

SUBCHAPTER B: DESIGN AND EVALUATION OF DAMS
§§299.11 - 299.17
Effective January 1, 2009

§299.11. General.

The executive director shall evaluate the hydrologic, hydraulic, and structural adequacy of the dam in determining whether a proposed or existing dam is considered a deficient dam.

(1) The executive director shall evaluate the hydrologic and hydraulic adequacy of the dam and spillways using the criteria in the most current version, at the time of the evaluation, of the agency's *Hydrologic and Hydraulic Guidelines for Dams in Texas*.

(2) The executive director may also take into consideration the condition of the dam, including the possibility that the dam might be endangered by:

- (A) overtopping;
- (B) seepage;
- (C) piping;
- (D) settlement;
- (E) erosion;
- (F) cracking;
- (G) sinkholes;
- (H) earth movement;
- (I) uplift;
- (J) overturning;
- (K) failure of gates or operation of gates;
- (L) failure of spillways;
- (M) failure of conduits; or
- (N) other conditions, as appropriate.

§299.12. Classification of Dams.

(a) The executive director shall classify all proposed and existing dams based on size (small, intermediate, or large) and downstream hazard (low, significant, or high) and not on the physical condition of the dam.

(b) The executive director may reclassify the hazard classification of a dam at any time based on:

(1) an inspection and downstream hazard evaluation by the executive director;

(2) a report of an inspection and downstream hazard evaluation by the owner's professional engineer;

(3) a breach analysis performed by either the executive director or the owner's professional engineer as described in §299.15(a)(4)(A)(i) of this title (relating to Hydrologic and Hydraulic Criteria for Dams); or

(4) a review of current aerial photography and topographic maps, along with information obtained in the field.

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§299.13. Size Classification Criteria.

The executive director shall classify dams for size based on the larger of the height of the dam or the maximum storage capacity.

Figure: 30 TAC §299.13

SIZE CLASSIFICATION		
Category	Impoundment Maximum Storage (Acre-Foot)	Height (Ft.)
Small	Equal to or Greater than 15 & Less than 1,000	Equal to or Greater than 25 & Less than 40
	Equal to or Greater than 50 & Less than 1,000	Greater than 6 & Less than 40
Intermediate	Equal to or Greater than 1,000 & Less than 50,000	Equal to or Greater than 40 & Less than 100
Large	Equal to or Greater than 50,000	Equal to or Greater than 100

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§299.14. Hazard Classification Criteria.

The executive director shall classify dams for hazard based on either potential loss of human life or property damage, in the event of failure or malfunction of the dam or appurtenant structures, within affected developments, that are existing at the time of the classification. The hazard classification may include use of a breach analysis that addresses the incremental impact of the potential breach over and above the impact of the flood that may have caused the breach, as defined in §299.15(a)(4)(A)(i) of this title (relating to Hydrologic and Hydraulic Criteria for Dams). The classification must be according to the following.

(1) Low. A dam in the low-hazard potential category has:

(A) no loss of human life expected (no permanent habitable structures in the breach inundation area downstream of the dam); and

(B) minimal economic loss (located primarily in rural areas where failure may damage occasional farm buildings, limited agricultural improvements, and minor highways as defined in §299.2(38) of this title (relating to Definitions)).

(2) Significant. A dam in the significant-hazard potential category has:

(A) loss of human life possible (one to six lives or one or two habitable structures in the breach inundation area downstream of the dam); or

(B) appreciable economic loss, located primarily in rural areas where failure may cause:

(i) damage to isolated homes;

(ii) damage to secondary highways as defined in §299.2(58);

(iii) damage to minor railroads; or

(iv) interruption of service or use of public utilities, including the design purpose of the utility.

(3) High. A dam in the high-hazard potential category has:

(A) loss of life expected (seven or more lives or three or more habitable structures in the breach inundation area downstream of the dam); or

(B) excessive economic loss, located primarily in or near urban areas where failure would be expected to cause extensive damage to:

- (i) public facilities;
- (ii) agricultural, industrial, or commercial facilities;
- (iii) public utilities, including the design purpose of the utility;
- (iv) main highways as defined in §299.2(33); or
- (v) railroads used as a major transportation system.

