# 15 DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT

214 MAINE EMERGENCY MANAGEMENT AGENCY

Chapter 3: DESIGN AND CONSTRUCTION STANDARDS FOR NEW OR RECONSTRUCTED DAMS

3.1 GENERAL PROVISIONS

 a. In accordance with the provisions of Section 1063, Chapter 22, Title 37‑B M.R.S.A., it is the intent of these dam regulations to provide for the proper and safe design and construction of impounding structures not exempt from the law to the extent required for the protection of public safety.

 b. These regulations shall not be construed or interpreted to relieve the owner or operator of any impoundment or impounding structure of any legal duties, obligations, or liabilities incident to ownership, design, construction, operation, or maintenance of the impounding structure.

 c. These regulations shall not serve to negate nor to satisfy requirements applicable to existing or proposed impounding structures which may be imposed through provisions of other local, state or federal laws, regulations, or ordinances.

 d. Any owner who owns, controls, operates, maintains, or manages an impounding structure or impoundment not exempt from the law, or any owner who proposes to perform any of the preceding, or any owner who proposes to construct an impounding structure not exempt from the law, shall engage a licensed Professional Engineer who is practicing in Maine in accordance with applicable laws of Maine to perform any engineering analysis required to comply with these regulations. Such plans and specifications, engineering analyses, and any other document prepared in compliance with the provisions of these dam regulations shall bear the Maine seal of the licensed Professional Engineer who has been engaged to prepare same.

 e. These regulations are effective July 1, 1990.

3.2 DEFINITIONS

 The following definitions shall apply to the terms used in these regulations:

 a. "Agency" means the Maine Emergency Management Agency.

 b. "Dam" means. any man-made artificial barrier, including appurtenant works, the site on which it is located and appurtenant rights of flowage and access, which impounds or diverts a river, stream or great pond and which is 2 feet or more in height and has an impounding capacity at water storage elevation of 15 acre-feet or more. Any such artificial barrier constructed solely for the purpose of impounding water to allow timber to be floated downstream in a logging operation shall not be considered a dam for the purposes of this chapter, unless it has been repaired, modified or maintained by or with the knowledge of the owner, lessee or person in control since the discontinuance of its use in connection with logging operations. Any adjacent property, easements, roads, bridges or works not necessary for the operation or maintenance of a dam or access to the dam shall not be included under the provisions of this chapter.

 For the purpose of this regulation, a dam shall be considered an "impounding structure".

 c. "Dam reconstruction" means the rebuilding or replacement of all or part of an existing dam that no longer functions in the manner for which it was originally constructed.

 d. "Director" means the Director of the Maine Emergency Management Agency.

 e. "Emergency Operations Plan" means a set of written instructions or guidelines. for use by public officials which recommends actions which, when implemented, will minimize the effects of a dam failure on people and property.

 f. "High or significant hazard" means that condition which poses a risk of loss of human life and substantial property damage.

 g. "Public safety" or "safety of the public" means protection of life, health or property from any condition, event or action at a dam which might compromise the safety, stability or integrity of the dam or its ability to function safely.

 h. "State Dam Inspector" means an inspector appointed or hired under Section 1064, Chapter 22, Title 37-B M.R.S.A.

 i. "Impoundment" means a body of water the storage of which is caused by any existing or proposed impounding structure not exempt from the law.

 j. "Owner" means the owner of the land on which is situated, and/or the holder of an easement permitting the construction of a dam and/or any person or entity agreeing to maintain a dam, which includes the State or any of its political subdivisions, including, but not limited to sanitation district commissions and authorities, and public or private institution, corporation, association, firm, or company organized or existing under the laws of this or any other state or country, or any person or group of persons acting individually or as a group.

 k. "Design flood" is the runoff, at the site of the impounding structure, utilized in impounding structure design, construction, operation, and maintenance, which will be safely passed by the impounding structure and shall not be less than that recommended spillway design flood commensurate with the size and hazard potential of the particular impounding structure in accordance with the procedures recommended in these regulations.

