



**US Army Corps  
of Engineers®**

# ENGINEERING AND CONSTRUCTION BULLETIN

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**SUBJECT:** Implementation Guidance for Dam Safety Modifications due to Changes in State-of-the-Art Design or Construction Criteria

**CATEGORY:** Guidance

## 1. References:

- a. Bureau of Reclamation, Reclamation Safety of Dams Act of 1978, Public Law 95-578, as amended (43 U.S.C. 506-509b) including the Reclamation Safety of Dams Act Amendments of 1984, Public Law 98-404.
- b. Engineer Circular (EC) 1165-2-217, Review Policy for Civil Works, 20 Feb 2018
- c. Engineer Manual (EM) 1110-2-2702, Design of Spillway Tainter Gates, 01 Jan 2000
- d. Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works Projects, 8 Aug 1999
- e. Engineer Regulation (ER) 1100-2-1156, Safety of Dams – Policy and Procedures, 31 Mar 2014
- f. Engineer Regulation (ER) 1165-2-119, Modifications To Completed Projects, 20 Sep 1982
- g. GAO Audit 16-106, Actions Needed to Improve Cost Sharing for Dam Safety Repairs, December 2015
- h. ASA (CW) Memo, Implementation Guidance for Section 1139 of the Water Resources Development Act 2016, Dam Safety Repair Projects, 22 Mar 2019
- i. Policy Guidance Letter No. 43, Cost Sharing for Dam Safety Assurance, 04 Apr 1994
- j. Water Resources Development Act of 1986, Public Law 99-662, Section 1203
- k. Water Resources Development Act of 2016, Public Law 114-322, Section 1139

2. **Purpose.** This ECB supersedes all prior USACE guidance related to cost sharing for dam safety and provides interim guidance for deciding when dam safety modifications would qualify as changes in state-of-the-art design or construction criteria.

3. **Background.** The Bureau of Reclamation has had the authority since 1978 to make dam safety modifications due to changes in hydrologic data, seismic data, or due to changes in the state-of-the-art criteria deemed necessary for safety purposes. Reduced cost sharing for such

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modifications were made to the Act (Ref 1.a.) in 1984. Congress directed the Secretary of the Army to implement similar cost sharing with respect to dam safety modifications in Section 1203 of the Water Resources Development Act (WRDA) of 1986 (Ref 1.j.); however, until 2019 Department of the Army guidance for Section 1203 cost sharing covered only dam safety modifications needed to address new hydrologic or seismic data. Section 1139 of WRDA 2016 (Ref. 1.k.) directed the Secretary of the Army to issue guidance on the types of circumstances under which state-of-the-art design or construction criteria apply to a dam safety repair project. With the issuance of the implementation guidance for Section 1139 of WRDA 2016 (Ref 1.h.), USACE can now fully implement Section 1203 of WRDA 1986.

**4. Applicability.** This ECB is applicable to all Headquarters USACE (HQUSACE) elements, Divisions, Districts, laboratories and field operating activities related to Civil Works projects. The actions and policies in this ECB will be applied when modifications are 1) necessary due to a change in state-of-the-art and 2) required for safety purposes.

This ECB and cost sharing implications will only apply going forward and no attempt will be made to consider retro-active adjustments to completed payments.

**5. Definitions and Distinction.** To help avoid confusion, the following terms are necessary to define.

a. State-of-the-art. Performing design and construction consistent with industry best practices of the time and the use of current technology. Reduced cost-sharing will apply in line with Section 7 below.

b. Design deficiency. Ref. 1.f. defines this as a flaw in the Federal design or construction of a project that significantly interferes with the project's authorized purposes or full usefulness as intended by Congress at the time of original project development. Note that the deficiency is not a design or construction deficiency if it results from causes external to the project design or construction effort. Reduced cost-sharing will not apply. Cost sharing for correction of design or construction deficiencies should be consistent with the current budget EC.

