



US Army Corps
of Engineers®

Prepared by:

Southwestern Division
Fort Worth District

Joe Pool Dam Slide Repairs (NID # TX08007, CWIS # 009420, P2 # 483666) Review Plan – PED/Construction

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MSC Approval Date: 18-Aug-2020

Last Revision Date:

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Section 1

Introduction

1.1 Purpose

This Review Plan (RP) for Joe Pool Dam Slide Repairs (P2483666), will help ensure a quality-engineering project is developed by the Corps of Engineers in accordance with EC 1165-2-217, “Review Policy for Civil Works”. As part of the Project Management Plan this RP establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products and lays out a value-added process and describes the scope of review for the current phase of work. The EC outlines five general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Biddability, Constructability, Operability, and Sustainability (BOCES) Review, and Policy and Legal Compliance Review. This RP will be provided to Project Delivery Team (PDT), DQC, ATR, and BCOES Teams. The technical review efforts addressed in this RP, DQC and ATR, are to augment and complement the policy review processes. The District Chief of Engineering has assessed that the life safety risk of this project is not significant; therefore a Type II IEPR/Safety Assurance Review (SAR) will not be required, see Paragraph 6.1.

1.2 References

- EC 1165-2-217, Review Policy for Civil Works, 20 February 2018
- ECB 2019-15, Interim Approach for Risk-Informed Designs for Dam and Levee Projects, 08 October 2019
- ER 1110-1-12, Quality Management, 31 Mar 2011
- ER 415-1-11, Biddability, Constructability, Operability, Environmental and Sustainability (BCOES) Reviews, 1 January 2013
- ER 1110-2-1156, Safety of Dams – Policy and Procedure, 31 Mar 2014
- EM 1110-2-1913 Design, Construction, and Evaluation of Levees, 30 April 2000
- Project Management Plan (PMP) for study
- MSC and/or District Quality Management Plan(s)

1.3 Review Management Organization

Southwestern Division is the Review Management Organization (RMO) for this project. This RP will be updated for additional project phases and for the construction phase.

Section 2

Project Description

2.1 Project Description

Joe Pool Dam is a high hazard potential dam located on river mile 11.2 of Mountain Creek, a tributary to the West Fork of the Trinity River, near Grand Prairie, Texas. The dam consists of an embankment, an outlet works, a broad-crested uncontrolled spillway and a dike. All elevations are reported in NAVD88 unless noted otherwise. The conversion from NGVD29 to NAVD88 is -0.017 feet. The embankment is a rolled, earth fill structure that is 22,180 feet long, with a crest width of 30 feet, a crest elevation of 564.5 feet, and a maximum height of 108.5 feet above the streambed.

Joe Pool Dam is classified as a Dam Safety Action Classification (DSAC) 3 (Moderate Urgency) per the 2013 Periodic Assessment due primarily to overtopping erosion after shallow slope failure, scour through a shutdown layer in the embankment, scour through a fault, and overtopping after a deep-seated slope failure

Joe Pool Dam has a history of downstream slope stability concerns. The project has suffered multiple slides including a major slide during first filling in January 1989. In the project vicinity a massive slide has occurred at the Lake Ridge Parkway Bridge in the Eagle Ford Shale unit of the foundation. The crest of the embankment contains numerous longitudinal cracks for which a formalized monitoring plan has not been developed. The piezometers in the embankment indicate that pore pressures within the foundation materials are high and still dissipating pore pressures developed as a result of fill placement during construction. The slides are attributed to steepness of the slope, material type and strength, depth of shrinkage cracks, rainfall amount and frequency, etc. The slides have occurred after or during heavy rainfall. It is thought that the triggering mechanism causing the slides is water entering vertical shrinkage cracks, traveling along unseen shrinkage cracks probably paralleling the slope, saturating the soil and softening the potential failure surfaces.

The Joe Pool Dam Slide Repairs Project will be a total of 9 shallow slides repairs; 8 shallow slides on the upstream slope and 1 shallow slide on the downstream slope of the embankment dam. Figure 2 depict slide locations. The estimated cost of the project is \$5,000,000.

