeting the stated objectives. Typographic errors and other minor stylistic changes should not be part of the formal technical review comments. Such comments will be provided separately to the PDT for their use and to the ATR team leader. A partial checklist for reviewers to consider is as follows:

- a) Constructability versus actual site conditions;
- b) Maintainability by USBR;
- c) Accuracy and reasonableness test of computations;
- d) Compliance with governing policies, criteria, and project requirements;
- e) Seamless review (discussions and agreements with PDT counterparts); and
- f) Product review comment/response/actions taken are documented in Dr. Checks.

A. Comment Resolution

Review comments do not necessarily have to be complied with, but each comment must be addressed and resolved. If a PDT member disagrees with a comment, the PDT member will try to resolve the comment through discussions with the ATR team member. The ATR team leader will help facilitate those discussions as needed. When this does not result in resolution, the issue will be elevated through the PDT member's chain of command as necessary. If this level of interaction does not resolve the issue, the responsible Functional Chief will make the final decision. The Functional Chief may consult with the Branch Chief, the CESP (Corps of Engineers South Pacific Division) staff, SMEs, or other appropriate sources. Resolution of disputes will be documented in Dr. Checks as appropriate.

B. Technical and Policy Issue Resolution

Issues involving technical and policy interpretation shall be brought to the attention of the chief of the functional element for resolution. In some cases the chief of the responsible functional element may request that CESP hold an issue resolution conference to resolve major policy or technical issues. CESP may also arrange for HQUSACE participation in the issue resolution conference.

C. Certification

For final products, a certification will be signed stating that issues raised by the ATR team have been resolved. The ATR certification will be signed by: the A-E (if appropriate), the Engineering Division Lead Engineer, the Planning Division Chief (as appropriate), the ATR team leader, the Project Manager (PDT Leader), other functional chiefs at the Section and Branch levels (as appropriate), the Chief of Engineering Division, the Office of Counsel, and the District Commander. Standard Corps certification forms will be used.

D. Unique, Sensitive, or High Visibility Items

The design of a modification of Folsom Dam to reduce flood damage is highly complex, and an inadequate or deficient design has the potential to significantly and adversely affect life and property. Therefore, it is imperative that the Sacramento District provide a total quality product. Following are some of the unique and highly sensitive aspects of the project:

- (1) Two Federal agencies, the Corps of Engineers and the Bureau of Reclamation, have jurisdiction over Folsom Dam for their respective responsibilities of flood damage reduction (FDR) and dam safety (DS). The JFP is somewhat unique in that modifications needed for both FDR and DS have been incorporated into one facility. Developing a project at Folsom Dam involves the combined efforts of the Corps and Reclamation, each with different policies concerning cost allocation, hydraulic dam safety and other areas.
- (2) The combination of a long, supercritical spillway chute and a steep, stepped chute section may be unprecedented.
- (3) Construction of the project must minimize impacts to the ongoing operation of Folsom Dam for flood control, water supply, environmental releases, hydropower, recreation and adverse traffic impacts resulting from the transport of construction materials to the dam site.
- (4) The resolution of existing dam safety concerns will be an integral part of design and construction involving close coordination with the non-Federal sponsors and the Bureau of Reclamation.
- (5) The work will require numerous design and construction procurements done under an aggressive schedule for the type of project.

7. Schedule/Costs

A. Past and Scheduled Review Periods

The ATR and SAR teams will review the feature-specific DDRs, including plans and specifications, for the JFP Approach Channel and Downstream Chute and Stilling Basin; the Environmental Impact Statement / Environmental Impact Report (EIS/EIR) for the Approach Channel; the Supplemental Environmental Assessment for the Phase IV staging area; and the O&M manual. Major design review milestones, and the tentative associated schedule, are listed in Table 1 below.

Table 1. Design Review Milestones

Review Activity	Approximate Schedule	Reviews
35% Design Review	17 Apr – 7 Jun 2008	ATR, SAR
65% Design Review (Downstream)	31 Oct – 4 Nov 2011	ATR
65% Constructability Review	5 - 7 Dec 2011	CRC
Draft EIS/EIR Review	9 – 13 Apr 2012 22 – 24 May 2012	ATR SAR
65% Design Review (Upstream)	9 – 13 Apr 2012	ATR, CRC
Supplemental EA Review	5 – 15 June 2012	ATR
65% Project Review (Upstream/Downstream)	13 – 15 Jun 2012	SAR
95% Design Review (Upstream/Downstream)	13 Aug – Sep 2012	ATR, SAR, CRC
Final EIS/EIR Review	13 Aug – Sep 2012	ATR, SAR
65% O&M Review	2014	ATR
95% O&M Review	2017	ATR

B. Constraints on the Process

The schedule is ambitious however achievable. Joint efforts between Corps and Reclamation require close coordination and cooperation. Means for tracking progress and enhancing communication, coordination, and documentation are in place for the project. If unforeseeable events occur that are significant enough to jeopardize meeting schedules the Project Manager, appropriate Engineering Division personnel, the Sponsors and other project stakeholders, along with any other team members deemed necessary, will together discuss the problem and what viable options are available. Increases in resources and/or changes to the schedule as a result of these meetings will be documented and kept in the project files.

C. Estimated Costs for Review Process

Funds have been budgeted for ATR and SAR review activities. The approximate cost breakdown per product activity is provided in Table 2 below. The costs are shared with the local sponsors.

Table 2. Estimated Costs

Review Activity	ATR	SAR
65% Design Review (Downstream)	\$150,000	

65% Design Review (Upstream) & Draft EIS/EIR Review	\$200,000	
Supplemental EA	\$50,000	
65% Design Review (Upstream/Downstream) & Draft EIS/EIR Review		\$200,000
95% Design Review (Upstream/Downstream) & Final EIS/EIS Review	\$200,000	\$200,000
65% O&M Review	\$50,000	
95% O&M Review	\$50,000	
Totals	\$650,000	\$300,000

8. Points of Contact

Questions about this Review Plan may be directed to the applicable District Project Delivery Team, Lead Engineer, Jeffrey Wisniewski, (916) 557-7973, or to the Project Manager, Elizabeth Salyers, (916) 557-5114. The Chief, Engineering Division, is Rick Poepelman, (916) 557-7301.

