

What should I look for during a dam inspection?

State of Kansas regulations require the inspection of high-hazard dams Class C every three years and significant hazard dams Class B every five years. These hazard classifications indicate the possible downstream impact of dam failure and do not refer to a dam's condition. From 2007 to 2010, Division of Water Resources engineers inspected high hazard and significant hazard dams and contacted owners if they observed any deficiencies. These state-funded inspections now must be done by licensed engineers at the owner's expense and submitted to DWR for review within 60 days after the inspection. If an owner fails to submit an inspection report by a licensed engineer with at least five years of experience, DWR will do the inspection and charge its cost to the landowner. Current law does not require low hazard dams to be inspected.

Regular inspections as well as inspections done after unusual events such as heavy rains or windstorms for any dam prolong a dam's lifespan and reduce costly repairs. When inspecting a dam, prepare first by reviewing design criteria, operation records, and past reports. Know the location of the dam's parts such as drains or instrumentation and have necessary instructional manuals. Document observations and measurements for each inspection is a comparative analysis. For instance, show locations where photographs are taken and the direction faced for reference. If photographing a depression, you may not know where it is without a sketch indicating location. Besides using a camera for documentation, other useful items are a checklist to remember what to look for, pen and paper to make a dam sketch showing problem areas, surveying rods, measuring tape, bucket and a timer for seepage, surveying equipment, lights for pipes or hard-to-see areas, machete to clear vegetation, and a shovel for drains that have been plugged.

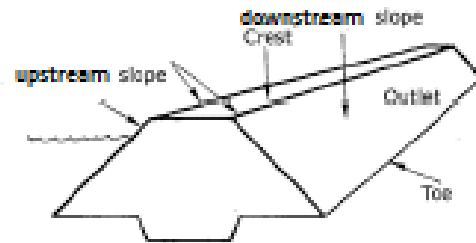
Walk a zigzag or parallel path. DWR inspectors typically walk the upstream slope, downstream slope, and top of dam. They also visually inspect the primary spillway inlet and outlet pool area and channel. When inspecting, note conditions as adequate or actions needed such as "monitor" or "repair" needed (future or immediate). Consult a licensed engineer with inspection concerns and also DWR's Water Structures Program, before making any dam modifications or repairs.

Each part of the dam has its own possible problems. At the toe, for example, look for seepage, which also occurs in the groin and abutment contact areas. If seepage is increasing in volume and flow, compare it with past inspections and document for future inspections. Also evaluate seepage water clarity and note whether it contains soil particles, which indicates soil-carrying water passing through the embankment or foundation.

View the dam's crest for depressions and conduits for blockage, separation, deterioration, or side erosion. Check stockwater pipes, filling tanks, primary spillway, or drawdown valves for deterioration or rusting. Be alert for cracking. Cracks that shrink and swell in a honeycomb pattern aren't a major problem but can lead to surface erosion. Cracks perpendicular to the dam itself can be caused by differential sediment or compressed foundation materials. A portion settles and leaves a crack where surface water can enter and lower freeboard in high runoff events. Cracking parallel to the dam is caused by different sediments or stability slides that can open voids for surface water. Measure cracking depth and length to make sure whether the crack is moving or if corrective action is needed.

Typical danger signs that state inspectors have noted include blocked trash screens, excessive woody vegetation, and excessive erosion of slopes or spillway. Regular maintenance helps correct these problems before they become dam failure causes. DWR inspection reports contain the following sections:

- Executive summary and history including summary of previous inspection
- Current inspection findings
- Survey information
- Discharge from spillways and drains
- Monitoring devices
- Hazard classification
- Hydrology and hydraulics review
- Emergency Action Plan (EAP)
- Maintenance and operation plan
- Items needing immediate attention
- Maintenance recommendations



Simple checklist

Crest (Top of dam)

Cracking: Cracks parallel to the crest? Cracks perpendicular to face? Measurement?

Erosion: Ruts? Gullies? Bare patches? Paths?

Settlement: Any areas lower than surrounding features?

Vegetation: Trees? Grass needs mowing?

Animal burrows: Animal type? Burrow size and depth?

Upstream embankment

Cracking: Cracks parallel to crest? Cracks perpendicular to centerline or by pipe? Measurement?

Erosion: Waterline? Sliding? Slumping? Paths?

Settlement: Any areas lower than surrounding features?

Vegetation: Trees? Grass needs mowing? Adequate?

Animal burrows: Animal type? Burrow size and depth?

Adequate slope protection: Enough rip rap?

Downstream embankment

Cracking: Length? Depth?

Erosion: Seepage? Wetness indicating internal erosion?

Sinkholes: Size and depth?

Vegetation: Trees? Grass needs mowing? Adequate?

Animal burrows: Animal type? Burrow size and depth?

Toe (downstream): Seepage? Boils? Springs? Flow measurement

Embankment drains: Damage or rust? Water quality? Free-flowing? Aligned?

Emergency spillway: Erosion? Obstructions (debris? trees and shrubs?)? Vegetation cover? Flowing?

Primary spillway inlet: Cracks? Deterioration? Leakage? Soil movement? Flowing? Aligned? Functioning?

Trash rack: Debris? Rust? Damaged areas?

Fencing? Gates? Posts? Wiring? Any needed?