

37.03.06 – SAFETY OF DAMS RULES

0001. LEGAL AUTHORITY ~~(RULE 0).~~

These rules are adopted pursuant to Chapter 17, Section 42-1714, Idaho Code, ~~and implement the provisions of Sections 42-1709 through 42-1721, Idaho Code.~~ ()

0012. TITLE AND SCOPE ~~(RULE 1).~~

01. Title. These rules are titled IDAPA 37.03.06, “Safety of Dams Rules.” ()

02. Scope. ()

a. ~~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.~~

~~The requirements that follow are intended as a guide to establish acceptable standards for construction and to provide guidelines for safety evaluation of new or existing dams. The rules apply to all new dams, to existing dams to be enlarged, altered or repaired, and maintenance of certain existing dams, 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 are not intended to restrict the application of other sound engineering design principles. Engineers are encouraged to submit new ideas which will advance the state of the art and provide for the public safety.~~ ()

b. Under no circumstances shall these rules be construed to deprive or limit the Director of the Department of Water Resources 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 for the proper administration of the law. ~~State sovereignty as expressed in Policy 1A of the adopted State Water Plan for independent review and approval of dam construction, operation and maintenance will not be waived due to any overlapping jurisdiction from federal agencies.~~ ()

3. 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.~~

0024. -- 009. (RESERVED)

010. DEFINITIONS (RULE 10).

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

~~**01. Active Storage.** The water volume in the reservoir stored for irrigation, water supply, power generation, flood control, or other purposes but does not include flood surcharge. Active storage is the total reservoir capacity in acre feet, less the inactive and dead storage.~~ ()

~~**021. Alterations, or Repairs or Either of Them.** Only such alterations or repairs as may directly Any activity that may affect the safety or integrity of the dam, or reservoir, as determined by the Director. Alterations, and repairs does not include routine maintenance items. ~~(See Rule Subsections 055.02.a. and 055.02.b.)~~ ()~~

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

~~04. Board. The Idaho Water Resource Board. ()~~

~~053. Artificial barrier or embankment. Any structure constructed to impede, obstruct, or store water.~~

~~4. Borrowed Fill Embankment. Any embankment constructed of borrowed earth materials, and which is designed for construction by conventional earth moving equipment.~~

~~5. Certificate of Approval. A certificate issued by the Director for all existing dams listing restrictions imposed by the Director, and without which no new dams none shall be allowed to impound water by the owner to impound water. A certificate of approval is also required for existing dams before impoundment of water is authorized. ()~~

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

~~7. Core. A zone of relatively low permeability material within an embankment.~~

~~8. Cutoff Trench. An excavation later to be filled with impervious material during construction of a dam to limit seepage beneath the structure and through the foundation.~~

~~9. Dam. Any artificial barrier together with appurtenant works, which is or will be ten (10) feet or more in height ~~or 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:~~

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

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

~~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.~~

~~d. Levees, that store water regardless of storage capacity.~~

~~07. Small Dams. Artificial barriers twenty (20) feet or less in height that are capable of storing less than one hundred (100) acre feet of water. ()~~

~~08. Intermediate Dams. Artificial barriers more than twenty (20) feet, but less than forty (40) feet in height, or are capable of storing one hundred (100) acre feet or more, but less than four thousand (4,000) acre feet of water. ()~~

~~09. Large Dams. Artificial barriers forty (40) feet or more in height or are capable of storing four thousand (4,000) acre feet or more of water. ()~~

~~10. Department Jurisdiction. The following are not subject to department jurisdiction: ()~~

~~a. Artificial barriers constructed in low risk areas as determined by the Director, which are six (6) feet or less in height, regardless of storage capacity. ()~~

~~b. Artificial barriers constructed in low risk areas as determined by the Director, which impound ten~~

~~(10) acre feet or less at maximum water storage elevation, regardless of height. ()~~

~~c. Artificial barriers in a canal used to raise or lower water therein or divert water therefrom. ()~~

~~d. Fills or structures determined by the Director to be designed primarily for highway or railroad traffic. ()~~

~~e. Fills, retaining dikes or structures, which are under jurisdiction of the Department of Environmental Quality, designed primarily for retention and treatment of municipal, livestock, or domestic wastes, or sediment and wastes from produce washing or food processing plants. ()~~

~~f. Levees, that store water regardless of storage capacity. Levee means a retaining structure alongside a natural lake which has a length that is two hundred (200) times or more greater than its greatest height measured from the lowest elevation of the toe to the maximum crest elevation of the retaining structure. ()~~

101. Days Used in Establishing Deadlines. Calendar days including Sundays, Saturdays, and holidays. ()

~~12. Dead Storage. The water volume in the bottom of the reservoir stored below the lowest outlet and generally is not withdrawn from storage. ()~~

1311. Department. The Idaho Department of Water Resources. ()

1412. Design Evaluation. The engineering analysis required to evaluate the performance of a dam relative to earthquakes, floods, or other site specific conditions ~~that are~~ anticipated to affect the safety of a dam, or ~~operation of~~ appurtenant facilities. ()

135. Director. The Director of the Idaho Department of Water Resources. ()

~~14. Embankment. An artificial barrier constructed of earth, sand, rock, or gravel used to impound water.~~

~~15. Emergency Action Plan. 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.~~

~~16. Engineer. A registered professional engineer, licensed as such by the state of Idaho. ()~~

~~167. Enlargement. Any change in or addition to an existing dam or reservoir, which raises or may raise the water storage elevation of the water contents impounded by the dam. ()~~

1817. Factor of Safety. A ratio of available shear strength to shear stress, required for stability. ()

~~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.~~

~~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).~~

~~1920. Flood Surge. A variable volume of water temporarily detained in the upper part of 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 cannot be retained either because of physical or administrative factors but is passed through the reservoir and discharged by the spillway(s) downstream until the reservoir level has been drawn down to the design maximum storage elevation. ()~~

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.