9. Review Plan Approval

The Sacramento District requests that the Risk Management Center endorse the above recommendations and approve this Review Plan as described in Appendix B of EC 1165-2-209.

Appendix H

ATR Certification Document

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the design and constructability of the plans, specifications, and design documentation report for the Folsom Dam JFP Auxiliary Spillway Phase IV, Folsom, CA. The ATR was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer’s needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks_{sm}.

Matthew Hanson, P.E.
ATR Team Leader
CENWP-EC-DS
Date

Beth Salyers, P.E.
Project Manager
CESPK-PM
Date

Michael Forrest, P.E.
Project Manager
URS-GEI Joint Venture, Oakland, CA
Date

Phil Brozek
Architect Engineer Project Manager
Brozek & Associates, Sacramento, CA
Date

Nate Snorteland
Review Management Office Representative
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.

Rick L. Poepelman, P.E.
Chief, Engineering Division
CESPK-ED
Date

Appendix I

Quality Control Plan for A-E

Task Order 21- Folsom Dam JFP Auxiliary Spillway Project
Approach Wall and Slab Design

Quality Control Plan

February 20, 2012
Revision 1

1. TASK SCOPE

The URS Group, GEI Joint Venture (the JV) will be responsible for the analysis and design of the Folsom Dam Joint Federal Project (JFP) Auxiliary Spillway Approach Channel. The approach channel will efficiently guide flows into the JFP Control Structure during releases and consists of two approach walls and an approach slab. This scope will identify the analysis, design, submittal, scheduling and communication requirements for this design effort. The JV will perform all necessary engineering services required to prepare a final technical memorandum along with 100% design plans and specifications. More specifically, the following are the nine (9) tasks for completing the services of Task Order #21:

Task 1 – Site Visit & Kick-Off Meeting

Task 2 – Alternative Recommendation Memorandum

Task 3 – Approach Wall Analysis & Design Memorandum and Quality Control Plan

Task 4 – 65% Analysis & Design Submittal

Task 5 – 65% Review Conference

Task 6 – 95% Analysis & Design Submittal

Task 7 – 95% Review Conference

Task 8 – Meeting Attendance

Task 9 – 100% Design Submittal

2. TASK DESCRIPTION

Task 1 – Site Visit & Kick-Off Meeting

The JV shall have design personnel attend a three hour meeting at the Folsom Field office at the award of this task order. The purpose shall be to review of the statement of work, the project schedule and submittals, and discuss any pertinent project information. The JV shall contact the USACE Structural Lead two (2) calendar days prior to the meeting to request any information, documentation or discussion items. The JV shall visit the

Approach Channel site prior to design to familiarize the design team and appropriate personnel with the field conditions, location and constraints of the project.

Task 2 – Alternative Recommendation Memorandum

The JV shall recommend an Approach Channel alternative that satisfies USACE Design Criteria specified in section 1.10. The recommendation shall take into consideration the structural loading, performance, constructability, cost, subsurface and scheduling limitations that accompany the Folsom Dam Joint Federal Project. Upon the recommendation of an alternative, the JV shall submit a memo to the USACE Structural Lead justifying the selection of the recommended alternative and describing the criteria against which design options were measured. The rationale for excluding the de-selected alternatives shall also be discussed. The USACE Structural Lead shall review and approve this memorandum. Analysis and design of the recommended alternative shall not commence prior to approval of this memorandum by the USACE Structural Lead.

Task 3 – Approach Wall Analysis & Design Memorandum and Quality Control Plan

Task 3.1 – Approach Wall Analysis & Design Memorandum

Upon recommendation and USACE approval of an Approach Channel alternative the JV shall develop a memorandum explaining the proposed methodologies, procedures and criteria for the structural analysis and design of the recommended alternative. The proposed design shall comply with the USACE criteria listed in section 1.10, and explain the loads, load cases and types of analyses to be performed. The JV shall not perform any analysis or design before the USACE Structural Lead has approved the Approach Wall Analysis and Design Memorandum; however, the JV may develop preliminary plans, profiles, sections and elevations after the effective date of the task order prior to approval. To streamline the approval process and increase the likelihood of approval, the weekly and/or regularly scheduled meetings with the USACE Structural Lead under Task 8 may be used to present and discuss draft memorandums. The memorandum shall address at minimum the following issues:

- Loads and load cases to be considered in the structural analysis;
- Analytical methods, types and levels of structural analysis, and anticipated structural behavior;
- Assumptions and approximations which shall be made to simplify the analysis;
- Seismic components to be used and how they will be applied to the structure(s);
- Summary of the steps which will be taken to perform the structural analysis and design;
- Modeling assumptions and computer programs to be used if a finite element analysis is proposed;

- Dynamic effects of the surrounding soil and/or rock on the structure and how they will be considered in the analytical models;
- Dynamic effects of the surrounding water on the structure and how they will be considered in the analytical models;
- Design method and criteria to be used for each of the structures; and
- Methods for preventing a transfer of loads to the Control Structure.

Task 3.2 – Quality Control Plan

The JV shall develop a Quality Control Plan (QCP) describing the planned Independent Technical Review (ITR) efforts, schedule and personnel. The QCP shall detail the means and methods by which work products are reviewed for accuracy, completeness and technical competency: the plan shall ensure that work products are reviewed for compliance with standard engineering and professional practices; that the scope of the work products adequately addresses the project goals; and that the data used to achieve the project goals is appropriate, consistent and accurate. Selected ITR personnel shall not be actively involved in the analysis and design of the selected Approach Wall alternative. The JV shall certify in a Quality Control Certification (QCC), accompanying all required submittals, that the requirements in the QCP have been satisfied, and that all concerns identified during ITR have been resolved. The QCC shall be signed by the JV Project Manager and a Principal.