Table 1. Summary of Slides

Slide #	Date Identified	Location w/r Centerline	Slide Limits		Offset from Centerline	Slope	Remarks
1	24 Feb 2018	Upstream	94+74 ¹	96+14 ¹	15	2.8H:1V	2020 Repair
2	24 Feb 2018	Upstream	81+92 ¹	84+00 ¹	15	2.8H:1V	2020 Repair
6	22 Aug 2018	Upstream					2020 Repair
3	26 Feb 2018	Upstream	70+23 ¹	71+67 ¹	15	2.8H:1V	2020 Repair
7	16 Oct 2018	Upstream	60+32 ¹	61+40 ¹	15	2.8H:1V	2020 Repair
9	25 Oct 2018	Downstream	73+00 ¹	74+05 ¹	15	2.8H:1V	2020 Repair

11	16 Oct 2019	Upstream	20+53 ⁴	22+07 ³	15	3H:1V	2020 Repair
12	02 Dec 2019	Upstream	27+60	29+40 ⁴	15	3H:1V	2020 Repair
13	28 May 2020	Upstream	11+00	13+00	15	3H:1V	2020 Repair

¹ Slide limits were estimated on 03 May 2019.

² Slide limits were estimated on 28 February 2019.

³ Slide limits were estimated on 01 April 2019.

⁴ Slide limits were estimated on 15 November 2019 by Paul Thomas (GIS Specialist).

The repair will consist of removal of slide material, bench-cut into undisturbed embankment material into the embankment section and on both sides of the slide, excavation of a key into the foundation material at the toe beneath the slope, and replacement of the removed embankment and foundation material with compacted, lime-treated embankment material. The benched cuts is intended to bond the repair with the existing embankment.

The surface of the repair is designed to match the existing conditions modeled off of the surface interpolation, which should closely match as-built conditions. Excavation shall extend 50 feet to both sides of the slide to ensure full removal of the slide mass and allow proper benching into the existing embankment. The typical section of the benches shall consist of 2 to 4-feet deep near vertical (sloped at approximately 1H:10V) and 2 to 4-feet wide near horizontal (surface of excavation should be graded to drain) that staircase down from the top of the repair near the crest to the bottom near the toe and at least 2 feet behind and below the slip surface or likely potential slip surface as shown in Figures 8 through 10, whichever is applicable based on location. The near vertical cut of each bench shall be slightly sloped, to improve bonding between the fill and the existing embankment material. These benches should be used to tie the repair into the original embankment and provide a stable excavation surface graded to drain during construction.

