

## **IDAPA 37 – DEPARTMENT OF WATER RESOURCES**

### **Water Allocations Bureau**

#### **37.03.06 – Safety of Dams Rules**

##### **Who does this rule apply to?**

*Owners of new or existing dam or mine tailings impoundment structures.*

##### **What is the purpose of this rule?**

*These rules establish acceptable standards for construction of dams and establish guidelines for safety evaluation of new or existing dams. The Rule applies to all new dams, to existing dams to be enlarged, altered or repaired, and maintenance of certain existing dams, as specified in the Rule. This chapter also establishes the collection of a fee to review plans, drawings, and specifications pertaining to the construction, enlargement, alteration, or repair of small high-risk, intermediate, or large dams.*

##### **What is the legal authority for the agency to promulgate this rule?**

*This rule implements the following statutes passed by the Idaho Legislature:*

Water Resource Board:

- [Sections 42-1710, Idaho Code](#) – Intent of Legislature – Construction, Maintenance and Operation of Dams and Mine Tailings Impoundment Structures
- [Sections 42-1713, Idaho Code](#) – Fees
- [Sections 42-1714, Idaho Code](#) – Rules

##### **Who do I contact for more information on this rule?**

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### 37.03.06 – SAFETY OF DAMS RULES

#### 000. LEGAL AUTHORITY.

These rules are adopted pursuant to Chapter 17, Section 42-1714, Idaho Code.

(3-30-23)

#### 001. SCOPE.

These rules establish acceptable standards for design and construction, and guidelines for evaluating the safety of new or existing dams. The rules apply to all new construction including existing structures considered for enlargement, alteration, modification, or repair as specifically provided in the rules. The Director will evaluate any deviation from the standards hereinafter stated as they pertain to the safety of any given dam. The standards listed herein are not intended to restrict the application of other sound engineering design principles that will provide for the public safety. Under no circumstances shall these rules be construed to deprive or limit the Director of any exercise of powers, duties and jurisdiction conferred by law, nor to limit or restrict the amount or character of data, or information which may be required by the Director from any owner of a dam or for the proper administration of the law.

(3-30-23)

#### 002. ADMINISTRATIVE APPEALS.

Any person aggrieved by an action of the Director and who has not previously been afforded an opportunity for a hearing on the matter is entitled to a hearing before the Director to contest the action pursuant to the provisions of Section 42-1701A(3), Idaho Code, and the Department's adopted Rules of Procedure.

(3-30-23)

#### 003. – 009. (RESERVED)

#### 010. DEFINITIONS.

Unless the context otherwise requires, the following definitions govern these rules.

(3-30-23)

**01. Alterations or Repairs.** Any activity that may affect the safety or integrity of a dam. Alterations and repairs do not include routine maintenance items.

(3-30-23)

**02. Appurtenant Structures.** Ancillary features (e.g., outlets, tunnels, gates, valves, spillways, auxiliary barriers, etc.) used for operation of a dam, which are owned or for which the owner has responsible control.

(3-30-23)

**03. Artificial Barrier or Embankment.** Any structure constructed to impede, obstruct, or store water.

(3-30-23)

**04. Borrowed Fill Embankment.** Any embankment constructed of borrowed earth materials, and which is designed for construction by conventional earth moving equipment.

(3-30-23)

**05. Certificate of Approval.** A certificate issued by the Director for all existing dams listing restrictions imposed by the Director, and without which none shall be allowed to impound water.

(3-30-23)

**06. Conduit.** A pipe or other constructed conveyance within a dam designed to release water or liquid in the reservoir.

(3-30-23)

**07. Core.** A zone of relatively low permeability material within an embankment.

(3-30-23)

**08. Cutoff Trench.** An excavation later to be filled with impermeable material during construction of a dam to limit seepage beneath the structure and through the foundation.

(3-30-23)

**09. Dam.** Any artificial barrier together with appurtenant works, which is or will be ten (10) feet or more in height and has or will have an impounding capacity at maximum storage elevation of fifty (50) acre-feet or more. Height of a dam is defined as the vertical distance from the natural bed of the stream or watercourse at the downstream toe of the barrier, as determined by the Director, or from the lowest elevation of the outside limit of the barrier, if it is not across a stream channel or watercourse, to the maximum water storage elevation. Under Section 42-1711, Idaho Code, the following are not included as regulated dams or are not considered dams for the purposes of Sections 42-1710 through 42-1721, Idaho Code:

(3-30-23)

a. Barriers in a canal used to raise or lower water therein or divert water therefrom.

(3-30-23)

b. Fills or structures determined by the Director to be designed primarily for highway or railroad traffic.

