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Pond dam repair offers opportunity to improve design

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Thirty-five years ago, while growing up on a cow-calf operation and moving irrigation pipe by hand in the summer heat to water bermudagrass for hay production, I vowed to never again curse rain. Dry years that we have recently experienced only strengthened my resolve. To be honest, the record rainfall month of May 2015 in southern Oklahoma softened my standpoint. I've had to repair a leak in the roof of my home, replace a $550 pressure tank due to flooding in my well house and hope the wash on the back side of my duck marsh dam did not grow before it could be repaired. But, I've managed to maintain a civil tongue toward the much needed rain that we were blessed with. Others were not nearly as fortunate. Many lives were lost and much more extensive damage occurred to property, buildings and roads.

Some pond dams suffered damage similar to my duck marsh or were completely washed out, leaving those pond owners to contemplate repair. Repairing a washed-out pond dam is expensive, not to mention the cost of restocking fish or providing an alternate source of water to

Fig. 1. Hooded inlet

Fig. 2. Drop inlet

livestock. However, there may be an opportunity to improve spillway design and reduce or eliminate future problems.

Two types of spillways can be used when constructing or repairing pond dams: principal and auxiliary. All ponds that capture runoff require auxiliary, also called emergency, spillways. Principal spillways minimize the use of auxiliary spillways and consist of two types: hooded inlet (Fig. 1) and drop inlet (Fig. 2). A hooded inlet

Fig. 3. A drop inlet spillway with anti-seep collars (USDA-NRCS Agriculture Handbook 590 "Ponds – Planning, Design, Construction").

spillway consists of a pipe installed through the dam at an angle so the pipe is at the desired water level on the front of the dam and at or near the bottom on the back of the dam. An anti-vortex plate is installed on top of the end extending through the front of the dam to more effectively utilize pipe capacity, and one or two anti-seep collars are usually installed around the pipe in front of the center of the dam to prevent water seepage through the dam next to the pipe.

A drop inlet also consists of a pipe installed through the dam. It differs from a hooded inlet in two ways: the pipe is installed through the bottom portion of the dam and a riser is attached vertically to the end extending into the pond. The top of the riser is set at the desired water level. Drop inlets are also installed with anti-seep collars (Fig. 3).

An auxiliary spillway is usually constructed at one end of the pond dam on soil or bedrock. It is designed to allow water flow around the end of the dam and back into the channel before breaching the dam. Auxiliary spillways constructed on soil should be well vegetated. On highly erodible soils, auxiliary spillways should be gently sloped and are sometimes lined with riprap, or larger sized rock, or concrete.

Auxiliary and principal spillways are installed in a stair-step-down manner from maximum dam height. Auxiliary spillways should be at least 3 feet below the top of the dam. Principal spillways should be installed at least 2 feet below the height of the auxiliary spillway. Pipe size for drop- and hooded-inlet spillways should be sufficient to handle five- to 25-year floods based on the watershed acres supporting the pond.

Principal spillways increase construction costs but, if designed and installed correctly, should prevent costly repairs and prevent fish immigration into the impoundment from downstream. For more information, refer to Agriculture Handbook 590 "Ponds – Planning, Design, Construction" at nrcspad.sc.egov.usda.gov/DistributionCenter/product.aspx?ProductID=115. ■