Task 4 – 65% Analysis & Design

The work and services associated with the 65% design shall include preparation of design drawings, draft specifications and a technical memorandum. The JV shall analyze and design the recommended alternative in accordance with the USACE criteria listed in section 1.10. The analysis and design shall incorporate the hydraulic, ground, seismic, seepage and other applicable Approach Channel loads consistent with the project requirements, location and site conditions. The design shall adequately address issues concerning stability, structural demand and capacity, and all potential failure modes. The JV shall be responsible for coordinating with the USACE Structural Lead to obtain required data for the analysis and design. The USACE Structural Lead will provide the JV with the data no more than fourteen (14) calendar days after the request is made.

Task 4.1 – 65% Plans & Specifications

The 65% Plans & Specifications shall depict plans, sections, elevations, reinforcing steel and miscellaneous details indicative of project whose design is nearly three-quarters complete. The submittal shall be consistent with professional engineering standards and omit only those structural details that have been reserved for the 95% design submittal. The specs shall be prepared in SpecsIntact.

Task 4.2 – Interim Design Technical Memorandum

The JV shall prepare an interim design technical memorandum (TM) for the 65% analysis and design. The TM shall present the relevant analysis and design methodologies, criteria, analysis results, design calculations, and quantity estimates. In particular, the TM shall include at least the following information:

- Analytical methods and types of structural analysis;
- Assumptions and approximations which are made to simplify the analysis;
- Dynamic components used and how they were applied to the structure as seismic loads;
- Summary of the steps which are taken to perform the structural analysis;
- Modeling assumptions and computer programs which are used for any finite element analysis;
- Loading conditions considered in design;
- Structural classification of the structure;
- Design basis, concept, and criteria;
- Stability analysis and results;
- Pertinent analysis results;
- Design calculations showing capacities of the structure to resist the demands;
- Demand-capacity evaluation; and
- Design results.

The interim TM shall be submitted to the USACE Structural Lead and reviewed by USACE personnel. Comments, questions, clarifications and other issues related to the interim TM shall be returned to the JV within seven (7) calendar days.

Task 5 – 65% Review Conference

The JV shall attend a one week 65% Agency Technical Review (ATR) in Downtown Sacramento. Attendance will require the JV to field questions from an assembled USACE review panel.

Task 5.1 – PowerPoint Presentations

The JV must prepare and deliver PowerPoint presentations discussing the completed analyses and designs, the design procedure(s), analysis results, constructability considerations, a summary of conclusions, and JV recommendations. The presentations shall be submitted seven (7) calendar days prior to the conferences for USACE review and comment, which is expected to take three (3) calendar days. The JV shall then revise and resubmit the presentations until approved by the USACE Structural Lead.

Task 5.2 – ATR Comment Response Memorandum

The ATR will require the JV to prepare a memorandum responding to review comments submitted by USACE personnel. The memorandum shall explain how errors, omissions or points of clarification will be corrected or explained in future submittals, or why the comment is inapplicable or unwarranted.

Task 6 – 95% Analysis & Design

The JV shall analyze and design the recommended alternative in accordance with the USACE criteria listed in section 1.10. The analysis and design shall incorporate the hydraulic, ground, seismic, seepage and other applicable Approach Channel loads consistent with the project location and site conditions. The design shall adequately address issues concerning stability, structural demand and capacity, and all potential failure modes. It shall also incorporate any comments, questions, clarifications or concerns raised during the 65% Review Conference. The work and services associated with the 95% design shall include preparation of design drawings, specifications and a draft final design technical memorandum. The JV shall be responsible for coordinating with the USACE Structural Lead to obtain required data for the analysis/design. The USACE Structural Lead will provide the data to the JV no more than fourteen (14) calendar days after the request is made.

Task 6.1 – 95% Plans & Specifications

The 95% Plans & Specifications shall depict plans, sections, elevations, reinforcing steel and miscellaneous details for the final design of the approach channel. The submittal shall be consistent with professional engineering standards and represent a complete set of biddable construction drawings which have not yet been reviewed by the USACE. The specs shall be prepared in SpecsIntact.

Task 6.2 – Draft Final Design Technical Memorandum

The JV shall prepare a draft final design TM for the 95% analysis and design. It shall address comments, questions, clarifications or concerns raised during the 65% Review Conference and those comments submitted to the JV by the USACE Structural Lead. The TM shall present the relevant analysis and design methodologies, criteria, analysis results, design calculations, and quantity estimates. In particular, the TM shall include at least the following information:

- Analytical methods and types of structural analysis;
- Assumptions and approximations which are made to simplify the analysis;
- Dynamic components used and how they were applied to the structure as seismic loads;
- Summary of the steps which are taken to perform the structural analysis;

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- Modeling assumptions and computer programs which are used for any finite element analysis;
- Loading conditions considered in design;
- Structural classification of the structure;
- Design basis, concept, and criteria;
- Stability analysis and results;
- Pertinent analysis results ;
- Design calculations showing capacities of the structure to resist the demands;
- Demand-capacity evaluation; and
- Design Results.

The draft final design TM shall be submitted to the USACE Structural Lead and reviewed by USACE personnel. Comments, questions, clarifications and other issues related to the draft final design TM shall be returned to the JV within seven (7) calendar days of receipt.

Task 7 – 95% Review Conference

The JV shall attend a one week 95% Review Conference in Downtown Sacramento. Attendance will require the JV to field questions from an assembled USACE review panel. The 95% Review Conference will require the JV to electronically evaluate and respond to comments submitted via the USACE Design Review & Checking System (Dr Checks). The JV shall also assist the USACE Structural Lead in back checking resolved conflicts, comments and/or questions.