(3-30-23)

- c.** Fills, retaining dikes or structures less than twenty (20) feet in height, which are under jurisdiction of the Department of Environmental Quality or the Department of Agriculture, determined by the Director to be designed primarily for retention or treatment of municipal, livestock, or domestic wastes, or sediment and wastes from produce washing or food processing plants. (3-30-23)
- d.** Levees, that store water regardless of storage capacity. (3-30-23)
- 10. Days.** Calendar days including Sundays, Saturdays, and holidays. (3-30-23)
- 11. Department.** The Idaho Department of Water Resources. (3-30-23)
- 12. Design Evaluation.** The engineering analysis required to evaluate the performance of a dam relative to earthquakes, floods, or other site-specific conditions anticipated to affect the safety or operation of the dam, or appurtenant facilities. (3-30-23)
- 13. Director.** The Director of the Department of Water Resources. (3-30-23)
- 14. Embankment.** An artificial barrier constructed of earth, sand, rock, or gravel used to impound water. (3-30-23)
- 15. Emergency Action Plan (EAP).** A written plan with instructions to be taken to reduce the potential for property damage and loss of life in an area affected by a dam failure or uncontrolled release of stored contents. (3-30-23)
- 16. Enlargement.** Any change in or addition to an existing dam which raises or may raise the elevation of the contents impounded by the dam. (3-30-23)
- 17. Factor of Safety.** A ratio of available shear strength to shear stress, required for stability. (3-30-23)
- 18. Flashboards.** Structural members of timber, concrete, steel, or other erosion resistant material placed across a channel or entrance to a spillway to temporarily raise the surface level of the reservoir. (3-30-23)
- 19. Flood.** An increase in water surface elevation due to naturally occurring runoff or other rise in water levels that result in the inundation of areas not normally covered by water. As defined herein floods may be expressed in terms of average annual probability of exceedance, corresponding to values which may be described as flow rate, volume, or elevation (i.e., stage). (3-30-23)
- 20. Flood Surge.** A variable volume of water temporarily detained in a reservoir, in the space (or part thereof) that is filled by excess runoff or flood water, above the approved design maximum storage elevation. Flood surge is passed through the reservoir and discharged downstream until the reservoir level has been drawn down to the design maximum storage elevation. (3-30-23)
- 21. Freeboard.** Vertical height between the maximum design water surface elevation and the lowest elevation along the top of the dam. Freeboard can include a provision for variables such as wave height, flood surcharge, settlement, and flashboards. (3-30-23)
- 22. Hazard Classification.** The potential adverse incremental consequences to downstream life, property, and the environment resulting from the release of water or stored content due to dam failure or mis-operation of the dam, exclusive of the size or the physical condition of the dam. Hazard Classifications shall be assigned to new and existing dams based on potential adverse incremental impacts in three categories: downstream development, estimated loss of life, and economic losses. (3-30-23)
- 23. Hydraulics.** The study of the conveyance of liquid through pipes and channels. (3-30-23)
- 24. Hydrology.** The study of precipitation, snowmelt, and runoff in relation to land surfaces. (3-30-23)
- 25. Inflow Design Flood (IDF).** The flood specified for designing a dam, or appurtenant facility.

Commonly expressed inflow design flood(s) include peak rate(s) of flow and volume(s) associated with floods having an annual exceedance probability of one percent (1%) (i.e., Q100) and zero point two percent (0.2%) (i.e., Q500), and the PMF (probable maximum flood). (3-30-23)

**26. Intermediate Dams.** Artificial barriers twenty (20) feet or more in height but less than forty (40) feet or capable of storing one hundred (100) acre-feet of water or more but less than four thousand (4,000) acre-feet. (3-30-23)

**27. Large Dams.** Artificial barriers forty (40) feet or more in height or capable of storing four thousand (4,000) acre-feet or more of water. (3-30-23)

**28. Levee.** A retaining structure alongside a natural lake which has a length two hundred (200) times greater than its greatest height measured from the lowest elevation of the toe to the maximum crest elevation of the retaining structure. (3-30-23)

**29. Lift Construction.** Embankment enlargement by raising the elevation of the structure on a continuous or recurring basis. Such practice will be considered under construction until the structure reaches its final crest elevation. (3-30-23)

**30. Maximum Water Storage Elevation.** The maximum design elevation of the water surface or stored contents which can be impounded by the dam. (3-30-23)

**31. Operation Plan.** A specific plan that promotes the safe operation of the dam for its intended purpose, and which provides specific limits and procedures for controlling inflow, storage, and/or release of water or slurry. (3-30-23)

**32. Owner.** Includes any of the following who own, control, operate, maintain, manage, or propose to construct a dam, or reservoir: (3-30-23)

**a.** The state of Idaho and its departments, agencies, institutions, and political subdivisions; (3-30-23)

**b.** The United States of America and any of its departments, bureaus, agencies and institutions; provided that the United States of America shall not be required to pay any of the fees required by Section 42-1713, Idaho Code, and shall submit plans, drawings and specifications as required by Section 42-1712, Idaho Code, for information purposes only; (3-30-23)

**c.** Every municipal or quasi-municipal corporation; (3-30-23)

**d.** Every public utility; (3-30-23)

**e.** Every person, firm, association, organization, partnership, business trust, corporation, or company; (3-30-23)

**f.** The duly authorized agents, lessees, or trustees of any of the foregoing; or (3-30-23)

**g.** Receivers or trustees appointed by any court for any of the foregoing. (3-30-23)

**33. Professional Engineer.** A person licensed as a professional engineer by the Idaho Board of Licensure of Professional Engineers and Professional Land Surveyors under chapter 12, title 54, Idaho Code. For the purposes of this rule, the use of the term engineer implies a professional engineer consistent with this definition. (3-30-23)

