Kansas Administrative Regulations

Kansas Department of Agriculture—Division of Water Resources

Article 40.—Design of Earth Dams

5-40-2. Dams; plans and specifications.

The plans required by K.S.A. 82a-302, and amendments thereto, to construct, repair, or modify a dam shall include sufficient views to show all features in three dimensions and in sufficient detail to instruct a competent contractor to construct, repair, or modify the dam by viewing the plans and specifications. All plans with multiple pages shall include an index describing the location of required views within the plans. The views and maps specified in this regulation shall be shown. Specific details shall be listed under the view that is typically most appropriate, but they may be displayed on another view to improve the legibility of the plans if sufficient detail is provided in the plans to describe each feature in three dimensions. The required plans shall include the following:

(a) Plan views of the dam and dam site, which shall include both abutments of the dam, the area downstream to the point where the auxiliary spillway or service spillway flows enter the receiving channel, and the area upstream of the upstream toe of the dam to where the borrow area will be permitted. All elevations shown on plans shall be referenced to the same datum as the benchmarks described on the plans. The following details shall be shown, if applicable:

(1) The location of the axis of the dam, showing stationing and top width limits;

(2) the toe of the upstream and downstream slopes;

(3) the location of the centerline and the limits of each open-channel spillway;

(4) the location of the primary spillway and any stilling basin;

(5) the location of each berm;

(6) the location of slope protection;

(7) the location of borings, test holes, and test pits;

(8) the location of intakes, outlets, valves, and valve wells;

(9) the location, description, and elevation of each benchmark;

(10) the location, description, and details of all foundation drains;

(11) the location and limits of each borrow area; and

(12) the location and topography of the area where the auxiliary spillway discharge returns to the receiving stream;

(b) a map of the drainage pattern above and below the dam site drawn to an appropriate scale. The map shall show the following:

(1) The location of the watercourse across which the dam is to be built and the point where the centerline of the dam crosses the centerline of the stream specified in latitude and longitude, or in feet north and west of the southeast corner of the section;

(2) the location of the dam and the outline of the reservoir;

(3) the boundary of the watershed, shown by a line enclosing the entire area that will drain into the reservoir;

(4) section lines, with sections properly identified; and

(5) the size of the drainage area in acres or square miles;

(c) a topographic map of the dam site and reservoir area, which shall be shown to a scale that provides sufficient detail to clearly show the required features and to locate them in the field, but in no case is less than 1 to 3,600. The elevation of each contour shall be clearly noted on the map. The following details shall be shown:

(1) The location of the dam; and

(2) the following topography:

(A) The contours at two-foot intervals. For dams more than 20 feet in height, contours may be spaced at greater intervals, but the interval shall not exceed four feet;

(B) the contour equivalent to the elevation of the lowest uncontrolled spillway inlet, not including any low-flow augmentation works;

(C) the contour equivalent to the maximum water surface reached during the design storm;

(D) the contour equivalent to the elevation of the top of the dam;

(E) construction ingress and egress routes to the dam and reservoir;

(F) the name and address of each person owning any of the following:

(i) The land on which the dam and its appurtenances, including the auxiliary spillway or service spillway, down to the location where the spillway discharges back to the receiving stream, will be constructed;

(ii) ingress and egress routes to the dam and reservoir;

(iii) the reservoir site up to the top of the dam elevation; and

(iv) the borrow areas if they are located outside the reservoir site;

(G) if the reservoir area is divided between more than one landowner, the property lines, which shall be shown on the topographic map of the reservoir;

(H) roads, railroads, pipeline crossings, and any other prominent features in the vicinity;

(I) the boundary line for each easement; and

(J) the limits of each borrow area;

(d) the cross-section view of the valley at the dam site, which shall be shown along the centerline of the dam with the same stationing as that used on the plan view. The following shall be shown:

(1) The elevation to which the top of the dam is to be maintained and the elevation to which the dam is to be initially constructed in order to provide an adequate settlement allowance;