22. **Hazard.** The potential consequences to downstream life and property resulting from a dam failure and uncontrolled release of water, exclusive of the size or the physical condition of the dam. Hazard Classifications shall be assigned to new and existing dams based on the severity of failure consequences to life and property.

23. **Hydraulics.** The conveyance of liquid through pipes and channels.

24. **Hydrology.** The study of precipitation, snowmelt, and runoff in relation to land surfaces.

2025. **Inflow Design Flood (IDF).** The flood specified for designing ~~the a dam, and or~~ appurtenant facilities. Commonly expressed inflow design flood(s) include peak rate(s) of flow and volume(s) associated with floods having an annual exceedance probability of 1% (i.e., Q100) and 0.2% (i.e., Q500), and the PMF (probable maximum flood). ()

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

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.

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.

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.

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

~~21. **Maximum Credible Earthquake.** The largest earthquake that reasonably appears capable of occurring under the conditions of the presently known geological environment. ()~~

~~2231. **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. A specific plan that will assure the project is safely managed for its intended purpose and which provides reservoir operating rule curves or specific limits and procedures for controlling inflow, storage, and/or release of water, diverted into, passed through or impounded by a dam. ()~~

~~2332. **Owner.** Includes any of the following who own, control, operate, maintain, manage, hold the right to store and use water from the reservoir or propose to construct a dam, or reservoir. ()~~

~~a. The state of Idaho and any of its departments, agencies, institutions and political subdivisions; ()~~

~~b. The United States of America and any of its departments, bureaus, agencies and institutions; provided that the United States of America are not 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; ()~~

- c. Every municipal or quasi-municipal corporation. ()
- d. Every public utility; ()
- e. Every person, firm, association, organization, partnership, business trust, corporation or company; ()
- f. The duly authorized agents, lessees, or trustees of any of the foregoing; or ()
- g. Receivers or trustees appointed by any court for any of the foregoing. ()

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.

34. Release Capacity. The ability of a dam to pass excess water through the spillway(s) and outlet works.

2435. Reservoir. Any basin which contains or will contain the water impounded by a dam. ()

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.

37. Spillway. A constructed channel over, through, or around a dam, which is designed to accommodate the inflow design flood and thus prevent overtopping by the reservoir.

25. Storage Capacity. The total storage in acre-feet at the maximum design storage elevation. (—)

~~26. Water Storage Elevation. The maximum elevation of the water surface which can be obtained by the dam or reservoir. It is further defined as the storage level attained when the reservoir is filled to capacity (i.e. to the spillway crest) or an authorized storage level attained by installing flashboards to increase the reservoir capacity, or a specified upper storage limit, which is attained by operation of movable gates that raises the reservoir to a controlled operating level. The maximum storage elevation is an equivalent term of water storage elevation. (—)~~

~~27. Release Capability. The ability of a dam to pass excess water through the spillway(s) and outlet works and otherwise discharge. (—)~~

011. -- 0124. (RESERVED)

15. 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.

16. -- 019. (RESERVED)

02520. DAM SIZE CLASSIFICATION AND RISK CATEGORY (RULE 25).

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:

Size Classification	Height (ft)	Storage Capacity
Small <u>Dams and Reservoirs</u>	<u>20 ft. or less</u> <u>Ten (10) feet or more but less than twenty (20) feet</u> and	<u>Less than 100 acre-ft.</u> <u>Fifty (50) acre-feet or more but less than one hundred (100) acre-feet.</u>

Intermediate <u>Dams and Reservoirs</u>	<u>More than Twenty (20) ft.-feet or more but less than forty (40) ft.-feet</u> or <u>and</u> <u>One hundred (100) Acre-ft.-acre-feet or more, but less than four thousand (4,000) acre-ft.-feet</u>
Large <u>Dams or Reservoirs</u>	<u>Forty (40) ft.-feet or more</u> or <u>Four thousand (4,000) acre-ft.-feet or more</u>

(—)

~~02. Risk Category.~~ The following table describes categories of risk used by the Department to classify losses and damages anticipated in down-stream areas, that could be attributable to failure of a dam during typical flow conditions:

<u>Risk Category</u>	<u>Dwellings</u>	<u>Economic Losses</u>
<u>Low</u>	<u>No permanent structures for human habitation.</u>	<u>Minor damage to land, crops, agricultural, commercial or industrial facilities, transportation, utilities or other public facilities or values.</u>
<u>Significant</u>	<u>No concentrated urban development, 1 or more permanent structures for human habitation which are potentially inundated with flood water at a depth of 2 ft. or less or at a velocity of 2 ft. per second or less.</u>	<u>Significant damage to land, crops, agricultural, commercial or industrial facilities, loss of use and/or damage to transportation, utilities or other public facilities or values.</u>
<u>High</u>	<u>Urban development, or any permanent structure for human habitation which are potentially inundated with flood water at a depth of more than 2 ft. or at a velocity of more than 2 ft. per second.</u>	<u>Major damage to land, crops, agricultural, commercial or industrial facilities, loss of use and/or damage to transportation, utilities or other public facilities or values.</u>

(—)

~~023. Determination of Size and Risk Category.~~ The Director shall determine the size ~~and risk~~ category of a new or existing dam. ()

~~02621. -- 02924. (RESERVED)~~

~~030. AUTHORITY OF REPRESENTATIVE (RULE 30).~~

~~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. (—)~~

25. HAZARD CLASSIFICATION.

1. 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 categories are meant to serve as guidelines for implementing design, construction, and operation criteria, subject to final interpretation by the Director.