**34. Release Capacity.** The ability of a dam to pass excess water through the spillway(s) and outlet works, including the contribution from any designed conveyance through or around the dam. (3-30-23)

**35. Reservoir.** Any basin which contains or will contain the water impounded by a dam. (3-30-23)

**36. Small Dams.** Artificial barriers ten (10) feet or more in height but less than twenty (20) feet in height and that store fifty (50) acre-feet or more but less than one hundred (100) acre-feet of water. (3-30-23)

**37. Spillway.** A constructed channel or other approved feature over, through, or around a dam, which is designed to accommodate the net inflow design flood and thus prevent overtopping by the reservoir. (3-30-23)

**38. Storage Capacity.** The total storage in acre-feet at the maximum design storage elevation. (3-30-23)

**011. – 014. (RESERVED)**

**015. AUTHORITY OF REPRESENTATIVE.**

When plans, drawings, and specifications are filed by another person on behalf of an owner, written evidence of authority to represent the owner shall be filed with the plans, drawings, and specifications. (3-30-23)

**016. – 019. (RESERVED)**

**020. DAM SIZE CLASSIFICATION.**

**01. Size Classification.** The following table defines the height and storage capacity limits used by the Department to classify dams regulated for the benefit of public safety:

Dam Size Classification	Height	Storage Capacity
Small Dams and Reservoirs	Ten (10) feet or more but less than twenty (20) feet	and Fifty (50) acre-feet or more but less than one hundred (100) acre-feet.
Intermediate Dams and Reservoirs	Twenty (20) feet or more but less than forty (40) feet	or One hundred (100) acre-feet or more but less than four thousand (4,000) acre-feet.
Large Dams or Reservoirs	Forty (40) feet or more	or Four thousand (4,000) acre-feet or more.

(3-30-23)

**02. Determination of Size.** The Director shall determine the size classification of a new or existing dam. (3-30-23)

**021. – 024. (RESERVED)**

**025. HAZARD CLASSIFICATION.**

**01. Hazard Classification.** The following table describes categories of hazard used by the Department to classify dams relative to the potential failure consequences estimated for downstream locations. The listed hazard classifications are meant to serve as guidelines for implementing design, construction, and operation criteria, subject to final interpretation by the Director:

Hazard Classification	Downstream Development	Estimated Loss of Life	Economic Losses
Low	Undeveloped property, no permanent or permanently occupied structures for human habitation.	No loss of life	Low economic losses generally limited to the owner; low damage to or disruption of transportation, utilities, or other public facilities or values including environmental loss.

Hazard Classification	Downstream Development	Estimated Loss of Life	Economic Losses
Significant	No concentrated urban development, 1 or more permanent structures for human habitation within the flood zone that are potentially inundated with flood water at a depth of less than two (2) feet.	Loss of life is unlikely to occur	Moderate damage to agricultural, commercial, or industrial facilities; moderate damage to or the disruption of transportation, utilities, or other public facilities or values including environmental loss.
High	Urban development, or any structure for permanent or temporary human habitation which are potentially inundated with flood water at a depth of two (2) feet or greater.	High probability for loss of life	Severe damage to agricultural, commercial, or industrial facilities; damage to or the prolonged disruption of transportation, utilities, or other public facilities or values including environmental loss.

(3-30-23)

**02. Determination of Hazard Classification.** The Director shall determine the hazard classification of a new or existing dam governed by these rules. Hazard classifications shall be assigned to new and existing dams based on the severity of failure consequences exclusive of the size or the physical condition of the dam. The designated hazard classification, as established by the Director, shall determine the applicable design and operational standards applied to the dam. (3-30-23)

**026. – 029. (RESERVED)**

**030. FORMS.**

Forms required by these rules are available from the Department to interested parties upon request. (3-30-23)

**031. – 034. (RESERVED)**

**035. DESIGN REPORTS, DRAWINGS, AND SPECIFICATIONS.**

The following provisions shall apply when submitting plans, drawings, reports, and specifications for dams to the Director for design review and approval, prior to commencing construction. (3-30-23)

**01. Submission of Duplicate Plans, Drawings and Specifications.** Any owner desiring to construct, enlarge, alter, or repair any dam, shall submit duplicate plans, drawings and specifications prepared by an engineer for the proposed work to the Director with required fees for approval prior to commencing construction. (3-30-23)

**02. Applying for and Obtaining Written Approval.** Construction of a new dam, or the enlargement, alteration, or repair of such shall not commence until the owner has applied for and obtained written approval of the plans, drawings, and specifications from the Director. (3-30-23)

**03. Preparation and Submission of Plans.** Plans and drawings shall be of a sufficient scale with an adequate number of views showing proper dimensions, so that the plans and drawings may be readily interpreted and so that the structure and appurtenances can be built in conformance with the approved design. Plans and drawings shall be submitted in both printed and digital format, with the printed version consisting of paper size eleven by seventeen (11 x 17) inches. After reviewing the plans, the Director will notify the owner of any required changes. (3-30-23)

