# GUIDANCE FOR THE DESIGN OF DAMS

## PLANS, SPECIFICATIONS & ENGINEERING REPORTS

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# CHAPTER 10
# GENERAL

## 10. INTRODUCTION

### 10.1 Acknowledgment

The technical guidance in this document has primarily been taken from Design of Small Dams, 3rd Edition, U.S. Bureau of Reclamation, Earth Dams and Reservoirs TR-60, NRCS, Earth and Rockfill Dams – General Design and Construction Considerations, EM 1110-2-2300, U.S. Army Corps of Engineers, Technical Manual: Conduits through Embankment Dams, FEMA.

### 10.2 Applicability

This document, Guidance for the Design of Dams in Mississippi ("Guidance"), should be used as a guide in the design and preparation of plans, specifications and engineering reports for dams, insofar as this guidance is applicable to normal situations for an individual project. Plans, specifications, contract documents and engineering reports required by regulation shall conform to the applicable items in this Guidance.

This document is not a regulation or a standard and has therefore not been adopted by the Commission on Environmental Quality. However, owners, consulting engineers, and other parties involved in the construction of any dam in the State should be aware of, and must comply with, the Commission's "Dam Safety Regulations LW-4", and all other applicable laws and regulations. This guidance does not supersede any existing laws, ordinances, regulations, or standards. If such conflicts arise, the designer should contact the Division of Dam Safety and the other appropriate agencies for instruction on how to proceed.

It should be recognized that simply complying with the items herein does not ensure that a design is correct, or even adequate, but only minimally acceptable to the Department. High quality projects will routinely exceed the minimum standards stipulated herein, and such quality will likely be reflected in the performance, value and satisfaction obtained from such a design.

**There are some differing requirements depending on the hazard classification** (Low, Significant or High), **the dam height** (Small dams are those less than 25 feet in height, Medium dams are greater than 25 feet and less than 50 feet in height and Large dams are greater than 50 feet in height), and **the storage volume** (Small lakes are less than 150 acre-feet maximum storage, Medium lakes are greater than 150 acre-feet maximum storage and less than 1,000 acre-feet maximum storage and Large lakes are greater than 1,000 acre-feet maximum storage).

Currently, the Dam Safety Regulations LW-4 do not require Low Hazard dams be designed by a registered professional engineer (state law or local ordinances may have different requirements, see previous paragraph). However, owners should consider having the spillway of their Low Hazard dam designed to High Hazard standards. This will help the owner avoid the risk of having to upgrade their dam if the hazard classification changes due to downstream development. Further, the Office of Land and Water, Division of Dam Safety neither warrants

nor assumes any responsibility for any design of any project governed by this Guidance. It is the owner's and/or design engineer's responsibility to ensure that such project designs and specifications are correct and adequate. Should anything contained herein appear to conflict with good design practice, such instance should be brought to the Division of Dam Safety's attention immediately for resolution.

Plans, specifications and engineering reports that vary from this guidance may be submitted and approved (as specified by applicable regulations) when properly justified by the consulting engineer and/or supported by reference to Design of Small Dams 3rd Edition, NRCS technical releases, U.S. Army Corps of Engineers engineering manuals, or other appropriate publications. Although the words "shall" and "must" are used extensively, they are to be interpreted in the context of this section (10.2 Applicability) of the Guidance.

It is recognized that this Guidance does not completely address every conceivable situation concerning the design, inspection, testing, or contracting of dam construction. Therefore, when any issue arises which is not explicitly covered by the Guidance, the Division of Dam Safety may require additional documentation or justification of the reasonableness or adequacy of the plans, specifications and engineering reports. The Division of Dam Safety may withhold completion of review or approval until such documentation, justification, or document changes are submitted and determined acceptable.

Any revisions, changes, addenda, etc. to reviewed and/or approved plans or specifications shall also be made in accordance with this section. Such revisions shall be submitted to the Division of Dam Safety for review and approval. Record drawings (As-built) clearly showing such alterations shall be submitted to the Division of Dam Safety at the completion of the work.

## 11. PLANS

### 11.1 General

___ All plans shall bear a suitable title block showing the name of the project, the name of the owner and a clear indication whether the owner is a state agency, municipality, district, association, institution, or private individual. The plans shall be signed, sealed, and dated by the Mississippi Registered Professional Engineer responsible for their development in a manner consistent with the requirements of the State Board of Registration for Professional Engineers and Land Surveyors, as they apply generally to the practice of engineering. Nothing herein is to be construed as allowing any such work to be performed other than by or under the direct supervision of a Registered Mississippi Professional Engineer.

___ The plans shall be of professional quality, clear and legible (suitable for microfilming). They shall be drawn to a scale that will permit all necessary information to be plainly shown. They shall show the scale in feet, a graphical scale, the north point, and date. Datum used shall be indicated. Locations and data of test borings and wells, when made, should be shown on the plans or reference made to their location in the geotechnical report. Generally, the plans should be full size, but not larger than 30 inches x 42 inches.

Submittal of draft plans for review may be legal size (8.5 x 14) or the AutoCAD project file may be sent in for review. Final submittal of plans shall consist of two (2) complete sets.

___ The plans for dams shall include a site plan which shows the surrounding property, all property lines, and ownership information as recorded in the tax assessor's record. The plans shall include the location, orientation and outline of the lake and dam relative to its surroundings. The drainage direction and receiving stream shall be shown.