<u>Hazard Category</u>	<u>Downstream Development</u>	<u>Estimated Loss of Life</u>	<u>Economic Losses</u>

<u>Low</u>	<u>Undeveloped property, no permanent or permanently occupied structures for human habitation.</u>	<u>No loss of life</u>	<u>Low probability for economic loss or damage to or disruption of essential infrastructure.</u>
<u>Significant</u>	<u>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 two (2) feet or less.</u>	<u>Loss of life is unlikely to occur</u>	<u>Significant damage to agricultural, commercial, or industrial facilities; damage to or the disruption of transportation, utilities, or other public facilities or values including environmental loss.</u>
<u>High</u>	<u>Urban development, or any structure for permanent or temporary human habitation which are potentially inundated with flood water at a depth greater than two (2) feet</u>	<u>High probability for loss of life</u>	<u>Major damage to agricultural, commercial, or industrial facilities; damage to or the disruption of transportation, utilities, or other public facilities or values including prolonged environmental loss.</u>

2. Determination of hazard classification. The Director shall determine the hazard category of a new or existing dam. Any dam classified as significant or high hazard regardless its height and storage capacity shall meet the requirements specified in rule 35, 45, 50, 55, and 60 of these rules.

~~03126. -- 03429. (RESERVED)~~

~~03530. FORMS (RULE 35).~~

~~Forms required by these rules are available from the Department to interested parties upon request. Construction of a small dam requires the filing of Form 1710 and construction of an intermediate or large dam requires the filing of Form 1712. ()~~

~~03631. -- 03934. (RESERVED)~~

~~04035. DESIGN REPORTS, CONSTRUCTION PLANS, DRAWINGS, AND SPECIFICATIONS (RULE 40).~~

~~The following provisions shall apply in submitting plans, drawings, reports, and specifications for dams to the Director for design review and approval, prior to commencing construction. ()~~

~~01. Submission of Duplicate Plans, Drawings and Specifications. Any owner who shall desire desiring to construct, enlarge, alter, or repair any intermediate or large 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. The Director may, however, require the submittal of plans, drawings and specifications prior to the construction of any dam. ()~~

~~02. Applying for and Obtaining Written Approval. Construction of a new dam, or the enlargement, alteration, or repairs of such shall not commence on existing dams shall not be commenced until the owner has applied for and obtained written approval of the plans, drawings, and specifications from the Director. Alteration or repairs do not include routine maintenance for which prior approval is not required. (See Rule Subsections 055.02.a and 055.02.b) ()~~

~~03. Plans Shall Be Prepared on a Good Quality Vellum or Mylar. Transparent copies reproducible by standard duplicating processes, if accurate, legible and permanent, will be accepted. Plans may initially be submitted in the form of nonreproducible paper prints. After reviewing the plans, the Director will notify the owner of any required changes. ()~~

034. 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 ~~plans and drawings~~approved design. Plans and drawings shall be submitted in both printed and digital format, with the printed version consisting of paper size 11 x 17 inches. After reviewing the plans, the Director will notify the owner of any required changes. ()

045. 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: Plans for new dams shall include the following information and plans for enlargement, alteration or repair of an existing dam shall include as much of the following information as required by the Director to adequately describe the enlargement, alteration or repair and the affect on the existing dam or its appurtenant facilities: ()

a. A topographic map of the dam site showing the location of the proposed dam by section, township and range, and location of ~~spillway, outlet works, and~~ all borings, test pits, borrow pits, and other locations of samples obtained for field or laboratory testing; ()

b. A profile ~~along the dam axis showing depicting~~ the locations, elevations, and depths of borings or test pits, including the visual illustration of logs of bore holes, and/or test pits, or borrow pits; ()

c. A ~~maximum~~ cross-section of the structure at maximum section dam 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 ~~outlet~~ conduits, valves, operating mechanism and dimensions of all other essential ~~structural~~ elements deemed necessary for properly constructing the approved design such as cutoff walls, filters, embankment zones, etc.; ()

d. Detailed drawings showing plans, cross and longitudinal sections of appurtenant features such as but not limited to spillway, training walls, the outlet conduits, valves, gates, trash racks, and controls ~~for operating the same, and trash racks works;~~ ()

e. A curve or table showing the capacity of the reservoir in acre-feet vs gauge height (~~referenced to a common project datum~~) of the reservoir storage level, and the computations used in making such determinations. ()

f. A curve or table showing the outlet discharge capacity in cubic feet per second vs gauge height of reservoir storage level, and the equation computations used in making such determinations; ()

g. A curve 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 equation computations used in making such determinations; ()

h. Detailed drawings of spillway structure(s), including cross-sections of the channel entrance and exit points heading to and from the spillway and a spillway profile; ()

i. Plans for flow measuring devices capable of providing an accurate determination of the flow of the stream above and 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 common project datum; and ()

j. Plans or drawings of instruments, recommended by the owner ~~or's~~ engineer to monitor performance of ~~intermediate or large dams- the dam~~ to assure safe operation, or as may be required by the Director as deemed necessary to monitor any ~~dam regardless of size, that is situated upstream of a high risk area~~ structure for benefit of public safety regardless of size. ()

056. 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. Specifications shall include provisions acceptable to the Director for adequate observation, inspection and control of the work by a registered professional engineer, during the period of construction. ()~~

~~**076. Changes to the Approved Design Specifications.** 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. The specifications shall not be materially changed without prior written consent of the Director. Significant design changes, while construction is underway, shall be submitted for the Director's review and approval. ()~~

~~**087. Inspections.** The owner shall ~~provide for and~~ 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 ~~excavation preparation~~ or construction ~~of the dam~~ which potentially jeopardize the future integrity and safety of the ~~dam project works~~. The Department may request of the owner that ~~Certain certain~~ stages of construction shall not proceed without inspection and approval by the Director, ~~including the following:~~ ()~~

~~a. After clearing and excavation of the foundation area and cutoff trench and prior to placing any fill material. ()~~