**04. Information Included with Plans.** Plans for new dams or the enlargement, alteration, or repair of such shall include as much of the following information as determined necessary by the Director to adequately describe the enlargement, alteration, or repair and the effect on the existing structure or its appurtenances: (3-30-23)

- a.** A topographic map of the project site showing the location of the proposed construction by section, township and range, and location of all borings, test pits, borrow pits and other locations of samples obtained for field or laboratory testing; (3-30-23)
- b.** A profile depicting the locations, elevations, and depths of borings or test pits, including the visual illustration of logs of bore holes, test pits, or borrow pits; (3-30-23)
- c.** A cross-section of the structure at maximum section showing elevation and width of crest, slopes of upstream and downstream faces, thickness of riprap, zoning of earth embankment, location of cutoff and bonding trenches, elevations and dimensional heights, size and type of conduits, valves, operating mechanism, and dimensions of all other essential elements deemed to be necessary for properly constructing the approved design; (3-30-23)
- d.** Detailed drawings showing plans, cross and longitudinal sections of appurtenant features such as but not limited to the spillway, training walls, outlet conduits, valves, gates, trash rack, and control works; (3-30-23)
- e.** A curve or table showing the capacity of the reservoir or tailings impoundment in acre-feet vs. gauge height referenced to a common project datum and the computations used in making such determinations; (3-30-23)
- f.** A curve or table showing the outlet discharge capacity in cubic feet per second vs. gauge height of reservoir storage level, and the computations used in making such determinations; (3-30-23)
- g.** A curve or table showing the spillway discharge capacity in cubic feet per second vs. gauge height of the reservoir or flood surcharge level above the spillway crest and the computations used in making such determinations; (3-30-23)
- h.** Detailed drawings of spillway structure(s), including cross-sections of the channel entrance and exit points to and from the spillway and a spillway profile; (3-30-23)
- i.** Plans for flow measuring devices capable of providing an accurate determination of the flow of the stream above or below the reservoir, and a permanent reservoir or staff gauge near the outlet of the reservoir plainly marked in feet and tenths of a foot referenced to an approved datum; and (3-30-23)
- j.** Plans or drawings of instruments recommended by the owner or engineer to monitor the performance of the dam to assure safe operation, or as may be required by the Director as deemed necessary to monitor any structure for benefit of public safety regardless of size. (3-30-23)
- 05. Specifications.** The engineer shall prepare specifications that include instructions for construction of the approved design in accordance with accepted engineering and industry standards of care, including provisions for adequate observation, inspection, and control of the work by an engineer during the period of construction. (3-30-23)
- 06. Changes to the Approved Design.** The approved design shall not be materially changed without prior written consent of the Director. Design changes which may affect the stability, size, or integrity of the structure, while construction is underway, shall be submitted for the Director's review and approval. In emergency situations, the owner shall make the required alterations or repairs necessary to relieve the emergency, and subsequently notify the Director of all alterations or repairs implemented. (3-30-23)
- 07. Inspections.** The owner shall allow inspections by the Department to assure the dam and appurtenant structures are constructed in conformance with the approved plans and specifications, or as may be revised by the engineer and approved by the Director if there are unforeseen conditions discovered during site preparation or construction which potentially jeopardize the future integrity and safety of the project works. The Department may request of the owner that certain stages of construction not proceed without inspection and approval by the Director. (3-30-23)

**08. Inspection, Examination and Testing of Materials.** All materials and workmanship shall be subject to review, inspection, examination, or testing by the Director. (3-30-23)

**09. Rejection of Defective Material.** The Director may order the owner or engineer to reject defective material. The owner shall correct rejected workmanship and replace rejected material with approved material. (3-30-23)

**10. Suspension of Work.** The Director may order the engineer to suspend any work that is or is likely to be subject to damage by inclement weather conditions. (3-30-23)

**11. Responsibility of Engineer.** These provisions shall not relieve the engineer of their responsible charge to assure that construction is accomplished in accordance with their approved plans and specifications as mandated by Sections 54-1202(10) and (15), Idaho Code, or to unilaterally suspend work as deemed necessary. (3-30-23)

**12. Design Report.** Owners proposing to construct, enlarge, alter, or repair a dam shall submit an engineering or design evaluation report to accompany the plans and specifications. The engineering report shall include as much of the following information as necessary to present the technical basis for the design and to describe the analyses used to evaluate performance of the structure and appurtenances. (3-30-23)

a. All technical reference(s), equations, calculations, and assumptions used in the design. (3-30-23)

b. Hydrologic data used in determining runoff from the drainage areas, reservoir flood routing pertinent to the project location, and hydraulic evaluations of the outlet(s) and the spillway(s) as may be required for approval of the design plans and specifications. (3-30-23)

c. Investigation of site and subsurface conditions, to include the engineering properties of the foundation area and of each type of material to be encountered or used in the construction of the project works. (3-30-23)