Task 7.1 PowerPoint Presentations

The JV will prepare and deliver PowerPoint presentations which discuss the completed analyses and designs, the design procedure(s), analysis results, constructability considerations, a summary of conclusions, and JV recommendations. The presentations shall be submitted seven (7) calendar days prior to the conferences for USACE review and comment, which is expected to take three (3) calendar days. The JV shall then revise and resubmit the presentations until approved by the USACE Structural Lead.

Task 8 – Meeting Attendance

In accordance with the project scheduling constraints the JV shall attend 3-hour weekly and additional regularly scheduled meetings with the Sacramento District Approach Channel USACE Structural Lead, Technical Lead and relevant USACE personnel. These meetings shall take place at the URS Downtown Oakland office and shall provide guidance to the JV, project oversight, status updates and help to resolve technical issues as they arise. The JV shall be prepared to submit informal paper copies of plans and design documents that are discussed.



Task 9 – 100% Analysis & Design

The JV shall perform any analysis and design on the selected alternative necessary to resolve questions, comments, conflicts or clarifications resulting from the 95% ATR/SAR. Any required analysis or design shall comply with the USACE criteria listed in section 1.10. The analysis and design shall incorporate the hydraulic, ground, seismic, seepage and other applicable Approach Channel loads consistent with the project location and site conditions. The design shall adequately address issues concerning stability, structural demand and capacity, and all potential failure modes. The work and services associated with the 100% design shall include preparation of design drawings, specifications and a final design TM. The JV shall be responsible for coordinating with the USACE Structural Lead to obtain required data for the analysis/design. The USACE Structural Lead will provide the JV with the data as soon as practical, but no more than fourteen (14) calendar days after the request is made.

Task 9.1 – 100% Plans & Specifications

The 100% Plans & Specifications shall depict plans, sections, elevations, reinforcing steel and miscellaneous details for the final design of the approach channel. The submittal shall be consistent with professional engineering standards and address all comments provided to the JV during the 95% review period. The 100% Plans & Specifications shall represent a complete set of biddable construction drawings approved by the USACE.

Task 9.2 – Final Design Technical Memorandum

The JV shall prepare a Final Design TM for the 100% analysis and design. It shall address comments, questions, clarifications or concerns raised during the 95% Review Conference and those comments submitted to the JV by the USACE Structural Lead. The TM shall present the relevant analysis and design methodologies, criteria, analysis results, design calculations, and quantity estimates. In particular, the TM shall include at least the following information:

- Analytical methods and types of structural analysis;
- Assumptions and approximations which are made to simplify the analysis;
- Dynamic components used and how they were applied to the structure as seismic loads;
- Summary of the steps which are taken to perform the structural analysis;
- Modeling assumptions and computer programs which are used for any finite element analysis;
- Loading conditions considered in design;
- Structural classification of the structure;
- Design basis, concept, and criteria;
- Stability analysis and results;

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- Pertinent analysis results ;
- Design calculations showing capacities of the structure to resist the demands;
- Demand-capacity evaluation; and
- Design Results.

The final design TM shall be reviewed by USACE personnel and the JV shall revise and resubmit the final TM until approved by the USACE Structural Lead.

3. PROJECT TEAM

Figure 1 shows an organization chart of the project team. The project management team consists of the JV Program Manager: Said Salah-Mars and the JV Task Order Manager: Mourad Attalla. Structural task leads are Ali Afrasiabi leading the Structural Analysis Group, Vincenzo Melchiorre leading the Structural Design Group, Fabiola Macias-Wallis leading the Technical Reports Group, Cliff Owyong leading the CADD Design Group, and Chao Gong and M.L. Handa leading the Specifications Group. Chao Gong will assume the role of technical supervision for design and analysis activities and will lead the detailed checking (technical review) of all technical work. Camilo Quinones and Jerry Wu will be the geotechnical engineers and David Simpson will be the geology lead. M.L. Handa, Senior Cost Estimator will head the Quantities & Constructability Review. The Independent Technical Review (ITR) will be conducted through URS senior staff as listed in Section 4. Michael Forrest, G.E., will be the Quality Control Officer to coordinate and audit the overall implementation of the QA/QC procedures and report the audit results and corrective action to the Task Order Manager and Program Manager.

An internal Technical Advisory Panel (TAP) is formed from senior staff with each of the members having over 25 years of experience to conduct a high-level review of the concepts, criteria, and methodology. The TAP members include:

- Dr. Said Salah-Mars, Vice President, Oakland Office Manager, and Principal Geotechnical Engineer with over 30 years of expertise in dams and geotechnical and seismic engineering.
- Dr. Lelio Mejia, P.E., G.E., Vice President and Principal Engineer with over 30 years of experience in earthquake engineering, geotechnical engineering, and dam engineering.
- Mr. Stephen Hom, P.E., SECB, LEED AP, F. ASCE, Senior Principal Engineer, URS Oakland Office with over 40 years of experience in structural engineering analysis and design.

4. INDEPENDENT TECHNICAL REVIEW

An Independent Technical Review (ITR) will be carried out by the JV for all work products before submitting to the Corps. The ITR shall be concerned with reviewing the work for compliance with standard engineering and professional practices, adequacy of the scope of the associated document, appropriateness of the data used, and accuracy of the results. The ITR shall not be actively involved in the analysis performed under the scope of work for the Task Order. The ITR process will be carried out by senior URS staff. The ITR will cover all deliverables to the Corps including design technical memoranda, design drawings, and specifications. Specifically, the following senior staff members are designated as the ITR reviewers for TO 21:

- Michael Forrest, P.E., G.E., Vice President, Water Engineering Department Manager at the URS Oakland Office (38 years of experience).
- Stephen Hom, P.E., SECB, LEED AP, F. ASCE, Senior Principal Engineer, URS Oakland Office (40 years of experience).
- Farhad Shahpar, P.E., Principal Engineer, URS Oakland Office (30 years of experience).
- Myron Humeny, P.E., S.E., Principal Engineer, URS San Francisco Office (30 years of experience).
- Rajendram Arulnathan, Ph.D., P.E., G.E., Earthquake Engineering Group Manager, URS Oakland Office (12 years of experience).