~~b. After installation of the outlet conduit and collars and before placing any backfill material around the conduit; ()~~

~~c. After construction is completed and before any water is stored in the reservoir. ()~~

~~d. At such other times as determined necessary by the Director. The Director will, upon seven (7) days notice, inspect and if satisfactory, approve the completed stage of construction. The Director may conduct inspections upon shorter notice upon good reason being shown or upon a schedule jointly agreed upon by the Director and the owner. ()~~

~~**098. Inspection, Examination and Testing of Materials.** All materials and workmanship shall be subject to inspection, examination, ~~or and~~ testing by the Director ~~at any and all times~~. ()~~

~~**109. Rejection of Defective Material.** The Director shall ~~have the right to require~~ ~~may order~~ the owner or engineer to reject defective material. ~~The owner shall correct rejected~~ ~~and workmanship or require its removal or~~ ~~correction respectively~~. ~~Rejected workmanship shall be corrected and rejected material shall be replaced with proper and replace rejected material with approved material.~~ ()~~

~~**110. Suspension of Work.** The Director may order the engineer to suspend any work that ~~is or is likely to be~~ ~~may be~~ subject to damage by inclement weather conditions. ()~~

~~**121. 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. These provisions shall not relieve the engineer of his responsibility to assure that construction is accomplished in accordance with the approved plans and specifications or to suspend work on his own motion.~~ ()~~

~~**13. Detailing Provisions of Specifications.** The specifications shall state in sufficient detail, all provisions necessary to insure that construction is accomplished in an acceptable manner and provide needed control of construction to insure that a safe structure is constructed. ()~~

~~**1412. Design Report.** Owners proposing to construct, enlarge, alter, or repair ~~an intermediate or large~~~~

dam shall submit an engineering or design evaluation report to accompany with 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. ()

a. All technical reference(s); equations and assumptions used in the design; ()

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.~~Hydrologic data used in determining runoff from the drainage areas; reservoir flood routing(s); and hydraulic evaluations of the outlet(s) and the spillway(s).~~ ()

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.~~Engineering properties of the foundation area and of each type of material to be used in the embankment.~~ ()

d. A stability analysis, including an evaluation of overturning, sliding, slope and foundation stability and a seepage analysis; ()

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 site as established by deterministic or probabilistic analyses.~~Seismic design loads shall be evaluated and applied at all large dams to be located in significant or high risk areas, in Seismic Zone 3, which for purposes of these rules is the area in Idaho east of Range 22 East, Boise Meridian. The evaluation required of large dams, that are classified significant or high risk, shall use the maximum ground motion/ acceleration generated by the maximum credible earthquake, which could affect the dam site.~~ ()

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.~~Seismic analysis may be required as determined by the Director for large dams located above high risk areas in Seismic Zone 2, which for purposes of these rules is the area in Idaho west of Range 22 East, Boise Meridian.~~ ()

e. Geologic description of reservoir area, including evaluation of landslide potential;

f. Engineering properties and the weathering characteristics of the contents proposed for storage in the impoundment, if applicable; and

g. Other information which would aid in evaluating the safety of the design.

1513. Additional Information/Waiver. The Director may require the filing of such additional information which in his opinion is necessary for the benefit of public safety or waive any requirement in these rules if available data demonstrates that it is unnecessary.~~or waive any requirement herein cited if in his opinion it is unnecessary.~~ ()

1614. 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:~~The Director may accept plans and specifications or portions thereof prepared for other agencies which are determined to meet the requirements of Rule 40.~~ ()

a. An operation plan; or

b. An emergency action plan to help protect downstream of life and property.

~~04136. -- 04444. (RESERVED)~~

~~045. **EMERGENCY ACTION AND OPERATION PLAN (RULE 45).**~~

~~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/ 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. The Director may waive the EAP requirement of individual Significant Hazard Dam upon a determination that the flood inundation zone resulting from the potential failure or uncontrolled release of contents impounded by the structure will not damage downstream property. An operation plan is required as described in the following rules and shall provide procedures for emergency operations and include guidelines and procedures for inspection, operation and maintenance of the dam and appurtenances, including any instruments required to monitor performance of the dam during normal operating cycles, critical filling or flood periods, or as may be required to monitor new or existing dams subject to earthquake effects.~~

~~()~~

~~01. **New, Reconstructed or Enlarged Dams.** Prior to the initial filling of the reservoir or refilling the reservoir for a reconstructed or enlarged dam in the following categories, the owner shall file with the Director an operation plan for review and approval: ()~~

~~a. Small, high risk. ()~~

~~b. Intermediate, significant risk. ()~~

~~c. Intermediate, high risk. ()~~

~~d. Large, any risk category. ()~~

~~02. **Existing Dams.** Unless exempted by the Director, owners of the following categories of dams shall file an operation plan with the Director on or before July 1, 1992 for review and approval: ()~~

~~a. Intermediate, high risk. ()~~

~~b. Large, significant risk. ()~~

~~c. Large, high risk. ()~~

~~03. **Alternate Plans.** The Director may accept existing studies or plans in lieu of an operation plan if the Director determines the information provided fulfills the requirements of Rule 45. ()~~

~~046. -- 049. (RESERVED)~~

~~050. **NEW INTERMEDIATE OR LARGE DAMS (RULE 50) 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. The following minimum criteria shall be used to evaluate the design of intermediate or large earthfill dams in Idaho. These standards are intended to serve as guidelines 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 this established criteria will be considered by the Director on a case by case basis in approving plans and specifications and evaluating dams. Dams constructed of other materials shall comply with these criteria as found appropriate by the Director and with other engineering criteria approved by the Director. ()~~

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: Slope stability analyses shall determine the appropriate upstream and downstream slopes. Unless slope stability analysis determines otherwise, the embankment slopes shall be:~~

Upstream slope	3:1 or flatter
Downstream slope	<u>2.5</u> :1 or flatter

()

