Fact Sheet 94–29

Dam Safety : Classification of Structures

Classification of dams is defined in the Ohio Administrative Code (OAC), Section 1501:21-13-01. Dams which are exempt from the Ohio Department of Natural Resources, Division of Soil and Water Resources jurisdiction are defined in Ohio Revised Code, Section 1521.06. The classification system divides dams which are under the jurisdiction of the Division into four classes, Class I, II, III, and IV. The chief of the Division determines the class of a dam during the preliminary design review for a new structure (OAC Rule 1501:21-5-02) and/or during the periodic inspection of existing structures (OAC Rule 1501:21-21-01). Classification of dams is necessary to provide proper design criteria and to ensure adequate safety factors for dams according to the potential for downstream damage should the dam fail. Please note that the classification is not an indication of the condition of a dam.

The classification system for dams in Ohio was modeled after the Federal Guidelines for Dam Safety established in 1979. The following parameters are the governing criteria for the classification: (See illustration on back)

1. Height of dam - defined as the vertical dimension as measured from the natural streambed at the downstream toe of a dam to the elevation of the top of the dam.

2. Storage volume - defined as the total volume impounded when the pool level is at the top of the dam immediately before it is overtopped.

3. Potential downstream hazard - defined as the resultant downstream damage should the dam fail, including probable future development.

The classification criteria are outlined in OAC Rule 1501:21-13-01 and summarized in the following list:

Height of Dam

Class I	—	greater than 60 feet
Class II	—	greater than 40 feet
Class III	—	greater than 25 feet
Class IV	—	less than or equal to 25 feet

Storage Volume

Class I	—	greater than 5000 acre-feet
Class II	—	greater than 500 acre-feet
Class III	—	greater than 50 acre-feet
Class IV	—	less than or equal to 50 acre-feet

(1 Acre foot equals about 326,000 gallons)

Potential Downstream Hazard

Class I — probable loss of life.

Class II — health hazard, flood water damage to homes, businesses, industrial structures (no loss of life envisioned), damage to state and interstate highways, loss of public utilities, railroads, downstream dams, only access to residential areas.

Class III — damage to low value non-residential structures, local roads, agricultural crops and livestock
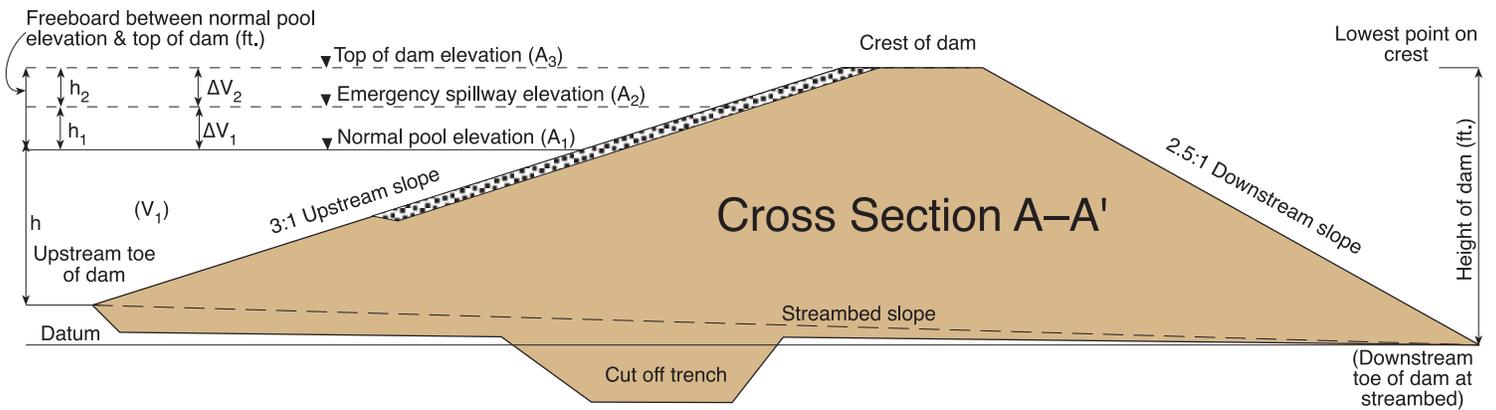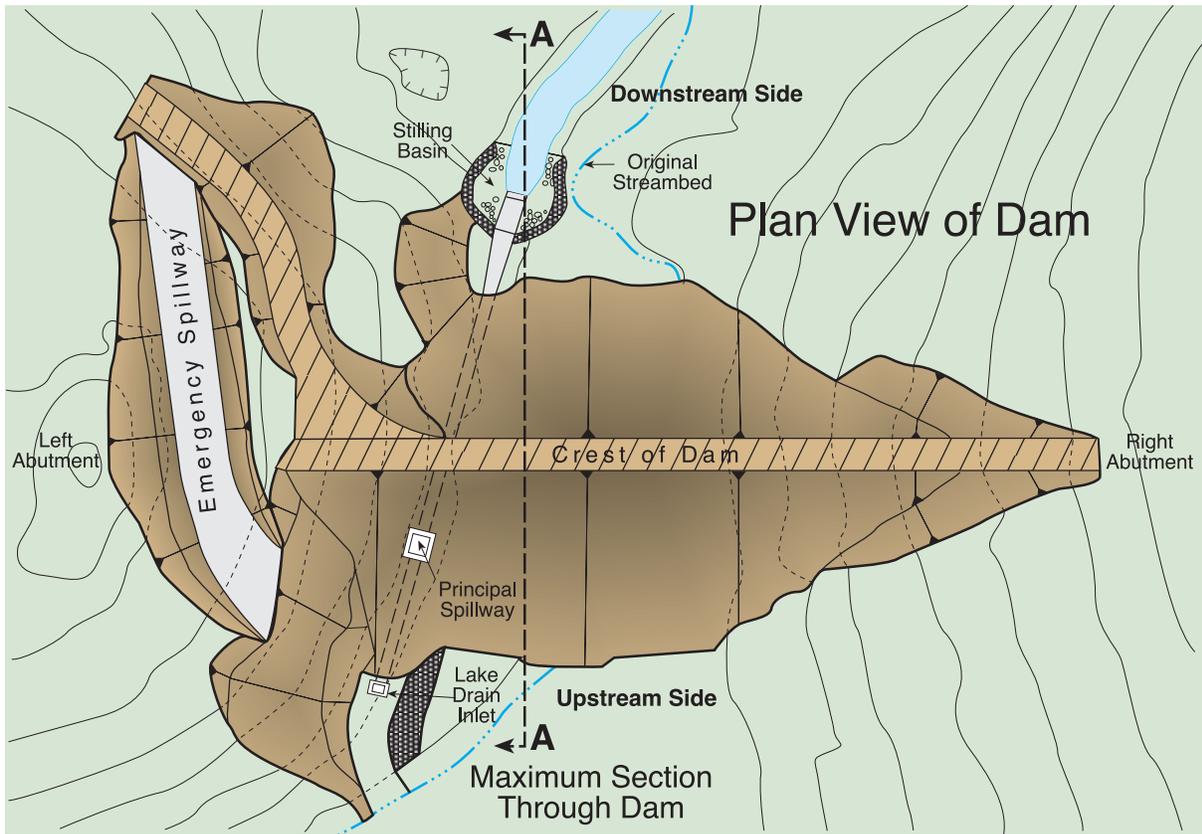
Class IV — losses restricted mainly to the dam