 l. "Design freeboard" means the minimum freeboard which would occur during passage of the design flood.

 m. "Inundation zone" means an area that would be inundated in excess of storm water by the water released by the impoundment in the event of a dam breach and is that area which would be inundated immediately downstream from the site of the impounding structure extending to that point on the stream where the calculated water surface profile resulting from the design flood, determined absent the impounding structure, converges with that calculated water surface profile which would result from failure of the impounding structure at the appropriate impounding capacity, with the time of such failure to be considered coincident with the time of occurrence of maximum inflow to the impoundment resulting from the design flood.

 n. "Height" means the structural height of a dam which is defined as the vertical distance from the natural bed of the stream or watercourse measured at the downstream toe of the dam to the top of the dam.

 o. "Maximum impounding capacity" means normal full pond. It also means the volume in acre-feet that is capable of being impounded at the elevation of the crest of the impounding structure including flash boards if any or the elevation of top of gates, if appropriate.

 p. "Impounding capacity" means the volume in acre-feet that is capable of being impounded at the elevation of the crest of the highest ungated outlet from the impoundment.

 q. "Life of impounding structure" and "life of the project" means that period of time during which the impounding structure is designed and planned to perform effectively, including that period of time required to remove the structure when it is no longer capable of functioning as planned and designed.

 r. "An impoundment constructed, maintained, or operated primarily for agricultural purposes" means an impoundment that is certified by the owner to be such.

 s. "Watercourse" means a natural channel having a well-defined bed and banks and in which water flows when it normally does flow.

 t. "Acre-foot" means a unit of volume equal to 43,560 cubic feet or 325,853 gallons (one foot of depth over one acre of area).

 u. "Flood plain" means those areas adjoining a river, stream or watercourse which have been or hereafter are likely to be covered by flood waters.

3.3 THE CLASSES OF IMPOUNDING STRUCTURES

 a. For the purposes of these regulations, existing or proposed impounding structures shall be classified as one of three categories in accordance with Table 1 of this chapter.

 b. For the purposes of these regulations, hazards pertain to potential loss of human life or property damage(s) in the flood plain downstream from the structure in event of failure. Structures conforming to criteria for the "low hazard" potential category generally will be found in rural or agricultural areas where failure may damage some farm buildings, limited agricultural land, or country roads. "Significant hazard" potential category structures will be those located in predominantly rural or agricultural areas where failure may damage isolated homes, secondary highways, minor railroads, or other impounding structures or cause interruption of use of service of relatively important pubic utilities. Impounding structures in the "high hazard" potential category will be those located where failure may cause serious damage to homes, extensive agricultural, industrial, and commercial facilities, important public utilities, main highways, railroads, or other impounding structures. Hazard potential classifications shall be proposed by the owner and shall be subject to approval by the Agency. Present and projected development of the flood plain downstream from the impounding structure shall be considered in determining the classification. Impounding structures shall be subject to reclassification as set forth in Section 1065 of Chapter 22, Title 37-B M.R.S.A.

TABLE I

Hazard Potential Classification

Category Urban Development Economic Loss

Low Hazard No permanent Minimal (undeveloped

 structure for human to occasional

 habitation structures or

 agriculture)

Significant No urban development Appreciable (notable

Hazard and no more than a agriculture, industry,

 small number of or structures)

 habitable structures

High Hazard Urban development Excessive (extensive

 with more than a community,

 small number of industry, or

 habitable structures agriculture)

SOURCE: U.S. Army Corps of Engineers

3.4 PROCEDURE(S)

3.41 WHO MUST FILE

 An owner who proposes to construct or reconstruct an impounding structure, shall file with the Agency, on forms provided by the Agency for that purpose, a statement concerning the location, purpose, impounding capacity, and height of the existing or proposed impounding structure. If a proposed impounding structure is not exempt from the provisions of the law, construction may not commence until a full and complete filing has been completed with the agency.