~~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. For large high and significant hazard dams and intermediate high hazard dams the embankment shall be designed, constructed and maintained to assure stability under static loads and prevent instability due to seepage or uplift forces, or drawdown conditions. Transmission of seepage through the embankment, abutments and foundation shall be controlled to prevent internal erosion of material and instability where seepage erodes or emerges. ()~~

~~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 protect against piping of the embankment fill material. Transmission of seepage through the embankment, abutments, and foundation shall be controlled to prevent internal erosion or the removal of material and instability where seepage emerges. filter fabric and/or toe drains to stabilize the fill and protect against piping of the embankment fill material. ()~~

~~c. The minimum factor of safety for a steady state loading condition shall be 1.5. The minimum factor of safety for rapid drawdown loading shall be 1.2. The minimum factor of safety for seismic loading shall be 1.0. dam under steady state condition shall be 1.5. During rapid drawdown of the reservoir, the minimum factor of safety for the embankment shall be 1.2. For dams constructed in Seismic Zone 3, the minimum factor of safety under seismic load shall be 1.0. ()~~

d. Seismic Stability

~~i. The stability of an embankment subjected to earthquake ground motions ~~can~~ 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. dynamic response or pseudo-static analyses. Pseudo-static analyses are acceptable for embankment dams constructed of soils that will not build up excess pore pressures due to shaking, nor sustain more than fifteen percent (15%) strength loss during earthquake events, otherwise the stability of an embankment dam shall be analyzed by a dynamic response method. A pseudo-static analysis simplifies the structural analysis (i.e. the resultant force of the seismic occurrence is represented by a static horizontal force applied to the critical section to derive the factor of safety against sliding along an assumed shear surface). The value of the horizontal force used in the pseudo-static analysis, is the product of the seismic coefficient and the weight of the assumed sliding mass. ()~~

~~e.ii. Slope deformation analyses are required for dams located in Seismic Zone 3, structures that are constructed of cohesionless soils and/or on foundations which are subject to liquefaction, when the peak acceleration at the site is anticipated to exceed 0.15g exhibiting fine grain-size gradation and/or on foundations that may be subject to liquefaction. ()~~

~~f.iii. The design analyses for large and high hazard dams shall include a geologic and seismic report. The seismic report 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/faulting, as determined by the Director. ~~new dams located in high risk areas (in Seismic Zone 2 or 3) shall include geologic and seismic reports, location of faults and history of seismicity.~~ (—)

iv. The design analysis for dams that do not meet the size or hazard criteria listed in Rule 50.1.d.iii shall include in the stability analysis, peak ground accelerations obtained from Seismic Hazard Maps published by the United States Geologic 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.

ge. Where in the opinion of the Director, embankment design or conditions warrant, ~~the owner may be required to instrumentation of the their~~ embankment and/or foundation ~~will be required.~~ (—)

~~h. The design analyses for new large dams located in high risk areas (in Seismic Zone 3) shall include an evaluation of potential landslides in the vicinity of the dam or immediate area of the reservoir, which could cause damage to the dam or appurtenant structures, obstruct the spillway or suddenly displace water in the reservoir causing the dam to overtop. If potential landslides pose such a threat, they shall be stabilized against sliding, with a minimum factor of safety of 1.5.~~ (—)

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. ~~The crest width shall be sufficient to provide a safe percolation gradient through the embankment at the level of the maximum storage elevation. The minimum crest width (top of embankment) shall be determined by:~~

~~W = H / 5 + 10~~ W = Width, in feet

~~H = Structural Height, in feet~~

~~The minimum top width for any dam is twelve (12) feet.~~ (—)

03. Cutoff Trenches or Walls. Cutoff trenches shall be excavated ~~into competent foundation material to bear on an approved stratum or zone, through relatively pervious foundation material to an impervious stratum or zone. The trench shall be backfilled with suitable material, compacted to the specified density. The cutoff trench shall extend up the abutments to the maximum storage elevation.~~ (—)

a. ~~Cutoff~~ The 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.~~ Side slopes shall be no steeper than one to one (1:1) for depths up to twelve (12) feet, and no steeper than one and one half to one (1 1/2:1) for greater depths to provide for proper compaction. Flatter slopes may be required for safety and stability. (—)

b. 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), to bond fills to smooth rock surfaces in a similar manner as cutoff trenches and shall be entrenched in the rock to a depth approximately one half the thickness of the cutoff wall. Concrete cutoff walls shall be doweled into the rock a minimum of eight (8) inches with a maximum spacing of eighteen (18) inches for three fourths (3/4) inch steel dowels. Concrete walls shall have a minimum projection of three (3) feet perpendicular to the rock surface and shall have a minimum thickness of twelve (12) inches. (—)

04. Impervious Core Material. Soils used to construct the inner sectional core of an embankment shall consist of relatively impervious 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. The approved earth materials (silt soils are seldom acceptable) shall be zoned as shown in the plans and placed in the embankment in continuous, approximately level layers, having a thickness of not more than six (6) inches before compaction. Compaction shall be based on ASTM D-698. A minimum compaction of ninety-five percent (95%) is required.~~ ()

~~a. An acceptable working range of moisture content for the core material shall be established and maintained.~~ ()

~~b. The material shall be compacted by means of a loaded sheepsfoot or pneumatic roller to the required density.~~ ()

~~c. No rock shall be left in the core material which has a maximum dimension of more than four (4) inches. The core material shall be free of organic and extraneous material.~~ ()

~~d. The core material shall be carried up simultaneously the full width and length of the dam, and the top of the core material shall be kept substantially level at all times, or slope slightly toward the reservoir.~~ ()

~~e. No frozen or cloddy material shall be used, and no material shall be placed upon frozen, muddy or unscarified surfaces.~~ ()