The ITR process is concerned with a high-level review of the deliverable. In addition to the ITR process, a technical review (Detailed Checking Review or DCR) is performed internally by the JV, in which the calculations and/or analyses are checked. The DCR will be performed by project team members other than those performing the calculations and/or analysis. The DCR reviewer will have an equal or more experience than the designer.

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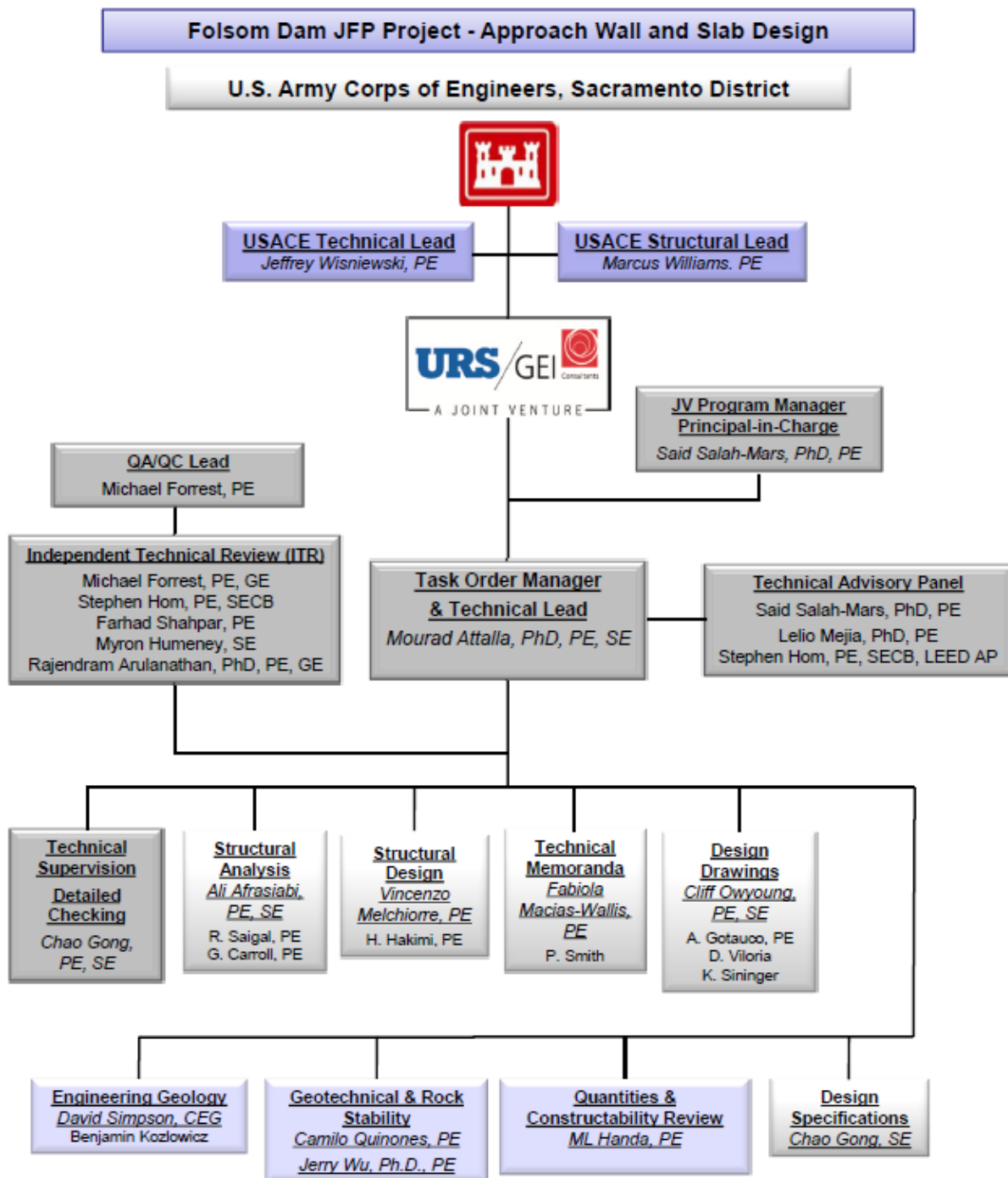


Figure 1: Organization Chart for Task Order 21

5. PROJECT MANAGEMENT AND QUALITY ASSURANCE

A project management plan, known as a Project Execution Plan (PXP) will be developed for this Task Order. Included in the PXP is the Quality Assurance Plan (QAP) documenting the necessary QA/QC procedures. This Quality Control Plan (QCP) reflects the requirements in the QAP.

6. COMMUNICATIONS

All technical communications will be transmitted between the Joint Venture's Task Order Manager, Mourad Attalla, and the Corps District's Structural Lead, Marcus Williams, and the Corps Technical Lead, Jeffrey Wisniewski. Administrative and contractual communication will be between the same. The JV Program Manager retains contracting authority. The Task Order Manager is responsible to promptly bring contractual matters to the attention of the JV Program Manager.

Whenever possible, communications between the JV and the Corps will be in writing. When verbal communications are held, they will be followed by written confirmation. To expedite the transfer of information, whenever possible, correspondence will be e-mailed or faxed and followed by the original documents using first class mail or courier. The Task Order Manager will prepare minutes of project meetings and distribute them to the meeting participants. We will also prepare summaries of significant discussions and telephone conversations and send them via e-mail to the District's Structural Lead soon after these discussions or telephone conversations have taken place.