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§299.15. Hydrologic and Hydraulic Criteria for Dams.

(a) Hydrologic criteria.

(1) Minimum hydrologic criteria for proposed dams. The following minimum hydrologic criteria includes those proposed dams to be constructed according to Texas Water Code, §11.142.

(A) A proposed dam design must meet the minimum design flood hydrograph criteria.

Figure: 30 TAC §299.15(a)(1)(A)

HYDROLOGIC CRITERIA FOR DAMS		
Classification		
Hazard, as defined in §299.14 of this title (relating to Hazard Classification Criteria)	Size, as defined in §299.13 of this title (relating to Size Classification Criteria)	Minimum Design Flood Hydrograph (expressed as a percentage of the probable maximum flood (PMF)).
Low	Small	25% PMF
	Intermediate	25% PMF to 50% PMF
	Large	50% to 75% PMF
Significant	Small	50% PMF
	Intermediate	50% PMF to 75% PMF
	Large	75% to PMF
High	Small	75% PMF
	Intermediate	75% to PMF

	Large	PMF
<p>When a range is given, the minimum flood hydrograph must be determined by straight-line interpolation within the given range. Interpolation must be based on either height of dam or maximum storage capacity, whichever results in the highest percentage of PMF. The interpolation for large, low-hazard dams for height must be between end points of 100 feet and 50% PMF and 200 feet and 75% PMF. The interpolation for large, low-hazard dams for maximum storage capacity must be between the end points of 50,000 acre-feet and 50% PMF and 300,000 acre-feet and 75% PMF. The interpolation for large, significant-hazard dams for height must be between end points of 100 feet and 75% PMF and 200 feet and PMF. The interpolation for large, significant-hazard for maximum storage capacity must be between the end points of 50,000 acre-feet and 75% PMF and 300,000 acre-feet and PMF.</p>		

(B) The minimum design flood hydrograph must be based on the size and hazard classification of a proposed dam at the time of the design and calculated using the criteria in the most current version, at the time of the analysis, of the agency's *Hydrologic and Hydraulic Guidelines of Dams in Texas*.

(C) Proposed dams and spillways or dams and spillway to be reconstructed, modified, enlarged, rehabilitated, or altered using hydrologic procedures of the Natural Resources Conservation Service will be acceptable, provided that the procedures are shown to be equal to or more conservative than the procedures provided in the most current version, at the time of the analysis, of the agency's *Hydrologic and Hydraulic Guidelines for Dams in Texas*.

(2) Exemptions to minimum hydrologic criteria for proposed dams. Any dam designed to withstand overtopping without failure of the dam, including the foundation and abutments, as demonstrated by studies prepared by the owner's professional engineer will be exempt from the minimum hydrologic criteria.

(3) Minimum hydrologic criteria for existing dams. The following criteria applies to dams that existed before the effective date of this subchapter.

(A) An owner of a large- or high-hazard existing dam that was required to meet 100% of the probable maximum flood (PMF) before the effective date of these rules and that is shown by an evaluation by a professional engineer to meet 75% or more of the PMF will not be required to upgrade the dam to meet minimum hydrologic criteria in paragraph (1)(A) of this subsection. The dam will be considered adequate to meet the minimum hydrologic criteria, provided the owner:

(i) has an emergency action plan that meets the requirements in §299.61 of this title (relating to Emergency Action Plans);

(ii) has an operation and maintenance plan for the dam as described in §299.43 of this title (relating to Operation and Maintenance);

(iii) has an inspection program that has been implemented as described in §299.42 of this title (relating to Inspections); and

(iv) submits an annual report to the executive director documenting compliance with the requirements in clauses (ii) and (iii) of this subparagraph, beginning 12 months after the effective date of this section.