Each dam is evaluated on the preceding criteria and placed in the highest class that any one of these criteria might meet. The Division, in accordance with the ORC Section 1521.062 and OAC Rule 1501:21-13-01 (C), has the right to reclassify any dam as a result of a change in circumstances not in existence at the time of the initial classification.

A dam is exempt from the state's authority under ORC Section 1521.062 if it is 6 feet or less in height regardless of total storage; less than 10 feet in height with not more than 50 acre-feet of total storage, or not more than 15 acre-feet of total storage regardless of height.

Any other questions, comments concerns, or fact sheet requests, should be directed to:

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Plan View of Dam

Downstream Side

Stilling Basin

Original Streambed

Emergency Spillway

Left Abutment

Crest of Dam

Right Abutment

Principal Spillway

Lake Drain Inlet

Upstream Side

A

A

Maximum Section Through Dam

Freeboard between normal pool elevation & top of dam (ft.)

Crest of dam

Lowest point on crest

$\blacktriangledown$ Top of dam elevation (A_3)

h_2 ΔV_2 $\blacktriangledown$ Emergency spillway elevation (A_2)

h_1 ΔV_1 $\blacktriangledown$ Normal pool elevation (A_1)

2.5:1 Downstream slope

3:1 Upstream slope

Cross Section A–A'

Height of dam (ft.)

h

(V_1)

Upstream toe of dam

Streambed slope

Datum

Cut off trench

(Downstream toe of dam at streambed)

$$V_{TOD} = V_1 + \Delta V_1 + \Delta V_2$$

V_{TOD} = Storage volume of lake pool when at top of dam

V_1 = Storage volume at normal pool elevation: $\dfrac{h}{3} A_1$

ΔV_1 = Incremental volume between normal pool and emergency spillway elevation: $\dfrac{h_1}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$

ΔV_2 = Incremental volume between emergency spillway and top of dam elevation: $\dfrac{h_2}{3} (A_2 + A_3 + \sqrt{A_2 A_3})$

A_1 = Lake surface area at normal pool elevation

A_2 = Lake surface area at emergency spillway elevation

A_3 = Lake surface area at top of dam elevation