___ Detail plans shall consist of: plan views, elevations, sections and supplementary views which, together with the specifications and general layouts, provide the working information for the contract and construction of the dam and its appurtenances. Plans shall also include: dimensions and relative elevations of the spillways / outlet structures, the location and outline form of monitoring equipment / wells, location, size and type of piping for outlets or drains, water levels, location and description of benchmarks used and ground elevations.

## 11.2 Plans of Dams

### 11.2.1 General Plan

A complete plan of existing and/or proposed dams shall be submitted for projects involving new dams and/or additions to existing dams. This plan shall show the following:

#### 11.2.1.1 Geographical Features

___ a. Topography and elevations - Existing or proposed streets and all ditches, streams, rivers and water surfaces shall be clearly shown. Contour lines at suitable intervals should be included. Location and description of benchmark used.

___ b. Boundaries - The boundary lines of the subdivision or the dam owner's property and the surrounding landowners shall be shown.

### 11.2.2 Detail Plans

___ Detail plans shall be submitted. Profiles should have a horizontal scale of not more than 100 feet to the inch and a vertical scale of not more than 10 feet to the inch. Plan views should be drawn to a corresponding horizontal scale and preferably be shown on the same sheet. Plans and profiles shall show:

___ a. Location of primary and emergency spillway.

___ b. Profile and plan drawings of spillways with elevations.

___ c. Embankment zones, cutoff trench, soil borings, borrow areas.

___ d. Special detail drawings, drawn to a scale that clearly shows the nature and details of the design of all joints, connections, thrust blocks, re-bar placement, instrumentation, drains, filters, etc.

## 12. SPECIFICATIONS

___ Complete technical specifications for the construction of the dam and all appurtenances, shall accompany the plans.

___ The specifications shall be signed, sealed, and dated by the Mississippi Registered Professional Engineer responsible for their development in a manner consistent with the requirements of the State Board of Registration for Professional Engineers and Land Surveyors, as they apply generally to the practice of engineering. Nothing herein is to be construed as allowing any such work to be performed other than by or under the direct supervision of a Mississippi Registered Professional Engineer.

___ The specifications accompanying construction drawings shall include, but not be limited to, all construction information not shown on the drawings which is necessary to inform the builder in detail of the design requirements for the quality of materials, workmanship and fabrication of the project. They shall also include: the type, size, strength, operating characteristics, and rating of equipment; earthwork and compaction; the complete requirements for all mechanical and electrical equipment, including piping, and joining of pipe, machinery, valves, corrosion protection; electrical apparatus, wiring, instrumentation, and meters; operating tools, construction materials; special filter materials, such as filter fabric, stone, sand, or gravel; miscellaneous appurtenances; chemicals when used; instructions for testing materials and equipment as necessary to meet design standards; and performance tests for the completed works and component units. It is suggested that these performance tests be conducted at design load conditions wherever practical.

## 13. OPERATION DURING CONSTRUCTION

___ Plans and specifications shall contain provisions for routing stream flow and runoff during the entire period of dam construction.

## 14. RECORD DRAWINGS

___ The owner shall ensure that written notification of completion of the dam is provided to this office within 30 days of completion of the dam. The completion notice shall be accompanied by a set of “as-built” plans (marked as record drawings or as-built) with the engineer’s certification that the project was completed in substantial compliance with the approved plans and specifications and any approved revisions.

## 15. STORM WATER PERMITTING REQUIREMENTS

Has the applicant fulfilled the storm water permitting requirements as outlined below?

( ) Yes ( ) No ( ) NA

a. Construction activities where less than one (1) acre of land is disturbed. **(No Permit Required)** ( ) Yes ( ) No ( ) NA

b. Construction activities where *more than one (1) acre but less than (5) acres* of land is disturbed. **A "Small Construction General Permit" is required.** The dam safety engineer checks to see if the applicant has obtained a copy of: (a) Small Construction Storm Water General Permit (which includes the notice of intent (NOI)); and, (b) Construction Guidance Manual (for the storm water pollution prevention plan (SWPPP)).

   ( )Yes ( )No ( ) NA

   All of these items are also available to the applicant for download on the MDEQ website www.deq.state.ms.us. Click "permits" under "Key Topics", then click "Storm water", then scroll down and look for Small Construction for the two forms listed above.
   **NOTE:** None of the above listed items for small construction general permits need be submitted to MDEQ unless specifically requested.

c. Construction activities where *(5) acres or more* of land is disturbed. **A "Large Construction General Permit" is required.** The dam safety engineer checks to see if the applicant has obtained a copy of: (a) Large Construction Storm Water General Permit; (b) Large Construction Storm Water NOI; and, (c) Construction Guidance Manual (for the storm water pollution prevention plan (SWPPP)).

   ( )Yes ( )No ( ) NA

   All of these items are also available to the applicant for download on the MDEQ website www.deq.state.ms.us.
   **NOTE:** All the above listed items are required to be submitted to the Environmental Permitting Division (EPD) at MDEQ. Coverage will be granted under the large construction general permit once these submittals are determined acceptable by MDEQ Environmental Permitting Division.

## 16. OTHER

a. Has the appropriate U. S. Army Corps of Engineers District Office been notified to see if a 404 Permit is required?

( ) Yes ( )No ( )NA

**NOTE:** If "yes" then a copy of the Corps' correspondence, application, or authorization letter shall be submitted.

b. Has the applicant obtained a groundwater withdrawal permit from the Office of Land and Water for wells used to augment lake water levels?

( ) Yes ( ) No ( ) NA