d. A stability analysis, including an evaluation of overturning, sliding, slope, and foundation stability; (3-30-23)

i. An evaluation of seismic design loads may be included in the stability analysis for all dams as deemed necessary by the Director for benefit of public safety. The evaluation required for the design of large dams or high hazard structures shall use the maximum ground acceleration which could affect the dam. In the absence of a site-specific seismic hazard analysis, the Director may accept seismic analyses that reference published seismic hazard maps which determine seismic loads estimated for seismic events corresponding to a return interval of two percent (2)% in fifty (50) years. (3-30-23)

ii. Seismic analyses may be waived by the Director for new or existing dams if the consequence of failure is demonstrated to be sufficiently low or the critical features of design are demonstrated to be sufficiently conservative to allow minor deformation(s) without releasing the contents of the impounding structure. (3-30-23)

e. Geologic description of the dam and reservoir area, including evaluation of landslide potential near the dam; (3-30-23)

f. Engineering properties and the weathering characteristics of the contents proposed for storage in the impoundment, if applicable; (3-30-23)

g. Other information which would aid in evaluating the safety of the design. (3-30-23)

**13. Additional Information/Waiver.** The Director may require the filing of such additional information which in their opinion is necessary for the benefit of public safety or waive any requirement in these rules if available data demonstrates that it is unnecessary. (3-30-23)

**14. Alternate Plans.** The Director may accept plans and specifications for dams, or portions thereof

prepared for other agencies which are determined to meet the requirements of Rule 35, including but not limited to the following: (3-30-23)

- a. An operation plan; or (3-30-23)
- b. An emergency action plan to help protect or mitigate the consequences of a dam failure on downstream life and property. (3-30-23)

**036. – 044. (RESERVED)**

**045. EMERGENCY ACTION AND OPERATION PLANS.**

An Emergency Action Plan (EAP) is required for all Significant and High Hazard dams. The EAP shall establish emergency procedures for notification and response during unexpected or non-routine events that occur naturally, or in response to mechanical issues, or due to intentional vandalism or terrorism. The EAP may be a component of an Operation Plan that includes comprehensive guidelines and procedures for inspection, operation, maintenance, and monitoring of instruments required to record performance of the structure during normal operating cycles, critical filling, or flood periods, or as may be necessary for evaluating the effects of an earthquake. Before the initial filling of a reservoir, the owner shall file with the Director an EAP for review and approval. (3-30-23)

**046. – 049. (RESERVED)**

**050. NEW DAMS AND RESERVOIRS.**

The following criteria shall be used by the Director as a basis to evaluate the design of new embankment dams and reservoirs. These guidelines are intended for a broad range of circumstances, and engineers should not consider them as a restriction to the use of other sound engineering design principles. Exclusion from these established criteria will be considered by the Director on a case-by-case basis during design review of plans, drawings, reports, and specifications submitted for approval prior to commencing construction. Structures which are or will be constructed of other materials, for example concrete, timber, steel, or combinations thereof shall comply with these criteria as found appropriate by the Director, and with other engineering design methods and construction standards of care approved by the Director. (3-30-23)

**01. Embankment Stability.** Slope stability analyses shall determine the appropriate upstream and downstream slopes. Unless a discrete slope stability analysis determines otherwise, the embankment slopes of earthen dams shall comply with the following:

Upstream slope	3:1 or flatter
Downstream slope	2.5:1 or flatter

(3-30-23)

a. Embankments shall be designed, constructed, and maintained to assure stability under static loads and prevent instability due to seepage or uplift forces, rapid drawdown conditions, and applied seismic loads. (3-30-23)

b. The design analysis shall consider the need for installing filters, including but not limited to chimney drains, blanket drains, or toe drains, to avoid developing saturated conditions and to protect against piping of the embankment fill material. Transmission of seepage through the embankment, abutments, and foundation shall be controlled to prevent internal erosion, the removal of material, or the creation of instability. (3-30-23)

c. The minimum factor of safety for a steady state loading condition shall be one point five (1.5.) The minimum factor of safety for rapid drawdown loading shall be one point two (1.2.) The minimum factor of safety for seismic loading shall be one point zero (1.0.) (3-30-23)

d. Seismic Stability. (3-30-23)

i. The stability of an embankment subjected to earthquake ground motions may be analyzed by the engineer using either a dynamic response or pseudo-static analyses. Pseudo-static analyses are acceptable for embankment dams and foundations composed of non-liquifiable soils that preclude the generation of excess pore water pressures due to shaking. Otherwise, the stability analysis shall employ a dynamic response method. (3-30-23)

ii. Slope deformation analyses are required for structures that are constructed of cohesionless soils exhibiting fine grain-size gradation and/or on foundations that may be subject to liquefaction. (3-30-23)

iii. The design analysis for regulated dams shall include in the seismic stability analysis peak ground accelerations obtained from Seismic Hazard Maps published by the United States Geological Survey (USGS) using a minimum return interval of 2 percent (2%) probability of exceedance in fifty (50) years, or greater interval, as determined by the Director. (3-30-23)

iv. The design analyses for large and high hazard dams shall include a report or report(s) covering geology, geologic hazard, and seismicity. The report(s) shall identify the location of faults, evaluate landslide potential, and include a history of seismicity. A comparison using deterministic and probabilistic analyses to calculate peak ground acceleration at the dam site may be required for geographic areas of the state showing evidence of seismic faults or faulting, as determined by the Director. (3-30-23)

e. Where in the opinion of the Director, embankment design or conditions warrant, the owner may be required to instrument their embankment or foundation. (3-30-23)