~~f. All materials used in the dam shall meet the stability and seepage requirements as shown by a design analysis of the structure and shall be properly installed to meet these requirements.~~ ()

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. Toe or chimney drains or free draining downstream material shall be installed where necessary to maintain the phreatic line within the downstream toe.~~ ()

~~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. Filter design for chimney drains, filter blankets and toe drains in clay and silt soils shall be selected using the following design criteria, unless deviations are substantiated by laboratory tests. All tests are subject to review and approval by the Director.~~

~~D15 filter/D15 base > 5 but < 20~~

~~D15 filter/D85 base < 5~~

~~D50 filter/D50 base < 25~~

~~D85 filter > 2 times diameter of pipe perforations, or 1.2 times width of pipe slots.~~ ()

~~b. Filter material requirements are determined by comparing the particle size distribution of the filter to the particle size distribution of the materials to be protected;~~

~~e.g. D50 filter~~

~~D50 material to be protected~~

~~Where D is the particle size passing a mechanical (sieve) analysis expressed as a percentage by weight.~~ ()

~~c. The base material should be analyzed considering the portion of the material passing the No. 4 sieve, for designing filters for base materials that contain gravel size particles. To assure internal stability and prevent segregation of the filter material, the coefficient of uniformity (D60/D10) shall not be greater than 20.~~ ()

~~d. The minimum thickness of filter blankets and chimney drains shall be twelve (12) inches, with the maximum size particle passing the one (1) inch sieve. The maximum particle size may be increased with increasing thickness of the filter, by the rate of one (1) inch per foot of filter. However, the maximum particle shall not exceed three (3) inches. Zoned filters and chimney drains must not be less than twelve (12) inches thick per each zone. The width of granular filters shall not be less than the width of the installation equipment unless the plans and specifications include construction procedures adequate to insure the integrity of a narrower width.~~ ()

~~be. Perforated and slotted drainpipes must be four (4) inches diameter or greater and shall be surrounded by permeable drainage material 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. 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. Perforated drain pipes must have a minimum of six (6) inches of drain material around the pipe. The maximum particle size shall not exceed one-half (1/2) inch unless the layer thickness is increased at the rate of one (1) inch per foot of filter. Underdrains and collection pipes must be constructed of noncorrosive material.~~ ()

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, to prevent the dam from overtopping during passage of the inflow design flood and to provide freeboard for wind generated waves. Camber estimated for post-construction settlement shall be included in the design and incorporated in the construction of the top of the embankment, unless waived by the Director. Camber may be estimated by multiplying the structural height of the dam by five percent (5%).~~ ()

~~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 to equal the surcharge elevation of the reservoir during passage of the inflow design flood. The height of wind generated waves (H) moving across a surcharged reservoir can be estimated by the following equation:~~

~~$H = 1.95 (F^{1/2})$ where F = fetch, the distance in miles across the reservoir, measured perpendicular to the major axis of the dam.~~ ()

~~b. For large, high risk dams the minimum freeboard shall be two (2) feet plus wave height during passage of the one percent (1%) flood or equal to the surcharge elevation of the reservoir during passage of the inflow design flood whichever is greater.~~ ()

~~c. Estimation of the height of the wind generated wave using the empirical equation in Rule 050.06.a. shall not preclude a more conservative design including consideration of fill materials, embankment zoning, slope surface protection, drainage or other safety factors.~~ ()

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. All dams which are subject to erosion shall be protected from wave action. The design engineer, with approval of the Director, shall determine whether or not rock riprap or other protection is necessary.~~ ()

~~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, and extend up the slope, from three (3) feet below the normal minimum operating level to the top of the dam.~~ ()

~~b. Where riprap is required by Rule Subsection 055.07, pipes, cables, brush, tree growth, dead growth,~~

~~logs, or floating debris are not acceptable substitutes for rock riprap and granular bedding material. ()~~

08. Outlet Conduits. All reservoirs impounding water shall ~~be provided with~~have an outlet conduit of sufficient capacity to prevent interference with natural streamflow through the reservoir to the injury of downstream appropriators, ~~unless waived by the Director.~~ 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 capability as determined by the Director. ()

a. Outlet conduits shall be laid on a firm, 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, and normally not be placed on fills which can consolidate, allow differential settlement, and cause separation or misalignment of the pipe. ~~Unless otherwise required, the outlet shall have a minimum inside diameter of twelve (12) inches. The conduits shall be of reinforced concrete or of metal pipe encased in concrete, poured with a continuous seal between the concrete and the trench except as otherwise approved by the Director. Void spaces and uncompacted areas shall not be covered over when the outlet trench is backfilled. Outlets shall be properly aligned on an established grade and may be supported on a concrete cradle, or otherwise supported and kept aligned when the outlet is covered. ()~~

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. Asphalt dipped or other metal pipe is not acceptable unless it is encased in concrete. 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 dam. ()~~

~~c. All outlet conduits shall have a seepage path through the impervious zone at least equivalent in length to the maximum head above the downstream end of the system. Only one-third (1/3) the horizontal distance through the impervious zone will be utilized when calculating the length of the seepage path. Collars may be used to satisfy this requirement but all collars shall extend a minimum of two (2) feet outside the conduit for dams up to thirty (30) feet in height and a minimum of three (3) feet for dams above that height. Collars shall be spaced at intervals of at least seven (7) times their height and no collar may be closer to the outer surface of the impervious zone than the distance it extends out from the conduit. ()~~

~~d. The use of multiple conduits is allowed only upon the written approval of the Director. ()~~

09. Gates and Valves. ~~All~~

~~a. Conduits shall be gated on the upstream end to avoid pressurizing the conduit inside the embankment. Pressurized conduits shall be fitted with both a guard gate and a control gate or valve, unless otherwise approved by the Director, with either a vertical or an inclined gate.~~

