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AGRICULTURAL EXPERIMENT STATION
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CONSTRUCTION OF FARM PONDS

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Water Supply

Artificial ponds in Alabama are constructed by throwing up earthen dams across natural hollows into which water is introduced from streams, artesian wells, springs or the run-off from terraced land. If the pond is to be constructed by damming up a stream, it is preferable to select one with as little flood water as possible.

Depth of Pond

If a fairly constant water supply is available, a successful pond may be constructed with the maximum depth of water as low as 6 feet, however, a maximum depth of 8 feet is preferable.

If the pond is constructed on a very small stream or if the water is supplied by the run-off from terraced lands, a greater depth for storage of water is necessary to carry the pond through periods of drought. In such cases, the maximum depth of water should be at least 10 feet.

Marking off Area for Pond

After the approximate water depth is determined, the area to be covered by the pond should be staked off, using a terracing or surveying level. If the survey indicates that the pond will have a great deal of water less than 4 inches in depth, the proposed water level should be either raised or lowered to eliminate, as far as possible, large areas of extremely shallow water. A large amount of shallow water in a pond makes the control of weeds and mosquitoes very difficult.

State Department of Health Permit Required

A permit from the State Department of Health is required before the pond is constructed. Consult your local Health Officer for further details.

Clearing Pond Area

All trees and brush in the area to be flooded and about 15 feet back from the water line should be cut off as close to the ground as possible; they should then be either removed from this area or burned. This will enable the owner to remove fish by seining when this is found desirable, and aids in the control of weeds and mosquitoes.

Marking off Area for Dam

All trees and brush should first be cleared off on the approximate area to be occupied by the dam. The top of the dam should be constructed to and maintained at a height of at least 3 feet above the water level if the pond occasionally receives moderate amounts of flood water. If large amounts of flood water must be handled, the top of the dam should be 4 or 5 feet above water level.

Using a terracing level or some similar instrument, the points where the top of the dam meets the hillside should first be marked with stakes (Figure 1). Between these stakes the height of the top of the dam from the ground should next be determined at several points marked with stakes. From these stakes the foundation for the dam should next be laid out as indicated in Figure 2. Stakes should be set at distances from the center of the dam twice the height of the dam at that point. A line connecting the outside stakes (Figure 2) will then outline the foundation for the dam. Two sets of stakes at the ends of the dam and one in the middle are set to mark the position and width of the center of the dam. The dam is then constructed by bringing the center up to the

indicated height and sloping the sides to the ground along the outline of the foundation, thus giving the sides a 2-to-1 slope (Figure 3).

Preparation of Foundation for Dam

The area upon which the dam is to be placed should be cleared of stumps, grass, and trash. In the center of this site, an area at least half the area of the foundation of the dam should have the top soil completely removed down to the original clay subsoil to prevent seepage under the dam. Less leakage will result if the first foot of subsoil is removed, or at least plowed deeply and repacked; this tends to break up natural drainage channels and makes a better bond between subsoil and dam. The earth removed in preparing the foundation may be used in the downstream edge of the dam.

Where the site for the dam is too wet and boggy to allow teams to clear off the foundation, this can be done economically by the use of ditching dynamite. However, such work should be supervised by someone familiar with the use of this material. For information and advice concerning its use, consult your local County Agent.

Installing Drain Pipe

After the foundation for the dam has been properly cleared and dug out, the center should be filled with good clay as indicated in the next section. When filled up level with the stream bed, or with the lower part of the pond, the drain pipe should next be installed.

The size of drain pipe needed depends upon the size of the pond and upon the volume of water running into the pond. A 4-inch drain will empty an acre pond, with a maximum depth of 9 feet and an average depth of 3 to 4 feet, in about 60 hours if no water is entering the pond during this period. A 6-inch drain will empty the same pond in half the above time, while a 12-inch drain will require about 1/9 this time. In the majority of cases, a 4- to 6-inch drain will be satisfactory for ponds up to 3 acres in size; while from 6- to 12-inch drains will be necessary for larger ponds up to 15 to 20 acres.

The drains may be of cast iron or galvanized iron; the former is much more permanent. Sewer tile has been found to be unsatisfactory if used entirely through the dam, due to cracks developing around the joints. However, it can be used to reduce the cost of the drain to some extent by running the cast iron pipe two-thirds the total distance through the dam and finishing out the distance to the downstream side with well cemented sewer tile.