(B) An owner of a dam not specified in paragraph (3)(A) of this subsection that was required to meet the minimum hydrologic criteria before the effective date of these rules, but is shown by an evaluation by a professional engineer to meet the minimum hydrologic criteria in paragraph (1)(A) of this subsection, will not be required to be upgraded and the dam will be considered adequate to meet the minimum hydrologic criteria.

(C) An owner of an existing dam that does not meet the minimum hydrologic criteria in paragraph (1)(A) of this subsection or the size or hazard classification has been raised and the dam does not meet the minimum hydrologic criteria in paragraph (1)(A) of this subsection for the new size or hazard classification may be required to submit to the executive director any of the following, prepared by a professional engineer:

(i) final construction plans and specifications as described in §299.22 of this title (relating to Review and Approval of Construction Plans and Specifications) for modifying, enlarging, or altering the dam or spillways to meet the minimum hydrologic criteria as described in paragraph (1)(A) of this subsection, provided the minimum hydrologic criteria at least meets 75% of the PMF and the owner addresses the requirements in paragraph (3)(A) of this subsection;

(ii) an analysis or other option to request a reduction in the minimum hydrologic criteria as described in paragraph (4) of this subsection; or

(iii) a plan for alternatives to upgrading as described in §299.17 of this title (relating to Alternatives to Upgrading Dams).

(D) An owner of an existing dam that meets the requirements of subparagraph (A) of this paragraph and that is required to be modified due to structural deficiencies shall be required to submit to the executive director final construction plans and specifications for the structural modifications as described in §299.22 of this title. The dam will not be required to be upgraded to meet the minimum design criteria in paragraph (1)(A) of this subsection.

(E) An owner of a dam that has been evaluated under this paragraph shall be advised of the requirements for the owner's dam by letter. The owner shall be required to submit a written plan of action to address the requirements and a time frame to complete the requirements.

(4) Reduction of minimum hydrologic criteria. The minimum hydrologic criteria may be reduced as follows.

(A) The owner may request that the executive director reduce the minimum hydrologic criteria if the owner submits:

(i) dam breach analysis, prepared by a professional engineer and using the normal storage capacity non-flood event, the barely overtopping flood event, and the design flood

event, if applicable, that demonstrate existing downstream improvements would not be adversely affected, which is defined as the downstream flooding differentials being less than or equal to one foot between breach and non-breach simulations in the affected area;

(ii) one or more technical options included in the most current version, at the time of the analysis, of the agency's *Hydrologic and Hydraulic Guidelines of Dams in Texas*, demonstrating that existing downstream improvements would not be adversely affected;

(iii) documentation of the purchase, or an easement for, the property downstream of the dam that would be impacted by a dam failure and showing that it has been dedicated to non-residential and non-commercial use; or

(iv) documentation that the property downstream has been dedicated by the property owner to non-residential and non-commercial use.

(B) The executive director shall evaluate the owner's request for reduction in the minimum hydrologic criteria to determine if the request is appropriate. If the executive director agrees with the analysis, the executive director shall approve the request in writing.

(C) If the executive director does not agree with the owner's request for reduction in the minimum hydrologic criteria, the executive director shall deny the request in writing.

(b) Hydraulic criteria for proposed dams or dams proposed to be reconstructed, modified, enlarged, rehabilitated, or altered.

(1) The owner shall have a professional engineer evaluate the hydraulic adequacy of the dam and spillways using the guidelines in the most current version, at the time of the analysis, of the agency's *Hydrologic and Hydraulic Guidelines of Dams in Texas*.

(2) The owner shall have a professional engineer address the stability of the spillways to determine if the spillways will adequately meet the minimum design storm without being significantly damaged.

(3) The owner shall have a professional engineer determine a minimum freeboard for a proposed large size dam as defined in §299.13 of this title (relating to Size Classification Criteria) as outlined in the most current version, at the time of the analysis, of the agency's *Hydrologic and Hydraulic Guidelines for Dams in Texas*.