~~b. All conduits shall be vented directly behind the gate.~~

~~c. All gate stem pedestals shall be securely founded to prevent future movement, unless otherwise determined by the Director. Reservoirs storing water during the winter and subject to severe ice conditions shall have inclined gate controls enclosed in a protective sleeve which is buried. All gate stem pedestals shall be made of concrete. All trash racks shall slope toward the reservoir.~~

~~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 and shall be covered with a trash rack.~~

~~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, with bars primarily in one (1) direction so they can be cleaned. If fish screens are used, they shall be placed over the trash rack and shall be~~

~~removable for cleaning, or of the self-cleaning type. ()~~

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, which is readily accessible, but secured to prevent unauthorized operation. ()

11. Release Capability. Based on the size of the dam and 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.

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

~~on the risk category assigned by the Director, the release capability of a dam shall equal or exceed the inflow design flood in the following table:~~

Downstream Risk Category	Size Classification	Inflow Design Flood
Low	Small	Q50
	Intermediate	Q100
	Large	Q500
Significant	Small	Q100
	Intermediate	Q500
	Large	0.5 PMF
High	Small	Q100
	Intermediate	0.5 PMF
	Large	PMF

~~NOTE: The inflow design flood(s) indicated in the table include specific frequency floods (2%/50yr, 1%/100-yr.) expressed in terms of exceedance with a probability the flood will be equaled or exceeded in any given year (a fifty (50)-year flood has a two percent (2%) chance of occurring in any given year and a one hundred (100) year flood has a one percent (1%) chance of occurring in any given year); or PMF—probable maximum flood, which may be expected~~

~~from the most severe combination of meteorologic and hydrologic conditions that are reasonably possible in the region. The PMF is derived from the probable maximum precipitation (PMP) which is the greatest theoretical depth of precipitation for a given duration that is physically possible over a particular drainage area at a certain time of year.~~ ()

a. All spillways shall be stabilized for the discharge of flow ~~by the use of~~ using concrete, masonry, riprap, or sod, if not constructed in resistant rock. ()

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. Where site conditions allow, the spillway shall be constructed independent of embankment dams. The spillway(s) shall guide the discharge of water away from the dam embankment so as not to erode or endanger the structure.~~ ()

c. The minimum base width of an open-channel spillway shall be ten (10) feet, or greater to allow access by mechanical equipment. ~~Conduits or siphon pipes other than glory hole spillways~~ Siphon pipes or pumps are not acceptable substitutes for an open-channel spillway. ()

d. The effectiveness of spillways shall be undiminished by bridges, fences, pipelines, or other structures. ()

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. Unless expressly authorized in writing by the Director, or approved as an integral part of an operation plan, stop logs or flashboards shall not be installed in spillways.~~ ()

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. The dam site shall be cleared of all trees, brush, large rocks, and debris unless otherwise waived by the Director. The reservoir site shall be cleared of all woody material, growth or debris that is large enough to lodge in the spillway, or outlet works, except as otherwise approved by the Director.~~ ()

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. ()

a. Upon completion of construction the owner or his engineer shall provide the Director a ~~short,~~ written narrative account of all items of ~~work~~ 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, ~~if the completed project has been substantially changed from the plans and construction specifications originally approved.~~ ()

b. The engineer, acting on behalf of and representing the owner, shall certify that construction, reconstruction, enlargement, replacement, or repair of the embankment ~~dam~~ and appurtenances was completed in accordance with the record drawings and specifications, ~~or as revised.~~ ()

~~051. -- 0524.~~ (RESERVED)

~~05560.~~ **EXISTING INTERMEDIATE OR LARGE DAMS AND RESERVOIRS (RULE 55).**

All dams and reservoirs regulated by the ~~department~~ 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. ~~embankment dimensions and the hydraulic capacity of the outlet works and spillway(s) as designed and constructed, or as otherwise required by these rules.~~ ()

01. Analyses Required. The analyses required by Rule 35 shall apply to all existing dams when the Director specifically requires the analyses. Where applicable, non-embankment dams shall comply with the following criteria. The analyses required by Rule 40 are not applicable to existing dams except as required in Rule Subsections 055.01.a. and 055.01.e. unless for good cause, the Director specifically requires the analyses. Dams constructed of other than earth material shall comply with these criteria, as determined by the Director, or with other engineering criteria approved by the Director. ()

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. For large, significant or high risk dams, the release capability required by Rule Subsection 050.11 shall be evaluated and applied to the structure. Dams of other size and risk are required to provide the release capability of Rule Subsection 050.11 but are not required to conduct the analyses. ()

~~**b.** Every dam, unless exempted by the Director shall have a spillway with a capacity to pass a flood of one percent (1%) (two percent (2%) for small low hazard dams) occurring with the reservoir full to the spillway crest at the beginning of the flood while maintaining the freeboard required by Rule Subsection 050.06.~~ ()

eb. The Director may lessen or waive the spillway requirement for dams that demonstrate out-of-stream (off-channel) storage, proposing off stream storage or upon a showing acceptable to the Director. ()

ec. 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: can include the capacity of spillway(s) and outlet(s), diversion facilities, or other appurtenant structures, and any approved operating procedures which utilize upstream storage, diversion and flood routing storage to pass flood events. The remainder of the required release capacity, if any, may be met by the following:

i. Reconstruction, enlargement or addition of spillway(s), outlet(s), diversion facilities or other constructed conveyance features appurtenant structures. ()

ii. A showing acceptable to the Director that potential failure of the dam during a flood of the specified magnitude described in Rule Subsection 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 results from any natural flood equal to or exceeding that magnitude, not substantially increase downstream damages over and above the losses and damages that would result from any natural flood up to that magnitude. ()

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. A showing acceptable to the Director that the release capability of the dam together with other emergency release modes such as a controlled failure or overtopping of the dam would not result in a larger rate of discharge than the rate of inflow to the reservoir. ()