The following subsections provide specific procedures for telephone conversations, emails, and deliverables:

1. Records of Telephone Conversations

Records of telephone conversations are to be completed for every telephone contact for which information is collected, decisions are made, or plans are arranged. The project employee who had the conversation is responsible for preparing the record of telephone conversation, and the appropriate project personnel will be copied on all such records. E-mail records will suffice for this activity and should also be sent to the other party involved for concurrence.

2. E-mails

For e-mails, the subject line will include a reference to the project name and purpose of the e-mail. The e-mails should identify the responsible person for the action item and when the action item is due. Individuals copied on the e-mail will be for information purposes. Acknowledgment of e-mails should be within one working day.

The URS Program Manager and senior JV team members participating in this Task Order will be copied on all e-mail correspondence.

All e-mail correspondence is subject to the same Independent Technical Review criteria and procedures as other deliverables where conclusions, recommendations or technical opinions are rendered.

3. Deliverables

Cover letters, signed by the Program Manager, or designee, will accompany all deliverables.

Footers showing the file path are required on all documents. All deliverables will have the QA documentation in place prior to submittal to the Corps. A Quality Control Certifications (QCC), according to URS Quality Policy, shall accompany all deliverables to the Corps, documenting that all the quality requirements have been satisfied and that all concerns identified in the ITR have been resolved.

7. CALCULATIONS

1. General

The calculations will include the basic procedures, references supporting the method of calculation, and the references supporting the selection of parameters used. Each calculation package to be sent for checking will include a calculation cover sheet and the following items, as a minimum:

- a. A concise statement of the purpose for the calculation.
- b. A listing of the inputs to the calculation and their sources.
- c. If parameter choices are taken from a reference, then the title page of the reference and the page(s) from where the parameters were taken or derived will be attached to the calculation documentation.
- d. A listing of the models/methodologies used in the calculation.
- e. If a validated commercial modeling/calculation package is used, the model documentation will include the basics concerning the program: name, vendor, version, etc.
- f. If hand calculations or spreadsheet-based calculations are used, and formulas are taken from a standard reference, the title page of the standard reference and the page(s) from where the formulas were derived will be attached to the calculation documentation.
- g. A summary of the calculation results.
- h. The calculations themselves. Computer files will be attached and documented per the project QA Plan.

Calculations will be performed per URS standard QA procedures with the following additional guidance:

- a. If spreadsheets are used for calculations, spot hand checks will be shown on the spreadsheets. Reference citations will include attachment of the reference title page and the page from which the formula/method was derived. The source of parameters used in the spreadsheet will be documented in a similar manner. If the same spreadsheet form is used several times with multiple values of parameters, the spreadsheet need only be documented in this detail once.
- b. If a commercial (validated) computer model is used, the input file to the program will be attached to the calculation. Each value input to the model will be documented by source, by hand annotations to the input file. Reference citations for input parameters will include attachment of the reference title page and the page from which the parameter was taken. If the source of the input parameter is a calculation, the document reference number for the calculation, and a page number from the calculation will be referenced.

2. Hand Calculations

Hand calculations are to be legible, well organized, and indexed at the beginning of the file in which they are contained. Standard calculation sheets should be used for all hand-calculations, and all required information (project name, calculation description, project number, date, and originator's first initial and last name) will be completed on each page of the calculations. When calculations have been completed, a competent, qualified civil/structural/geotechnical engineer will check them. Comments from the designated checker will also be included in the project file.

3. Computer Calculations

Calculations that are completed by computer runs will be printed and stored with the date of the computer run, the iteration of the run if applicable, and the path of the file if the run is saved. The originator of the computer run will verify that all the noted information is included on the run printout and initial the first page of the computer run. The reviewer performing the DCR shall check the input data and spot-check sample output data. All computer runs will be kept in the design calculation files. Superseded runs will be so noted, dated, and initialed by the originator. Team staff will only use computer programs for which verification has been filed in the project QA file.

8. MEETINGS

Following the Notice to Proceed (NTP), the Task Order Manager will host a kick-off meeting or conference call attended by all JV pertinent project personnel. The Task Order Manager will also host meetings, both scheduled and on an as-needed basis, with the project team. The Task Order Manager will be responsible for communicating all

instructions and directions from the Corps to other members of the project team, and for transmitting all concepts and questions from the project team to the Corps. Weekly coordination meetings will be held at URS Oakland office to discuss and resolve technical issues. The meetings will be attended by the USACE Structural Lead, USACE Technical Lead, URS Task Order Manager, and members of the design team as needed.

9. SUBMITTALS

1. Progress Reports: The JV shall prepare progress/status reports to be delivered by the 10th of each month. Progress reports shall be brief (1-2 pages), describing work performed and a quantitative statement of overall work progress, including percentage of work accomplished on each task and submittal. It shall also include a description of the current problems that may impede performance of the tasks outlined in this SOW and suggest corrective actions. This report shall discuss work to be performed in the next two (2) week time frame and contain a current submittal schedule. Progress reports shall be mailed to the Project Manager and the A-E Administration Section.
2. Required Submittals: The following are the required submittals for Task Order #21:
 - a. Task 2 – Alternative Recommendation Memorandum: The JV shall develop and electronically submit an Alternative Recommendation Memorandum to the USACE Structural Lead in .PDF and .DOC formats. The contents of this memo shall comply with the description in Section 2, Task 2 of this document. Within seven (7) calendar days of receipt of the Alternative Recommendation Memorandum, USACE personnel will review the memorandum and the USACE Structural Lead will provide notification of approval or disapproval.
 - b. Task 3 – Approach Wall Analysis & Design Memorandum and Quality Control Plan: The JV shall develop and electronically submit an Approach Wall Analysis & Design Memorandum and a Quality Control Plan to the USACE Structural Lead in .PDF and .DOC formats. The contents of these documents shall comply with the descriptions of Section 2, Task 3. Within seven (7) calendar days of receipt of the Approach Wall Analysis & Design Memorandum and Quality Control Plan, USACE personnel will review the documents and the USACE Structural Lead will provide notification of approval or disapproval.
 - c. Task 4 – 65% Analysis & Design Submittal: The JV shall comply with the requirements of Section 2 Task 4 in submitting the 65% Plans & Specifications and Interim Design TM. All JV submittals shall be peer reviewed prior to submittal in accordance with Section 4. The JV shall include all QC comments and responses as an attachment to each submittal.
 - Task 4A – 65% Plans & Specifications: The 65% Plans & Specifications Submittal shall include the following:

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- Three (3) hard copies of the 65% Design Plans on 11 x 17 half-size sheets;
 - Three (3) hard copies of the 65% Design Specifications developed using SpecsIntact;
 - 2011 AutoCad files for all design drawings;
 - PDFs for all design drawings;
 - Electronic files of all computer analysis models pertinent to the 65% design submittal;
 - All Excel spreadsheets used in analysis and design;
 - All Mathcad calculations used in analysis and design;
 - All supporting calculations used in analysis and design will be submitted in the original format including Microsoft Excel spreadsheets, Mathcad, and SAP 2000.
- Task 4B – Interim Design Technical Memorandum: The Interim Design TM shall comply with the requirements described in Section 2 Task 4.2. The Contractor shall develop and electronically submit an Interim Design TM to the USACE Structural Lead in .PDF and .DOC format.
- d. Task 5 – 65% Review Conference: The JV shall submit PowerPoint Presentations and a Comment Response Memorandum to the USACE Structural Lead in accordance with the requirements of Section 2, Task 5.
- Task 5A – 65% PowerPoint Presentation: The PowerPoint presentation to be delivered at the 65% ATR shall be electronically submitted to the USACE Structural Lead seven (7) calendar days prior to the start of the conference. USACE personnel will review the presentation and the USACE Structural Lead will provide comments or approval within three (3) calendar days. The presentation shall be revised and resubmitted as needed until approved by the USACE Structural Lead.
 - Task 5B – ATR Comment Response Memorandum: Upon conclusion of the ATR, the JV will have three weeks (21 calendar days) to submit the ATR Comment Response Memorandum. USACE personnel will review the memorandum and the USACE Structural Lead will provide comments or approval within seven (7) calendar days. The Memorandum shall be revised and resubmitted until approved by the USACE Structural Lead.
- e. Task 6 – 95% Analysis & Design Submittal: The JV shall comply with the requirements of Section 2 Task 6 in submitting the 95% Design Plans & Specifications and Draft Final Design TM to the USACE Structural Lead. All JV submittals shall be peer reviewed prior to submittal in accordance with Section 4. The JV shall include all QC comments and responses as an attachment to each submittal.

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- Task 6A – 95% Plans & Specifications: The 95% Plans & Specifications Submittal shall include the following:
 - Three (3) hard copies of the 95% Design Plans on 11 x 17 half-size sheets;
 - Three (3) hard copies of the 95% Design Specifications developed using SpecsIntact;
 - 2011 AutoCad files for all design drawings;
 - PDFs for all design drawings;
 - Electronic files of all computer analysis models pertinent to the 95% design submittal;
 - All Excel spreadsheets used in analysis and design;
 - All Mathcad calculations used in analysis and design;
 - All supporting calculations used in analysis and design will be submitted in the original format including Microsoft Excel spreadsheets, Mathcad, and SAP 2000.
- Task 6B – Draft Final Design Technical Memorandum: The Draft Final Design TM shall comply with the requirements of Task 6B in Section 2. The Contractor shall develop and electronically submit an Interim Design TM to the USACE Structural Lead in .PDF and .DOC formats.
- f. Task 7 – 95% Review Conference PowerPoint Presentation –The PowerPoint presentation to be delivered at the 95% Review Conference shall be electronically submitted to the USACE Structural Lead seven (7) calendar days prior to the start of the conference. The presentation shall conform to the description listed in Section 2, Task 7. USACE personnel will review the presentation and the USACE Structural Lead will provide comments or approval within three (3) calendar days. The presentation shall be revised and resubmitted as needed until approved by the USACE Structural Lead.
- g. Task 9 – 100% Design Submittal – The JV shall comply with the requirements of Section 2, Task 9 in submitting the 100% Plans & Specifications and Final Design TM to the USACE Structural Lead. All JV submittals shall be peer reviewed prior to submittal in accordance with Section 4. The JV shall include all QC comments and responses as an attachment to each submittal.
 - Task 9A – 100% Plans & Specifications: The 100% Plans & Specifications Submittal shall include the following:
 - Three (3) hard copies of the 100% Design Plans & Specifications on 11 x 17 half-size sheets;
 - 2011 AutoCad files for all design drawings;
 - PDFs for all design drawings;

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- Electronic files of all computer analysis models pertinent to the 65% design submittal;
 - All Excel spreadsheets used in analysis and design;
 - All Mathcad calculations used in analysis and design;
 - All supporting calculations used in analysis and design will be submitted in the original format including Microsoft Excel spreadsheets, Mathcad, and SAP 2000.
- Task 9B – Final Design Technical Memorandum: The Draft Final Design TM shall comply with the requirements of Section 2, Task 9.2. The JV shall develop and electronically submit an Interim Design TM to the USACE Structural Lead in .PDF and .DOC format.
3. Document Formats:
- a. The 65%, 95%, and 100% submittals will be provided to the Corps in both hardcopy and electronically.
 - b. All text documents will be prepared in a Word compatible format.
 - c. All spreadsheets will be prepared in an Excel compatible format.
 - d. All drawings will be prepared in a current version of an AutoCAD compatible format.
 - e. Reports shall be prepared on 8-1/2"x11" or 11"x17" charts and graphs where required.
 - f. Units will be in English.