(c) Hydraulic criteria for existing dams. If it becomes necessary for an owner of an existing dam to reevaluate the hydraulic adequacy of the dam and spillways, the owner shall have a professional engineer evaluate the hydraulic adequacy of the dam and spillways using the guidelines in the most current version, at the time of the analysis, of the agency's *Hydrologic and Hydraulic Guidelines of Dams in Texas*.

§299.16. Structural Evaluation of Dams.

(a) The owner shall have a professional engineer submit a geotechnical, geological, and structural evaluation in a report to the executive director with the final construction plans and specifications as described in §299.22 of this title (relating to Review and Approval of Construction Plans and Specifications) to support the design of a proposed dam or a dam that is proposed to be reconstructed, or structurally modified, enlarged, rehabilitated, or altered. The report must include, as applicable:

- (1) details of the geology of the project site and vicinity;
- (2) location and logs of test borings, pits, and shafts;
- (3) results of field and laboratory tests on structural and foundation materials;
- (4) seepage studies;
- (5) stability analyses of embankments, spillways, retaining walls, and inlet structures, as described in subsection (b) of this section; and
- (6) recommendations concerning:
 - (A) embankment slopes, crest width, and berms;
 - (B) core trench size and depths;
 - (C) moisture-density and strength requirements;
 - (D) soil dispersion requirements;
 - (E) minimum compressive strength for concrete;
 - (F) construction sequence procedures and techniques for excavations and embankments;
 - (G) types of compaction equipment; and
 - (H) seepage control requirements.

(b) The owner shall have a professional engineer develop a stability analysis as outlined in the most current version, at the time of the analysis, of the agency's *Design and Construction Guidelines for Dams in Texas* to support the design of proposed large- and intermediate-size dams, as defined in §299.13 of this title (relating to Size Classification Criteria), and large- and intermediate-size dams that are proposed to be reconstructed or structurally modified, enlarged, rehabilitated, or altered. The analysis must be submitted to the executive director with the final construction plans and specifications as described in §299.22 of this title.

(c) The executive director may require the owner of an existing dam to have a professional engineer perform a geotechnical and structural evaluation or a stability analysis and submit a report, as described in subsections (a) and (b) of this section, following an inspection, as described in §299.42 of this title (relating to Inspections), if the executive director determines that the dam was found to be deficient and the integrity of the dam was threatened. If the owner has a professional engineer prepare a report, the owner shall submit the professional engineer's report to the executive director for review upon completion of the report.

(d) When a person proposes one of the following activities near the owner's dam, the owner or the executive director may request that the person have a professional engineer perform an evaluation to determine if the integrity of the dam would be compromised. If the person has a report prepared by a professional engineer, the person shall submit the evaluation report to the executive director and the owner for review and approval before any work is performed for a proposal to:

- (1) dredge the reservoir within 200 feet of the dam;
- (2) install a utility line or pipeline in the dam or in the spillways that requires significant excavation in the dam or spillways;
- (3) construct a road across the dam or spillways or within 200 feet of the dam;
- (4) drill oil or gas wells, perform horizontal drilling or fracturing, or perform oil or gas exploration within 500 feet of the dam and spillways; or
- (5) blast within 1/2 mile of the dam.

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§299.17. Alternatives to Upgrading Dams.

(a) An owner may elect to implement alternative methods, instead of upgrading the dam using structural methods, to meet minimum hydrologic criteria by submitting to the executive director:

- (1) a plan for meeting the requirements in §299.15(a)(3) of this title (relating to Hydrologic and Hydraulic Criteria for Dams);
- (2) a plan for meeting the requirements in §299.15(a)(4) of this title;
- (3) a plan for removing the dam, as described in §299.51 of this title (relating to Removal or Breach of Dams);
- (4) a plan for lowering the reservoir level to a level that will allow it to meet the appropriate minimum hydrologic criteria; or
- (5) a plan using a combination of structural and non-structural methods as proposed by the owner's professional engineer.

(b) The executive director shall review the owner's proposal and respond as described in §299.22(e) of this title (relating to Review and Approval of Construction Plans and Specifications).

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