~~**iv.** A showing acceptable to the Director that limiting physical factors unique to the dam site exist that prevent construction of a spillway or other release capability mechanisms during a flood of the specified magnitude described in Rule Subsection 050.11 provided the owner implements storage operational procedures and/or provides for emergency warning to protect life and property.~~ ()

de. 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. 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 for any existing dam regardless size or hazard potential. For large, high risk dams, the seismic

~~design loads shall be evaluated and applied to dams located east of Range 22E, B.M. The evaluation shall use the maximum ground motion/acceleration generated by the maximum credible earthquake. ()~~

~~fe. The Director may accept existing studies relative to requirements of Rule Subsections 055.01.a-60.01.a and Rule 60.01.d-055.01.e., if the Director determines the information provided fulfills the requirements of the rules Rule Subsections 055.01.a. and 055.01.e. ()~~

~~fg. 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. The Director may allow until July 1, 1992 for completion of the analyses required in Rule Subsections 055.01.a. and 055.01.g. and may allow the owner of an existing dam a compliance period of up to ten years for completing the studies, to complete structural modifications or implement other improvements necessary to provide the release capability determined to be required (Rule Subsection 055.01.a.) or complete structural modifications necessary to assure the dam and appurtenant facilities will safely function under earthquake loads (Rule Subsection 055.01.g.). ()~~

~~hg. 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.~~

~~h. Within thirty (30) days after completing the analyses required in Rules 60.01.a or 60.01.d, Rule Subsection 055.01.a. or 055.01.g., the owner of an existing dam that is found deficient in by either analysease (Rule Subsection 055.01.a. or 055.01.g.) shall file with the Director a plan and schedule outlining the dates work or construction items will be completed for mitigating the deficiency. ()~~

02. Other Requirements. ()

a. Routine maintenance items include the following: ()

i. Eradication of rodents and filling animal burrows; ()

ii. Removal of vegetation and debris from the dam; ()

iii. Restoring original dimensions of the dam by the addition of fill material; ()

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

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

vi. Repair or replacement of wingwalls, headwalls or aprons including spalling concrete. ()

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

i. ~~Alteration or modification~~ Reconstruction of embankment slopes; ()

ii. Replacement, reconstruction, or extension of outlets; ()

iii. Foundation stabilization; ()

iv. Filter or drain construction or replacement; ()

v. Spillway size alteration or modification; ()

vi. Installation of instrumentation or piezometers; or ()

vii. Release capability or reservoir storage modification. ()

c. Items not specifically described in rules 60.02.a and 60.02.b ~~Rule Subsections 055.02.a. and 055.02.b.~~ will be determined by the Director as either routine or non-routine upon receipt of a written request from the owner or his representative seeking such a determination. ~~to be included in one rule or the other upon receipt of a written request from the owner or his representative seeking such a determination.~~ ()

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. ()

e. Upon completion of reconstruction of a dam or feature of a dam included in Rule 60.02.b, ~~Rule Subsection 055.02.b.,~~ the owner or his engineer shall provide the Director a ~~short~~ 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. ()

f. Upon request, the owner of every dam shall provide his 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. ()

~~056. -- 061. (RESERVED)~~

~~060. SMALL DAM DESIGN CRITERIA (RULE 60).~~

~~The following provisions apply to small dams. ()~~

~~01. Design and Construction of Small Dams. Design and construction of small dams located in high risk areas as determined by the Director require submittal of fees, plans and specifications prepared by an engineer and shall follow the same general criteria established under Rules 40, 45, 50, and 55. Other small dams not determined to be in a high risk area shall follow the same general criteria established under Rules 50 and 55 or larger dams, except that submittal of plans, specifications and test results is not required. ()~~

~~02. Notification Prior to Construction. The owner shall notify the Director in writing ten (10) calendar days prior to commencing construction. ()~~

~~03. Approval Required. The owner shall not proceed with the following stages of construction without approval from the Director. ()~~

~~a. After clearing and excavation of the foundation area and cutoff trench, and prior to placing any fill material; ()~~

~~b. After installation of the outlet conduit, and before placing any backfill material around the conduit; ()~~

~~c. After construction is completed, and before any water is stored in the reservoir; ()~~

~~d. At such other times as determined necessary by the Director. The Director, will, upon seven (7) day notice, inspect and, if satisfactory, approve the completed stage of construction. ()~~

~~04. Notification upon Completion of Construction. The owner shall in writing notify the Director upon completion of construction. ()~~

~~061. -- 064. (RESERVED)~~

~~065. DAMS STORING TAILINGS AND WATER (RULE 65).~~

01. Construction of Mine Tailings Impoundment Structures ~~Dams~~ Storing Fifty Acre-Feet or More.

~~New or existing mine tailings impoundment structures intended to store fifty (50) acre-feet or more of water above the surface of the tailings material shall meet the applicable requirements specified in Rules 35, 45, and 60 of these rules and IDAPA 37.03.05 Mine Tailings Impoundment Structure Rules. The Director may waive applicable requirements in Rule 35, 45, or 60 if, in the opinion of the Director, sound engineering design provided by the owner indicates such requirements are not applicable. Construction of dams intended to store or likely to store fifty (50) acre feet or more of water in excess of the water contained in the tailings material shall meet the requirements specified in Rules 40, 45, 50 and 55 of these rules. The Director may waive any or all of these requirements if, in the opinion of the Director, sound engineering design provided by the owner indicates such requirements are not applicable. ()~~

~~**02. Abandonment Plan.** An abandonment plan which provides a stable, maintenance free condition at any time tailings are not being actively placed for an extended period of time, as determined by the Director, shall be submitted to the Director by the owner of a dam storing tailings and water. This rule may be waived by the Director if determined not to be applicable. ()~~

066. -- 999. (RESERVED)