3.42 PRELIMINARY REPORT

 The owner of a proposed new impoundment or owner of an existing impoundment which is to be constructed or reconstructed shall submit to the Agency a written Preliminary Report regarding the proposed impounding structure. As a minimum, the Preliminary Report shall include the following information:

 a. A general description of the impounding structure and appurtenances and a proposed classification as set forth in Section 3.3 of these regulations. The description shall include a statement of the purpose for which the impoundment and impounding structure is to be used.

 b. A general description of properties located in the inundation zone downstream from the site of the proposed impounding structure, including the location and number of residential structures, buildings, roads, utilities and other property that would be endangered should failure of the impounding structure occur.

 c. A statement from the governing body of the local political subdivision that they are aware of the intent to build or reconstruct an impounding structure and a description of the zoning ordinances and land use classifications applicable to the affected flood plain downstream and upstream from the site of the proposed impounding structure.

 d. Maps showing the general location of the proposed impounding structure that include: the county or city in which the (existing or proposed) impounding structure (or would be) located, the location of roads, access to the site, and the outline of the impoundment. Existing serial photographs and existing topographic maps may be used for the purpose.

 e. Preliminary drawings of a general nature which include cross sections, plans and profiles of the impounding structure, proposed pool levels, and type of spillways.

 f. Preliminary design criteria, including a description of the size, ground cover conditions, and extent of development of the watershed, the geological and the geotechnical engineering assumptions for the foundations and materials to be used.

 g. The owner's written request for preliminary and final inspection.

 h. Written documentation by the owner's engineers certifying that dam construction will be consistent with final design plans and as-built plans.

 i. A schedule for filling the reservoir.

3.43 FINAL DESIGN REPORT

 Construction or reconstruction may not commence until a final design report is received by the Agency. The final design report shall include:

 a. A report of geotechnical investigations of the foundation soils or bedrock and of the materials to be used to construct or reconstruct the impounding structure.

 b. Design assumptions and analyses sufficient to indicate that the impounding structure will be stable during its construction or reconstruction and during the life of the impounding structure under all conditions of reservoir operations, including rapid filling and rapid drawdown of the impoundment.

 c. Confirmation of the stability of the reservoir rim area in order to safeguard against reservoir ruin slides of such magnitude as to create waves capable of overtopping the impounding structure and confirmation of stability during seismic activity.

 d. Design assumptions and analyses to indicate that seepage in, around, through, or under the impounding structure, foundation, and abutments win be reasonably and practically controlled so that internal or external forces or results thereof will not endanger the stability of the impounding structure.

 e. Calculations and assumptions relative to design of the spillway(s).

 f. Provision to insure that the impounding structure and appurtenances will be protected against significant deterioration or erosion due to freezing and thawing, wind and rain, or any combination thereof.

 g. Other pertinent design date, assumptions, and analyses commensurate with the nature of the particular impounding structure and individual site conditions. When required by the Agency, a delineation of the inundation zone will be prepared by the owner for "high" and "significant hazard" impounding structures.

 h. Plans and specifications as outlined in Section 3.54 of this chapter.

 i. After verifying that the dam construction methods and design specifications were met, authorization to impound water will be issued prior to filling the reservoir.

 j. The Agency shall accept, review, and notify the owner within [45] working days whether the Preliminary Design Report is acceptable or not. The same procedure shall be followed for the Final Design Report.