Figure 1: Project Location Map

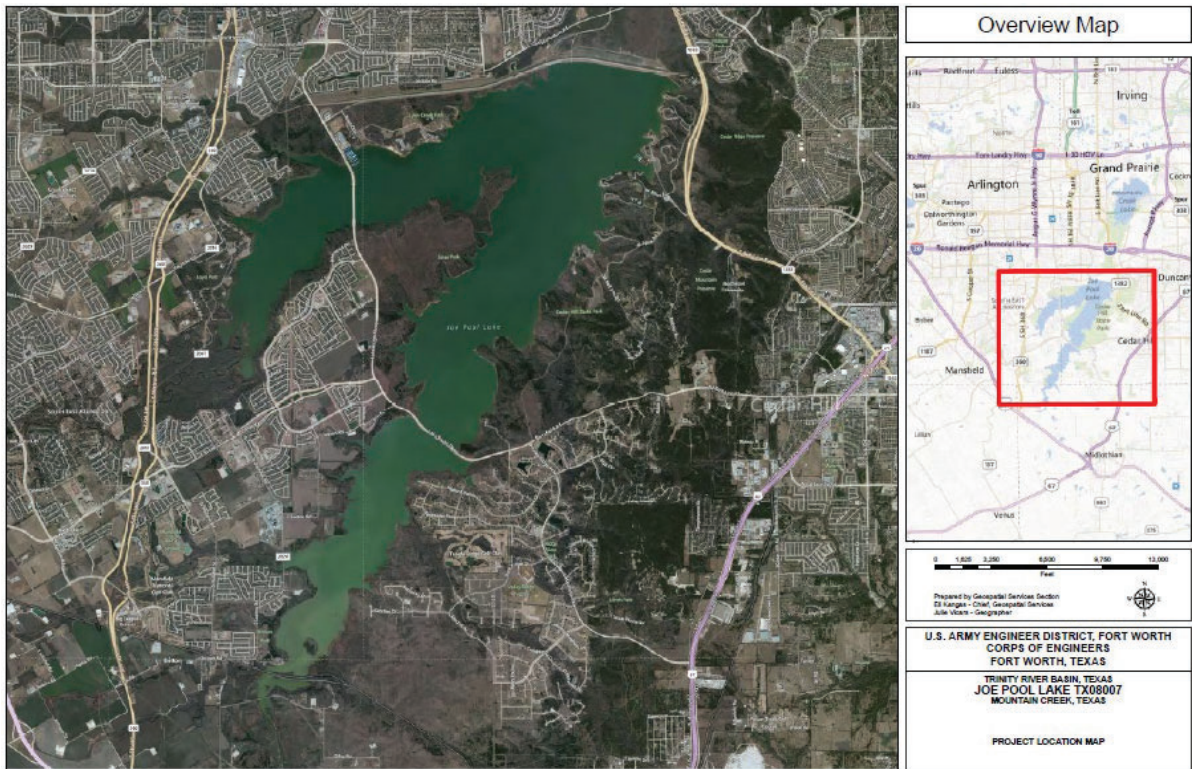


Figure 2: Joe Pool Lake Overview and Slide Location
(Slides #4, #5, #8, and #10 have been repaired)



Figure 3: Slide #1



Figure 4: Slide #2 & #6



Figure 5: Slide #3



Figure 6: Slide #7



Figure 7: Slide #9



Figure 8: Slide #11



Figure 9: Slide #12



Figure 10: Slide #13



Figure 11: Typical Section of Existing and Proposed Conditions for Slides #1, 3, 7, 11, 12 and 13

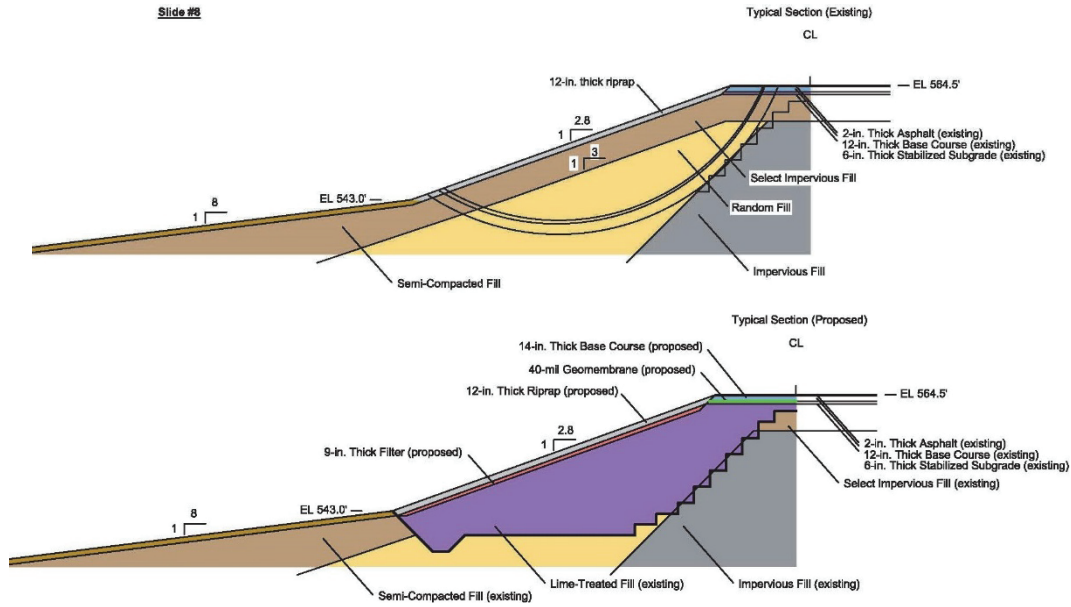


Figure 12: Typical Section of Existing and Proposed Conditions for Slide #2 and #6