4. Documents Submittals:

For the 65%, 95%, and 100% submittals, the following copies will be prepared and submitted to the Corps:

- a. Three (3) hard copies of the 65% Submittal and one electronic version in Adobe PDF format. The QCC, along with all review comments from the JV's ITR and JV's responses to the comments will be included in an appendix.
- b. Three (3) hard copies of the 95% Submittal along with an electronic version in Adobe PDF format.
- c. Three (3) hard copies of the 100% Submittal along with electronic versions in both Microsoft Word and Adobe PDF formats, along with 1 CD containing:
 - 1) the structural finite element models with input and output files (if applicable);
 - 2) the electronic versions of the 100% submittal in both Microsoft Word and Adobe PDF formats; and

- 3) all supporting calculations and analysis results that are not included in the 100% submittal. The QCC, along with all review comments from the JV's ITRs and JV's responses to the comments will be included in an appendix.

10. PROJECT SCHEDULE

All work and services shall be completed by March 31, 2013. The submittal milestone dates for the base tasks of this Task Order are shown in Table 1. Submittal schedule for specific tasks are based on the SOW as follows:

1. Task 2 - Alternative Recommendation Memorandum: The JV shall develop and electronically submit a Draft Alternative Recommendation Memorandum to the USACE Structural Lead in .PDF and .DOC formats thirty-one (31) calendar days after the effective date of this task order. The Corps shall review and return the submittal not later than February 12, 2012.

Final Submittal: The JV will submit the final document (in Adobe PDF and Microsoft Word formats) to the Corps no later than seven (7) calendar days following the receipt of the Corps' comments on the draft submittal.

2. Task 3 - Approach Wall Analysis & Design Memorandum and Quality Control Plan: The JV shall develop and electronically submit an Approach Wall Analysis & Design Memorandum and a Quality Control Plan to the USACE Structural Lead in .PDF and .DOC formats forty-six (46) calendar days after the effective date of this task order. Within seven (7) calendar days of receipt of the Approach Wall Analysis & Design Memorandum and Quality Control Plan, USACE personnel will review the documents and the USACE Structural Lead will provide notification of approval or disapproval
3. Task 4 – 65% Analysis & Design Submittal: The JV will submit the 65% Plans & Specifications and Interim Design TM within eighty-six (86) calendar days of the effective date of this task order.
4. Task 5 – 65% Review Conference: The JV shall submit PowerPoint Presentations and a Comment Response Memorandum to the USACE Structural Lead within eighty-nine (89) and one hundred twenty three (123) calendar days respectively of the effective date of this task order.
5. Task 6 – 95% Analysis & Design Submittal: The JV will submit the 95% Design Plans & Specifications and Draft Final Design TM to the USACE Structural Lead within two hundred nineteen (219) calendar days from the effective date of this task order.
6. Task 7 – 95% ATR/SAR PowerPoint Presentation: The PowerPoint presentation to be delivered at the 95% ATR/SAR shall be electronically submitted to the USACE Structural Lead seven (7) calendar days prior to the start of the conference. USACE

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personnel will review the presentation and the USACE Structural Lead will provide comments or approval within three (3) calendar days. The presentation shall be revised and resubmitted as needed until approved by the USACE Structural Lead.

7. Task 9 – 100% Design Submittal: The JV will submit the 100% Plans & Specifications and Final Design TM to the USACE Structural Lead within three hundred three (303) calendar days from the effective date of this task order.

Table 1: Project Submittal Milestone Schedule

Milestone	# of Calendar Days from NTP	Date
Effective Start Date	--	1/4/2012
Draft Alternative Recommendations Memo	31	2/4/2012
Final Alternative Recommendations Memo	-- ¹	-- ¹
Analysis and Design Memo and QCP	46	2/19/2012
65% Plans and Specs & Interim Design Technical Memo	-	3/30/2012
65% Review Conference	96	4/9/2012
Power Point Presentation (Submit to the Corps)	89	4/2/2012
ATR Comment Response Memo	123	5/6/2012
95% Plans and Specs and Draft Final Design Technical Memo	219	8/10/2012
95% Review Conference	229	8/20/2012 (TBD)
Power Point Presentation (Submit to the Corps)	222	8/13/2012
Progress Meetings with USACE	-	Weekly
100% Plans and Specs and Final Design Technical Memo	-	11/2/2012
Final Completion	452	3/31/2013

Notes: ¹ JV shall submit final document seven (7) calendar days following receipt of the Corps' comments on the draft Alternative Recommendations Memo.



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF:

CESPK-ED-JF

31 August 2012


MEMORANDUM FOR Commander, South Pacific Division, ATTN: CESPD-PD-C,
(Ms. Berresford)

SUBJECT: Review Plan for the American River Watershed Project, Folsom Dam Joint Federal Project (JFP), Auxiliary Spillway, California

1. The enclosed review plan for the Auxiliary Spillway of the Folsom Dam Joint Federal Project has been prepared in accordance with EC 1165-2-209. This Review Plan was previously coordinated with representatives from CESPD-RBT (Mr. Norko) and CEIWR-RMC (Mr. Allen). All known comments submitted by CESPD-BTD and CEIWR-RMC have been addressed in the attached version of the Review Plan.
2. This Review Plan describes the overall quality management strategy and activities anticipated for the subject project. Mr. Matthew D. Hanson of NWP is currently serving as the ATR Chairman. A joint venture of PBI/CYS has been selected and is serving as the A-E firm facilitating the Type II Independent External Peer Review (IEPR).
3. CESPK requests written approval of the enclosed Review Plan for the Auxiliary Spillway of the Folsom Dam Joint Federal Project dated August 2012 by the RMO in accordance with EC 1165-2-209.
4. The CESPK-ED point of contact for this Review Plan is Mr. Eric E. Nagy. Please contact Mr. Nagy if you have any questions at (916) 557-7350.

FOR THE COMMANDER:

Encl


RICK L. POEPELMAN, P.E.
Chief, Engineering Division