**02. Top Width.** The minimum top width for any embankment shall be twelve (12) feet to allow safe access by wheeled vehicles or tracked equipment for maintenance or repair. (3-30-23)

**03. Cutoff Trenches or Walls.** Cutoff trenches shall be excavated into competent foundation material to bear on an approved stratum or zone, as site conditions require and when employed. (3-30-23)

a. The cutoff trench shall be backfilled with suitable material free from organic matter and debris and compacted to the specified moisture and density. The cutoff trench shall extend up the sides of both abutments to the design maximum storage elevation. (3-30-23)

b. Cutoff trenches shall be wide enough to allow the free movement of excavation and compaction equipment. To provide for proper compaction side slopes shall be no steeper than one to one (1:1) for shallow depths up to twelve (12) feet, and no steeper than one and one half to one (1.5:1) for greater depths. Flatter slopes may be required for safety and stability, as determined by the Director. (3-30-23)

c. Concrete cutoff walls may be used in a similar manner as cutoff trenches, with the base firmly entrenched in the underlying foundation material. Where suitable bedrock or suitable foundation material exists, concrete cutoff walls shall be doweled with steel rebar a minimum depth and spacing determined by the engineer necessary to create a structural bond with the underlying foundation. Concrete walls shall have a minimum vertical projection above the foundation surface of three (3) feet, oriented perpendicular to the surface, and shall have a minimum thickness of twelve (12) inches. Reinforcement of the concrete may be required in addition to being doweled into suitable foundation material(s). (3-30-23)

**04. Impermeable Core Material.** Soils used to construct the inner sectional core of an embankment shall consist of relatively impermeable cohesive materials approved by the engineer and compacted in strict accordance with the approved plans and specifications. A minimum ninety-five percent (95%) maximum dry density compacted in accordance with the American Society Testing Materials (ASTM) D-698 is required. The use of other relatively impermeable however non-cohesive material is subject to approval by the Director on a case-by-case basis. (3-30-23)

**05. Drains.** Toe, blanket, or chimney drains consisting of approved free draining material or approved manufactured drainage geotextile shall be installed where necessary to maintain the phreatic line at or near the design level(s) within the embankment. (3-30-23)

a. Filter design for toe, blanket, or chimney drains, or any combination thereof shall be included in the

design plans and specifications submitted by the engineer for review and approval by the Director. (3-30-23)

**b.** Perforated and slotted drainpipes must be four (4) inches diameter or greater and shall be surrounded by permeable drainage material to a distance equal to or greater than the outside pipe diameter. The maximum particle size of the drainage material shall be between one-half (1/2) inch to three-fourths (3/4) inch, or as specified by the design engineer based on the drainage filter analysis. Underdrains and collection pipes must be constructed of noncorrosive material, taking care to ensure slots and perforations are appropriately sized to avoid long-term migration of the drain material into the pipe. (3-30-23)

**06. Freeboard.** The elevation of the top of the embankment shall be constructed and maintained above the design flood surcharge level, including the vertical height of wind generated waves estimated for the greatest distance of open water measured perpendicular to the major axis of the dam. Camber estimated for post-construction settlement shall be included in the design and incorporated in the construction of the top of the embankment. (3-30-23)

**a.** The minimum freeboard shall be two (2) feet plus wave height as calculated for the design spillway flow capacity during passage of the one percent (1%) flood, or greater. (3-30-23)

**07. Riprap.** All embankments which are subject to erosion on either the upstream and downstream slope(s) shall be protected using riprap or other approved material. Pipes, cables, brush, tree growth, dead growth, logs, or floating debris are not acceptable substitutes for approved riprap. The engineer, with approval of the Director, shall determine the extent of slope protection as deemed necessary for existing site, seasonal, and operating conditions. (3-30-23)

**a.** Where rock riprap or other approved material is used for erosion protection on the upstream slope, it shall be placed on an approved thickness of well-graded and free-draining granular bedding material. Riprap or other approved erosion protection material shall extend up the slope a sufficient height. (3-30-23)

**08. Outlet Conduits.** All reservoirs impounding water shall have an outlet conduit of sufficient capacity to prevent interference with natural streamflow through the reservoir to the injury of downstream appropriators. In addition to any natural flow releases, the outlet conduit should be of sufficient capacity to pass at the same time, the maximum water requirement of the owner. A larger outlet conduit may be required to provide adequate release capacity as determined by the Director. Upon recommendation of the design engineer, the Director may waive this requirement for off channel reservoirs. (3-30-23)