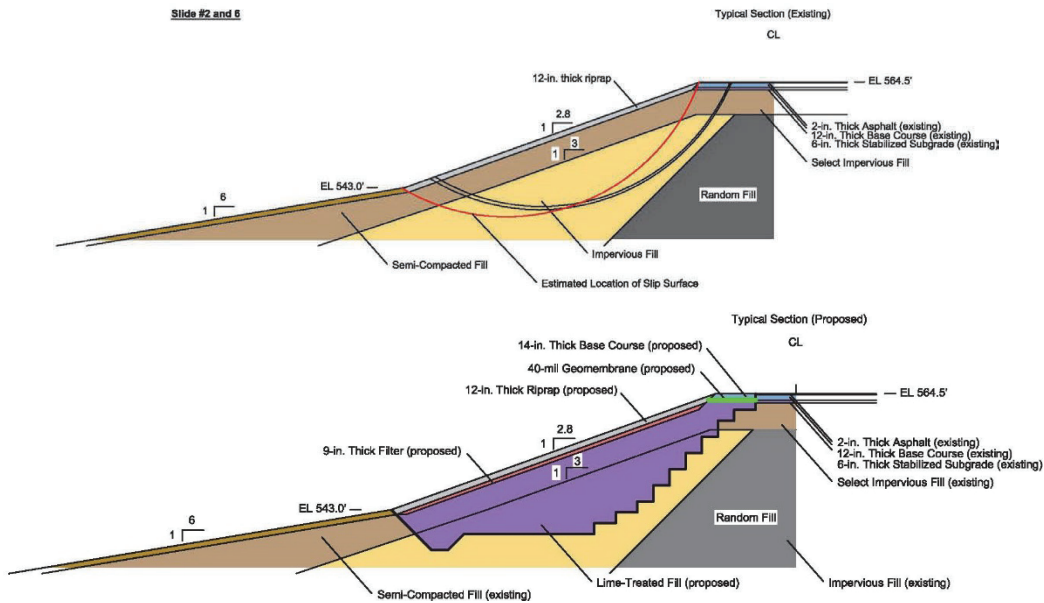
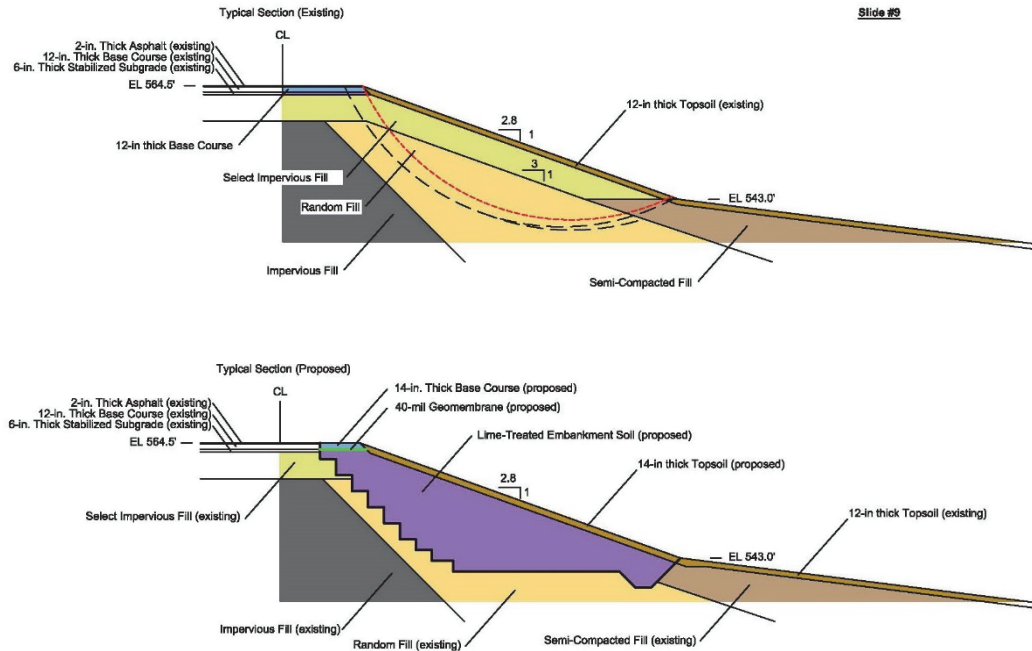


Figure 13: Typical Section of Existing and Proposed Conditions for Slide #9

2.2 Project Sponsor

Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, policy and legal compliance, and BCOES reviews. Sponsor Peer Review of In-Kind Contributions - There will not be in-kind contributions for this effort.