(2) the location and elevation of the auxiliary spillway or service spillway at the centerline of the dam;

(3) the original surface of the ground, including the streambed, up to the elevation of the top of the dam;

(4) the proposed elevations of the bottom of the cutoff trench; and

(5) the location of all test holes and the materials encountered in the test holes;

(e) a cross-section view perpendicular to the centerline of the dam at the lowest point on the downstream toe extending to the limits of the fill being placed. If the cross section is variable, a typical section shall be shown for each reach of similar cross section with a proper description of the reach by stationing. Additional typical cross sections along the centerline of the primary spillway and the centerline of any other outlets shall be shown. Cross sections of the dam shall include the following:

(1) The elevations of the shoulders and centerline of the dam and the width of the top of the dam;

(2) the elevation of the top of any berm, the elevation of the outside shoulder of any berm, and the top width of any berm;

(3) the slopes of upstream and downstream faces of the dam;

(4) the elevation, location, and type of slope protection;

(5) the zones of the embankment;

(6) the dimensions to which the dam is to be constructed to provide an adequate allowance for settlement;

(7) the elevation, location, and dimensions of the planned cutoff trench; and

(8) the elevation of the downstream toe of the dam at its lowest point;

(f) the following information concerning each open-channel spillway:

(1) A plan view showing the location and stationing along the centerline of the spillway, together with the location of the control section;

(2) cross sections showing side slopes and dimensions of the spillway, and the original surface of the ground up to the point where the spillway sides intersect the original ground surface;

(3) a profile along the centerline of the spillway, extending from the point upstream where the profile of the spillway intersects natural ground through the control section to the streambed below the dam. The stationing on the profile shall correspond to that on the plan view. The station and elevation of the breaks in the grade of the spillway shall be shown. This profile shall show the existing ground elevation, proposed grade of the bottom of the spillway, elevation of slope protection on the side slopes, and geologic logs of the borings required in the auxiliary spillway or service spillway by K.A.R. 5-40-40, superimposed on the profile through which the spillway is excavated; and

(4) the data necessary to stake out any curves;

(g) the following information concerning the primary spillway:

(1) The profile along the centerline of the spillway, extending from the intake to the outlet, showing the size, dimensions, and locations of seepage control features. This profile shall show existing ground elevations and the proposed grade of the spillway;

(2) the plan, profile, and cross-section views of the stilling basin, primary spillway supports, and other features;

(3) the geologic logs of the borings done in the vicinity of the primary spillway shall be superimposed on the profile;

(4) the location and type of all bedding materials;

(5) a table of pipe grades for all concrete pipes; and

(6) conduit joint details;

(h) the number of acres enclosed by each contour within the reservoir area and the total storage capacity of the reservoir in acre-feet at the elevation of each contour, which shall be determined and tabulated on the plan. The data shall be compiled for all contours in the reservoir up to the elevation of the top of the dam. Computations of capacity shall be based on the natural topography of the reservoir basin but may include the volume of any excavation in the reservoir made during construction of the dam;

(i) a curve or table showing the discharge capacities, in cubic feet per second, of all spillways through a range of surface water elevations from the lowest spillway inlet elevation to the top of the dam elevation, which shall be developed and shown on the plans or in the design report;

(j) the following information, which shall be shown on the plans in plan view, profile, and cross section:

(1) Drain details, including foundation drains;

(2) permanent erosion control protection, including riprap; and

(3) details of stilling basins, outlets, and other appurtenant structures; and

(k) the following information, which shall be shown on either the plans or the specifications:

(1) A table of gradation for each drain; and

(2) a table of gradation of the bedding of the riprap.

(Authorized by K.S.A. 2006 Supp. 82a-303a; implementing K.S.A. 2006 Supp. 82a-302 and 82a-303a; effective May 1, 1983; amended May 1, 1985; amended May 1, 1987; amended May 18, 2007.)