With the smaller drains, it is cheaper and just as satisfactory to dispense with a valve, using a 90° ell and section pipe running up to the water level inside the pond. When it is desired to drain the pond, this section is shoved sidewise, unscrewing the ell, until the pipe lies flat on the bottom of the pond. For larger drains, a gate valve is probably the most satisfactory, although somewhat costly. It is usually recommended that this valve be placed inside the pond and that the valve be operated by connecting a long pipe to the wheel or stem of the valve. In this case, it will be necessary to build a platform above water from which to operate the valve. Placing the valve inside the pond prevents the drain pipe from filling with sediment and reduces somewhat the danger of leaks.

The drain should be laid so that the lowest part of the pond can be drained. After it is properly placed, concrete collars should be poured completely around the pipe at points approximately 15 feet apart. This should be done both to hold the pipe securely while the dam is being built and to prevent seepage through the dam along the pipe.* The valve should be opened so that the drain can take care of the water from the stream while the dam is being constructed.

Construction of Dam

Soil containing enough clay to allow the forming of a hard ball when the moist soil is squeezed tightly by hand is satisfactory for the dam construction. This soil should be free of leaves, roots and other trash. Only the most impervious

* Clay should then be packed around the pipe, keeping it sufficiently moist to enable it to be forced tightly against the underside of the pipe.

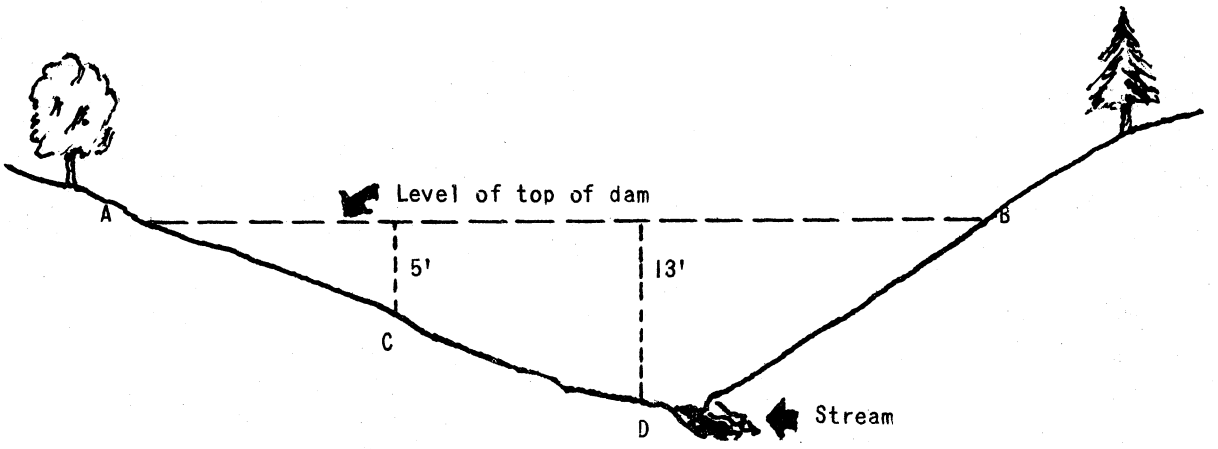

Figure 1. In laying off the dam with a level, first mark points A, B, C, and D with stakes. Then determine the height of top of the dam from points C and D.

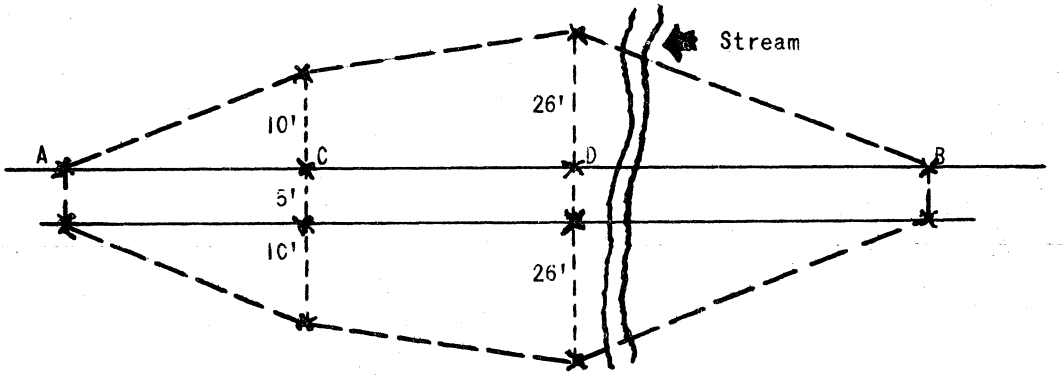

Figure 2. From stakes A, B, C, and D measure over 5 feet (or more) for the width of the center of the dam. Then drive stakes at points from center of the dam twice the height of the dam at those points. These outer stakes connected with dotted line mark the outline of the dam.