Section 3

District Quality Control

3.1 Requirements

All implementation documents (including supporting data, analyses, reports, environmental compliance documents, water control manuals, etc.) shall undergo DQC in accordance EC 1165-2-217. The District shall perform these minimum required reviews in accordance with District's Quality Management Plan, https://www.publications.usace.army.mil/Portals/76/Publications/EngineerCirculars/EC_1165-2-217.pdf?ver=2018-05-01-105219-217.

A 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). The home district shall manage the

DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they should not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Quality Checks include a review of the alternatives considered, schedules, budgets, means and methods of construction, and have lessons learned been considered. DQC is assuring the math and assumptions are correct by having a checker initial each sheet of the computations. Additionally, the PDT is responsible to ensure consistency and effective coordination across all project disciplines during project design and construction management.

See Attachment 1, Table 6 for the DQC Lead, reviewers, and reviewer’s disciplines.

3.2 Documentation

Documentation of DQC activities is required and will be documented using DrChecks.

3.3 DQC Schedule and Estimated Cost

Although DQC is always seamless, the following milestone reviews are schedule in Table 2. The cost for the DQC is approximately \$15,000.

Project Phase/Submittal	Review Start Date	Review End Date
DQC 60% P&S Review	29 May 2020	24 Jul 2020
DQC Final P&S Review	8 Sep 2020	25 Sep 2020
Note: Include all other relevant reviews. This should include DQC reviews scheduled outside of the traditional milestone reviews.		

Table 2 DQC Schedule

Section 4

Agency Technical Review

4.1 Requirements

All implementation documents (including supporting data, analyses, reports, environmental compliance documents, water control manuals, etc.) shall undergo ATR in accordance EC 1165-2-217. ATR reviews will occur seamlessly, including early involvement of the ATR team for validation of key design decisions, and at the scheduled milestones as shown in Section 4.6. A site visit will not be scheduled for the ATR Team.

The ATR will assess whether the analyses presented are technically correct, went through robust DQC, and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. The PDT should obtain ATR agreement on key

data such as hydraulic and geotechnical parameters early in design process. The goal is to have early involvement of ATR team, especially when key decisions are made. The ATR Lead should be invited virtually to all PDT meetings, in order to understand the design efforts and to know when to engage other ATR members for key decisions. Value added Lessons Learned from the ATR team should be shared early on to have the best chance of being adopted by the PDT. Most of the ATR effort should be accomplished midway through the design effort; after completion of design the ATR effort will check that the effort agreed to at mid point was accomplished.

This is consistent with the requirement that the ATR members shall not be involved in the day-to-day production of the project/product.

The four key parts of a quality review comment will normally include:

- (1) The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures;
- (2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
- (3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
- (4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

4.2 Documentation of ATR

Documentation of ATR will occur using the requirements of EC 1165-2-217. This includes the four-part comment structure described in paragraph 4.1 and the use of DrChecksSM.

4.3 Products to Undergo ATR

The Plans and Specifications will undergo review by the ATR team.

4.4 Required Team Expertise and Requirements

ATR teams will be established in accordance with EC 1165-2-217. The following provides an estimate of the disciplines and experience required for the ATR of Joe Pool Dam Slide Repairs. The ATR team will be chosen based on each individual’s qualifications and experience with similar projects. All EC reviewers will be certified in CERCAP:

<https://maps.crrel.usace.army.mil/apexcrrel/f?p=123:LOGIN:3633789766540::::>

The following disciplines will be required for ATR of this project:

ATR Lead: The ATR team lead is a senior professional outside the home MSC with extensive experience in preparing Civil Works documents and conducting ATRs. The lead has the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline, in this case, Geotechnical Engineering.