**a.** Outlet conduits shall be laid on a firm and stable foundation material to avoid the likelihood of differential settlement or consolidation causing the separation or misalignment of the conduit. Outlet conduits shall be encased on all sides by concrete of approved compressive strength and having a minimum thickness of twelve (12) inches. During construction outlet conduits shall be properly aligned on an established grade and adequately supported to prevent movement or damage caused by placement of concrete or by compaction equipment. (3-30-23)

**b.** Unless otherwise required, the outlet conduit shall have a minimum inside diameter of twelve (12) inches. The conduits shall consist of approved material and composition as approved by the Director. Exceptions may be made only where conditions warrant, but in no case shall the reasonable life expectancy of the pipe be less than the design life of the embankment. (3-30-23)

**09. Gates and Valves.** (3-30-23)

**a.** Conduits shall be gated on the upstream end to avoid pressurizing the conduit inside the embankment. Designed pressurized conduits shall be fitted with both a guard gate and a control gate or valve. (3-30-23)

**b.** All conduits shall be vented directly behind the gate. (3-30-23)

**c.** All gate stem pedestals shall be securely founded to prevent future movement. (3-30-23)

**d.** At least one (1) of the sides of the inlet structure shall be open to allow water to flow into the outlet

conduit. The opening shall be covered with a trash rack. (3-30-23)

e. Trash racks should be designed to facilitate cleaning of trash and debris. If fish screens are used, they shall be placed over the trash rack and shall be removable for cleaning or be self-cleaning. (3-30-23)

**10. Outlet Controls.** Outlet controls shall be installed at a stable location, on the crest or on an elevated platform, or within an enclosure when required, but secured to prevent unauthorized operation. Reservoirs storing water during the winter and subject to severe freezing conditions shall have inclined gate stems or other controlling mechanical or hydraulic features enclosed in a protective sleeve which is buried beneath the upstream slope to suitable depth, to prevent damage or movement caused by ice. (3-30-23)

**11. Release Capacity.** Based on the size of the dam and the downstream hazard classification assigned by the Director, the release capacity shall equal or exceed the inflow design flood as set forth in the following table. Where the table specifies an inflow design flood range, the governing inflow design flood shall be determined by the professional engineer in responsible charge of design and IDWR based on a site-specific review of the proposed dam, watershed conditions, and downstream hazard potential. The minimum flow capacity of the emergency spillway(s) shall be sized using the one-percent (1%) rate of flow (i.e., Q100 cfs) calculated for the contributing watershed upstream from the dam, plus two (2) feet of freeboard, plus wave height.

Hazard Classification	Dam Size Classification	Inflow Design Flood (IDF)
Low	All Sizes	Q100
Significant	Small	Q100
	Intermediate	Q100 to Q500
	Large	Q500
High	Small	Q100 to Q500
	Intermediate	Q500
	Large	Q500 to PMF

(3-30-23)

a. All spillways shall be stabilized for the discharge of flow using concrete, masonry, riprap, or sod, if not constructed in resistant rock. (3-30-23)

b. For embankment dams, where site conditions allow, the spillway shall be constructed independent of the embankment. The spillway(s) shall guide the discharge of water away from the embankment. (3-30-23)

c. The minimum base width of an open-channel spillway shall be ten (10) feet, or greater to allow access by mechanical equipment. Siphon pipes or pumps are not acceptable substitutes for an open-channel spillway. (3-30-23)

d. The effective flow capacity of spillways shall be undiminished by bridges, fences, pipelines, or other obstructions. (3-30-23)

e. The installation of stop logs or flashboards in the spillway is prohibited unless they are part of an approved design and included as an integral part of an approved operation plan. (3-30-23)

**12. Reservoir Site.** Prior to filling the reservoir, the site shall be cleared of all woody material, growth or debris that is large enough to lodge in the spillway, or outlet works. (3-30-23)

**13. Inspection and Completion Reports.** As construction proceeds, it is the responsibility of the engineer to submit test reports (e.g., soil material analyses, density tests, concrete strength tests, etc.) along with periodic inspection and progress reports to the Director. (3-30-23)

**a.** Upon completion of construction the owner or their engineer shall provide the Director a written narrative account of all items of construction. Record drawings (i.e., as-builts or as-constructed drawings) and revised specifications shall be submitted to the Director to accurately reflect the completed project works. (3-30-23)

**b.** The engineer, acting on behalf of and representing the owner, shall certify that the construction, reconstruction, enlargement, replacement, or repair of the embankment and appurtenances was completed in accordance with the record drawings and specifications. (3-30-23)

**051. – 059. (RESERVED)**

**060. EXISTING DAMS AND RESERVOIRS.**

All dams and reservoirs regulated by the Department shall be operated and maintained to retain the existing structural dimensions, to resist deformations or movement, and to maintain the hydraulic capacity of the outlet works, spillway, and other discharge features as designed and constructed, or as otherwise required by these rules. (3-30-23)

**01. Analyses Required.** The analyses required by Rule 035 shall apply to all existing dams when the Director specifically requires the analyses. Where applicable, non-embankment dams shall comply with the following criteria. (3-30-23)