3.5 DESIGN OF STRUCTURES AND HYDROLOGY

3.51 INVESTIGATION; FOUNDATIONS; CONSTRUCTION MATERIALS, SURVEYS; AND HYDROLOGIC CALCULATIONS

 a. The owner shall complete all investigations prior to submitting the design report. The scope and degree of precision required is a matter of engineering judgement based on the complexities of the site and the hazard potential classification of the proposed structure. The geotechnical engineering investigation shall consist of borings, test pits, and other subsurface exploration necessary to define adequately the existing conditions. The investigations shall be performed so as to define the soil, rock, and groundwater conditions.

 b. All construction materials shall be adequately specified to insure that their properties meet design criteria. If on-site materials are specified, they shall be located and determined to be adequate in extent and in properties.

 c. Surveys shall be made with sufficient accuracy to locate the proposed construction and to define the volume of the storage in the impounding structure. The area downstream from the proposed impounding structure shall be investigated in order to delineate the areas and extent of potential damage in case of failure. Locations of center lines and other horizontal and vertical control shall be shown on a map of the site.

 d. The drainage area shall be determined. Present and projected conditions shall be reasonably considered in determining the runoff characteristics of the drainage area. All hydrologic assumptions shall be included in the design calculations which shall be submitted as part of the design report.

 e. Periodic inspections will be conducted by a qualified Dam Inspector during the construction or reconstruction of all dams in this State. Additionally, written reports noting all conditions found will be forwarded to the Director, MEMA, within 15 working days. Conditions affecting public safety of employees shall be forwarded to the Director at the earliest opportunity.

3.52 THE DESIGN FLOOD

 The magnitude of the minimum design flood to be utilized in impounding structure design, construction, operation, and maintenance shall not be less than the recommended spillway design flood commensurate with the size and hazard potential of the particular impounding structure in accordance with the recommended procedures contained within the Corps of Engineers published guidance and those which are incorporated in these regulations by reference to the extent they are not inconsistent with other provisions of these regulations and existing laws of Maine.

3.53 SPILLWAY DESIGN

 a. Every impounding structure shall have a spillway system with adequate capacity to discharge water in keeping with potential hazards involved without endangering the safety of the impounding structure.

 b. A spillway shall be required, unless it is demonstrated by the applicant that adequate capacity is provided by other means to prevent endangering the integrity of the impounding structure.

 c. A vegetated earth or unlined emergency spillway may be approved when demonstrated that it will pass the spillway design flood without jeopardizing the safety of the structure.

3.54 PLANS AND SPECIFICATIONS

 The plans and specifications for a new or reconstructed impounding structure shall consist of the following as a minimum:

 a. The name of the project; the name of the owner; classification of the impounding structure as set forth in Chapter 3 of these regulations; designated access to the project; and the location with respect to highways, roads, streams, and existing impounding structures and impoundments that would affect or be affected by the proposed impounding structure.

 b. Cross sections, profiles, logs of test borings, laboratory and in situ test data, drawings of principal and emergency spillways, and other additional drawings in sufficient detail to indicate clearly the extent and complexity of the work to be performed.

 c. The technical provisions, as may be required to describe the methods of construction and construction quality control for the project.

 d. Special provisions, as may be required to describe technical provisions needed to insure that the impounding structure is installed according to the approved plans and specifications.

 Plans and specifications shall be submitted with the final design report.

 e. The owner shall notify the Agency of any proposed changes in design, plans, and specifications that will affect the safety of the impounding structure.

3.6 CONSTRUCTION SCHEDULE

3.61 The applicant shall submit a construction schedule with the final design report that includes:

 a. A time and construction sequence schedule that includes the estimated time to complete the construction activities.

 b. Techniques to be used to divert stream flow during construction to prevent hazard to life, health, and property.

 c. A plan of quality control testing to confirm that materials and construction methods met the design requirements set form in the specifications.

3.7 ACCEPTABLE DESIGN PROCEDURE AND REFERENCES

3.71 The following are acceptable as design procedures and references:

 a. The design procedures, manuals, and criteria used by the United States Army Corps of Engineers.

 b. The design procedures, manuals, and criteria used by the United States Department of Agriculture, Soil Conservation Service.

 c. The design procedures, manuals, and criteria used by the United States Department of the Interior, Bureau of Reclamation.

 d. The design procedures, manuals, data, and criteria used by the United States Department of Commerce, National Weather Service.

STATUTORY AUTHORITY: Section 1063 of Chapter 22, Title 37-B M.R.S.A.

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