**6. Process and Guidance.** In order to qualify for reduced cost sharing under this authority, the District Commander must prepare a decision document for approval by the Assistant Secretary of the Army for Civil Works (ASA(CW)) that documents the proposed modification of the dam or related facilities, the construction or operation of the dam or related facilities by the Corps, the specific change in the state-of-the-art design or construction criteria, and how this particular change requires a modification to the dam or related facilities for safety purposes. The decision document will follow the format and procedure for the Dam Safety Modification Report (DSMR) as described in Ref 1.e.

a. Dam Safety Considerations. USACE considers risk posed by dams with Dam Safety Action Classifications of 1, 2, or 3 as unacceptable and thus actions to reduce risks are necessary for safety purposes. USACE will permit reduced cost-sharing for dam repairs that address risk-driving potential failure modes known to exist now but were not known at the time of design and construction; that were designed and constructed with features that are now considered vulnerable, non-robust, or contrary to accepted engineering practice; dams whose investigation,

analysis, and design were not sufficiently rigorous or accurate in comparison to current standards due to advances in technology; or dams that were constructed with techniques, equipment, and materials that are now known to result in unreliable and unsafe performance.

b. There have been many improvements in the standard practices for dam design and construction over the past decades. Most of the improvements result in design or construction methods that also result in a safer project. Some examples include, but are not limited to, the following:

(1) Changes in design of Tainter gates to include accounting for trunnion friction when designing strut arms (Ref 1.c).

(2) Improved knowledge of karst topography conditions in foundations and abutments and how they should be treated.

(3) Liquefaction and seismic design of embankments and foundations.

(4) Improved knowledge of internal erosion including filter criteria, fill material gradations, conduit protection, and seepage control methods.

(5) Changes in concrete technology and construction details including air entrainment, alkali-silica reaction, cavitation protection, waterstops, drains, and joint details.

(6) Improved tools for characterizing site and construction materials, along with new and improved construction techniques and construction equipment which can achieve reliable construction of features not previously feasible

**7. Cost Sharing Requirements.** The study phases (Issue Evaluation and Dam Safety Modification) remain 100% federally funded and are not cost shared. Section 1203 of WRDA 1986 provides for special cost-sharing for modification of dams and related facilities constructed or operated by USACE. The portion of the total cost that is attributable to dam safety modifications needed to address new hydrologic or seismic data or changes due to state-of-the-art design or construction criteria must be cost shared as described below.

a. Under Section 1203, for project modifications due to changes in hydrologic or seismic data or changes in state-of-the-art design or construction criteria, 15% of the cost of the modification is allocated to the project purposes in the same percentages as the original project costs. Applicable repayment by non-Federal interests, with the exception of costs assigned to irrigation, are made in accordance with the agreements executed by the Department of the Army with the non-Federal interests. Costs assigned to irrigation must be recovered by the Secretary of Interior in accordance with Public Law 98-404, for which the repayment period is not more than fifty years. Procedures for determining the amount of sponsor cost will need to be tailored to fit the specifics of each individual project.

(1) Projects with a Formal Cost Allocation. The cost allocated to each project purpose will then be shared in the same percentage as when the project was constructed, or when the purpose was added, whichever is appropriate.

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(2) Projects without a Formal Cost Allocation, but with a signed Project Partnership Agreement or Project Cooperation Agreement or Local Cooperation Agreement. An agreement for the initial project construction may contain an allocation or assignment of costs among project purposes.

(3) Projects without a Formal Cost Allocation or a signed agreement. In most cases where there is no signed agreement, there was some sort of a letter of intent at the time of construction that indicated what items of local cooperation that non-Federal interests would provide, such as lands, easements, rights-of-way, relocations, or disposal areas (LERRD).

(4) Contract for Storage. In some cases water supply storage may have been reallocated from conservation or from flood control storage. The agreement for the reallocation of storage is a contract. The contract usually defines how the amount paid by the contract holder was computed and shows the basis for the assignment of costs. The share of cost to be paid for the dam safety modification should be allocated in the same percent as the cost of joint use facilities was allocated. In such a case, the contract will need to be modified if it does not include a provision for payment of the proposed work.

b. In all cases, 15% of the cost of the modification for dam safety purposes will be further reduced by the cost allocation in effect using the appropriate method identified above. For example, assume the total cost of a contract was \$20,000,000, for which the portion attributable to a dam safety modification due to a change in state-of-the-art was \$15,000,000 and the cost agreement in effect at the time was to provide 15.35% for irrigation. The reduced cost share is \$1,112,875  $[(\$5,000,000 * 0.1535) + (\$15,000,000 * 0.15) * 0.1535]$ .

**8. Updates to Regulations.** Formal updates to applicable USACE regulations are planned in the future as funding and resources become available.

**9. Point of Contact.** HQUSACE point of contact for this ECB is Ms. Phoebe Percell, P.E., CECW-EC, (202) 761-7662.

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