**a.** Every dam shall have an overflow spillway with a capacity that will pass an inflow design flood of one percent (1%) probability of occurrence (i.e., Q100) or more, with the reservoir or the impoundment full to the spillway crest while maintaining the freeboard required by Rule 050.06. (3-30-23)

**b.** The Director may lessen or waive the spillway requirement for dams that demonstrate out-of-stream (off-channel) storage. (3-30-23)

**c.** The release capability or discharge capacity can include the combined rates of flow for multiple appurtenances; for example, spillways, outlets, diversion facilities, or other constructed conveyance features. Approved operating procedures which can be shown to utilize upstream storage, diversion, and reservoir flood routing to reduce flood runoff events may also be considered. The remainder of the required release capacity, if any, may be met by the following: (3-30-23)

**i.** Reconstruction, enlargement or addition of spillways, outlets, diversion facilities, or other constructed conveyance features. (3-30-23)

**ii.** A showing acceptable to the Director that potential failure of the dam during a flood of the specified magnitude described in Rule 050.11 would be incrementally small in comparison to the flood being considered, and that the release of reservoir would not substantially increase downstream damages to life and property which are anticipated to result from any natural flood equal to or exceeding that magnitude. (3-30-23)

**iii.** A showing acceptable to the Director that limiting physical factors unique to the project site exist that prevent construction of a spillway or other release capability mechanisms during a flood of the specified magnitude described in Rule 050.11, and provided the owner implements storage operational procedures, or restrictions, or provides for emergency warning to protect life and property. (3-30-23)

**d.** Seismic loads shall be evaluated and applied to dam stability. The Director may require that evaluation of seismic loads for large and high hazard structures shall use the maximum ground motion/acceleration generated by the maximum credible earthquake. For any existing dam, the Director may accept maximum ground motion/acceleration corresponding to specified return intervals using a probabilistic evaluation of earthquake history in accordance with USGS hazard maps using a minimum return interval of 2 percent (2%) probability of exceedance in fifty (50) years, or greater interval, as determined by the Director. (3-30-23)

**e.** The Director may accept existing studies relative to requirements of Rule 060.01.a. and Rule 060.01.d., if the Director determines the information provided fulfills the requirements of the rules. (3-30-23)

**f.** The Director may allow the owner of an existing dam a compliance period to complete structural

modifications or implement other improvements deemed necessary to provide the necessary hydraulic capability. (3-30-23)

**g.** The Director may allow the owner of an existing dam a compliance period to complete structural modifications or implement other improvements deemed necessary to resolve seismic stability or safety concerns. (3-30-23)

**h.** Within thirty (30) days after completing the analyses required in Rules 060.01.a. or 060.01.d., the owner of an existing dam found deficient by either analyses shall file with the Director a plan and schedule for mitigating the deficiency. (3-30-23)

**02. Other Requirements.** (3-30-23)

**a.** Routine maintenance items include the following: (3-30-23)

i. Eradication of rodents and filling animal burrows; (3-30-23)

ii. Removal of vegetation and debris from the dam; (3-30-23)

iii. Restoring original dimensions of the dam by the addition of fill material; (3-30-23)

iv. Addition of bedding or riprap material which will not increase the height or storage capacity; (3-30-23)

v. Repair or replacement of gates, gate stems, seals, valves, lift mechanisms or vent pipes with similar equipment; or (3-30-23)

vi. Repair or replacement of wingwalls, headwalls or aprons including spalling concrete. (3-30-23)

**b.** The following are not routine maintenance items and are subject to design review and approval prior to commencing construction: (3-30-23)

i. Alteration or modification of embankment slopes; (3-30-23)

ii. Replacement, reconstruction, or extension of outlets; (3-30-23)

iii. Foundation stabilization; (3-30-23)

iv. Filter or drain construction or replacement; (3-30-23)

v. Spillway size alteration or modification; (3-30-23)

vi. Installation of instrumentation or piezometers; or (3-30-23)

vii. Release capability or reservoir storage modification. (3-30-23)

**c.** Items not specifically described in Rules 060.02.a. and 060.02.b. will be determined by the Director as either routine or non-routine upon receipt of a written request from the owner or their representative seeking such a determination. (3-30-23)

**d.** Where riprap is required to prevent erosion and to maintain a stable embankment, pipes, cables, brush, tree growth, logs, or floating debris are not acceptable substitutes for rock riprap and granular bedding material. Dams or portions thereof which are stable without riprap, are not required to have riprap. (3-30-23)

**e.** Upon completion of reconstruction of a dam or feature of a dam included in Rule 060.02.b., the owner or their engineer shall provide the Director a written narrative account of all items of work. Record drawings and revised specifications shall be submitted to the Director if the completed project has been substantially changed

from the plans and construction specifications originally approved. (3-30-23)

f. Upon request, the owner of every dam shall provide their name and address to the Director and shall advise the Director of future changes in ownership. If the owner does not reside in Idaho, the owner shall provide the name and address of the person residing in Idaho who is responsible for the operation, maintenance, and repair of the dam. (3-30-23)

**061. – 999. (RESERVED)**