15A NCAC 02K .0208 STRUCTURAL STABILITY AND SLOPE PROTECTION

(a) Design and construction of dams to assure structural stability shall be consistent with modern engineering practice. The scope and degree of precision that will be required for a specific project will depend on the conditions of the site and the damage potential of the proposed structure. Consideration in design for structural stability shall include, but are not necessarily limited to, the following:

(1) the hazard potential of the dam under present downstream conditions and under conditions which would likely develop during the life of the reservoir;
(2) foundation bearing capacity, compressibility, and permeability; the extent and reliability of the site investigation; and the predictability of the site and foundation conditions;
(3) the reliability of construction materials, such as borrow soils, in terms of sufficient volume to complete construction without unanticipated interruption and in terms of predictability of physical properties such as strength, permeability, and compressibility;
(4) durability of construction materials;
(5) construction conditions at the site;
(6) the degree of quality control to be exercised during construction;
(7) pore pressure build-up during construction;
(8) the rate of filling the reservoir and the rate of possible reservoir drawdown;
(9) tailwater conditions and the impact of tailwater drawdown;
(10) possible effects of landslides and subsurface solution activity on the structural stability of the dam and spillway structures;
(11) the extent of piezometers and other devices which will be used to monitor the completed dam and the degree of access for inspections.

(b) Slope stability analyses should be considered by the design engineer for all embankment dams and may be required for class B and class C dams. Where slope stability analyses are required, documentation in the final design report shall include the design cross section(s) showing the soil parameters assumed for analysis, the location of the phreatic surface assumed for analysis, stability computations, and the location and computed safety factor(s) for the most critical circle(s) or failure wedge(s). A minimum factor of safety of 1.5 for slope stability for normal loading conditions, and 1.25 for quick drawdown conditions and for construction conditions, shall be required unless the design engineer provides a thoroughly documented basis for using other safety factors.

(c) Foundation bearing capacity and sliding base analyses should be considered for all dams and may be required for class B and C dams. Where bearing capacity or sliding base analyses are required, documentation of assumptions, computations, and safety factors shall be included in the final design report. A minimum factor of safety against bearing capacity and sliding wedge failure of 2.0 shall be required unless the design engineer provides a thoroughly documented basis for using other safety factors.

(d) Resistance of appurtenant structures against flotation uplift shall be provided for all dams. If the structures are anchored by dead weight alone, the buoyant weight shall be used for analysis and the minimum factor of safety shall be 1.15. If the structures are anchored to soil or rock, the minimum factor of safety for that portion of the resistance provided by soil or rock anchorage shall be 2.0 unless the design engineer provides a thoroughly documented basis for using a lower safety factor.

(e) For concrete, masonry, or other similar dams of relatively narrow cross section, resistance against overturning under maximum design loading conditions shall be considered; overturning stability computations shall be required for class B and class C dams. Where overturning analyses are required, the computations shall be included in the final design report. The minimum safety factor against overturning under maximum design loading conditions shall be 1.5 unless the design engineer provides a thoroughly documented basis for using a lower safety factor.

(f) The anticipated reservoir and tailwater drawdown conditions shall be considered in all stability computations and shall be included in the design documents provided in the final design report.

(g) The slopes must be protected against erosion by wave action, and the crest and downstream slope must be protected against erosion due to wind and rain. Riprap and other erosion protection shall be provided over the full range in stage between the lowest drawdown elevation and at least two feet above full normal pool. Exceptions for slowly rising reservoirs, such as waste storage facilities, may be approved in writing by the Director.

History Note: *Authority G.S. 143-215.26; 143-215.27; 143-215.31;*
Eff. June 15, 1980;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. December 23, 2017.