Geotechnical Engineer - shall have experience in the field of geotechnical engineering, analysis, design, and construction of (Insert type ex. mass concrete) dams. The geotechnical engineer shall have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion protection design, and earthwork construction. The geotechnical engineer shall have knowledge and experience in the forensic investigation of seepage, settlement, stability, and deformation problems associated with high head dams and appurtenances constructed on rock and soil foundations.

4.5 Statement of Technical Review Report

At the conclusion of each ATR effort, the ATR team will prepare a review report with a completion and certification memo. The report will be prepared in accordance with EC 1165-2-217.

4.6 ATR Schedule and Estimated Cost

Although ATR is always seamless, the preliminary ATR milestone schedule is listed in Table 3. The cost for the ATR is approximately \$10,000.

Project Phase/Submittal	Review Start Date	Review End Date	Site Visit
ATR 60% P&S Review	27 Jul 2020	31 Jul 2020	
ATR Final P&S Review	28 Sep 2020	2 Oct 2020	
Note: Include all other relevant reviews. This should include ATR reviews scheduled outside of the traditional milestone reviews.			

Table 3 ATR Schedule

Section 5 BCOES Review

5.1 Requirements

All implementation documents (including supporting data, analyses, reports, environmental compliance documents, water control manuals, etc.) shall undergo BCOES review in accordance ER 415-1-11 and ER 1110-1-12. BCOES reviews are done during design for a project using the design-bid-build (D-B-B) method or during development of the request for proposal (RFP) for a design-build (D-B) project. The BCOES review results are to be incorporated into the procurement documents for all construction projects.

5.2 Documentation of BCOES

The BCOES review will be documented using DrChecksSM. The BCOES reviewers will include local sponsors' facility operators and maintenance staff, as well as construction, operations, and environmental staff to improve the BCOES aspects of designs. The BCOES roster is provided in Attachment 1.

Section 6

Safety Assurance Review

6.1 Decision on SAR

The District Chief of Engineering has made a risk-informed-decision that this project poses/does not pose a significant threat to human life (public safety) and therefore a SAR will not be performed.

6.2 Policy and Legal Compliance Review

All implementation documents will be reviewed throughout the project for law and policy compliance. These reviews culminate in reported recommendations, supporting analyses, and coordination that comply with law and policy. These items warrant approval or further recommendation to higher authority by the home MSC Commander. DQC (Product Review) and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies.

Section 7

Public Posting of Review Plan

As required by EC 1165-2-217, the approved RP will be posted on the District public website (<https://www.swf.usace.army.mil/About/Organization/PPMD/Peer-Review-Plans/>). This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the RP are necessary.

Section 8

Review Plan Approval and Updates

The MSC Commander, or delegated official, is responsible for approving this RP. The Commander's approval reflects vertical team input (involving the District, MSC, and RMC) as to the appropriate scope, level of review, and endorsement by the RMC. The RP is a living document and should be updated in accordance with 1165-2-217. Commander approval will be documented in an Attachment to this plan. All changes made to the approved RP will be documented in Attachment 3, Table 11 RP Revisions. The latest version of the RP, along with the

Commanders' approval memorandum, will be posted on the District's webpage and linked to the HQUSACE webpage. The approved RP should be provided to the RMO.

Section 9

Engineering Models

The use of certified, validated, or agency approved engineering models is required for all activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, BCOES, policy and legal review, and SAR (if required). Where such approvals have not been completed, appropriate independent checks of critical calculations will be performed and documented. The following engineering models, software, and tools are anticipated to be used:

Model Name	Version	Validation Date
GeoStudio	10.2.1	
Bentley InRoads V8i	Series 4	
SpecsIntact	5.1	

Table 4 Models and Status

Section 10

Review Plan Points of Contact

Title	Organization	Phone
Dam Safety Program Manager	CESWF-EC-G	817-886-1698
Geotechnical Engineer	CESWF-EC-G	817-886-1058
E & C Division Chief	CESWF-EC	817-886-1947

Table 5 RP POC's