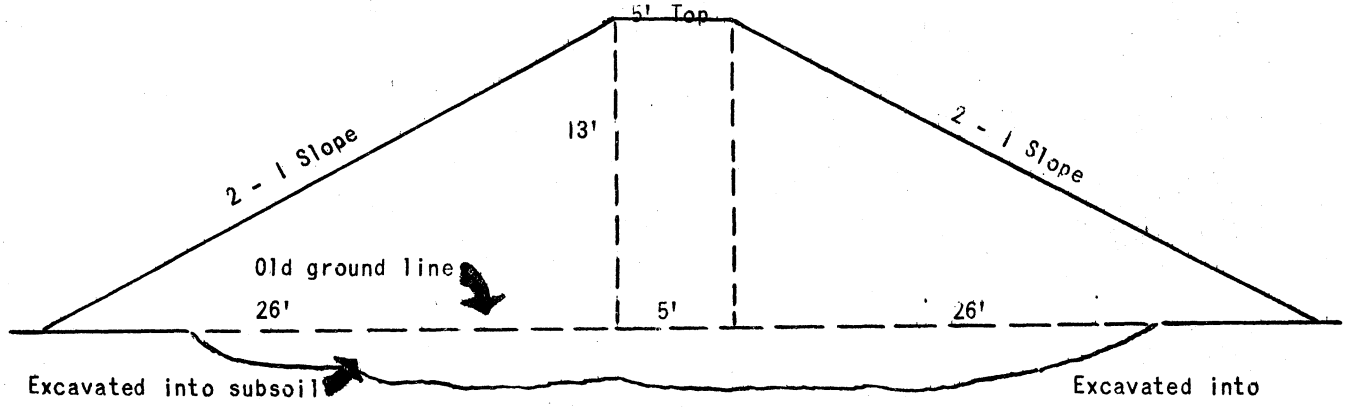

Figure 3. Cross-section through center of the dam, showing the 2-to-1 slope of the sides and the approximate area excavated down into the subsoil for the foundation.

clay available should be used in the center of the dam.

The moving of the dirt for the dam can be very successfully done with slip scrapes and teams, as the soil is most thoroughly packed by this method. However, tractors with bull-dozers or rotary scrapes, steam shovels, and trucks have also been used successfully where care is taken to pack the soil as much as possible during construction and where sufficient extra height is allowed for settling of the dam.

For dams extremely well packed, a minimum of 6 inches should be added to every 10 feet in height to take care of settling; while for loosely packed dams, it may be necessary to add as much as 2 feet to each 10 feet in height of the dam.

The top width of the dam should be approximately 5 feet for dams up to 15 feet in height. For higher dams, the top width should be a minimum of 1/3 the height. The front and back side should have a 2-to-1 slope as shown in Figure 3. A 3-to-1 slope on the front (or upstream side) is not necessary except for very large ponds where the dam must stand considerable wave action.

The Spillway

The cheapest type of spillway is that constructed to one side of the dam on the old hillside. It is extremely important to build a spillway large enough to take care of the maximum amount of water which can be expected. The main cause of failure of dirt dams is the over-topping of the dam by flood waters, due to lack of sufficient capacity in the spillway. Some idea of the width necessary can be gained by examining the banks of the stream for signs of the highest driftwood left by high water. After estimating the size required, **make it considerably larger.** A wide, shallow spillway is much preferable to a narrow, deep one, as the former requires less height to the dam and reduces the number of fish leaving the pond through the spillway during floods. The water also leaves the spillway with much less velocity thus reducing the protection necessary immediately below the cemented area.

The spillway should be paved with concrete for a sufficient distance to carry the water entirely away from the dam.

Sodding and Rip-rapping Dam

Immediately upon completion of the dam, it should be planted with Bermuda grass on the back side, the top and down the front to the water level. For ponds 1 acre or so in size which are well protected from wind by high hills or trees, rip-rapping the dam at the water line is not necessary, as the Bermuda roots appear to offer sufficient protection. For larger ponds or for small ponds exposed to the wind, additional protection from wave action on the dam is necessary. Sufficient protection for most ponds can be secured by laying rock from one to two feet below to about one foot above the water line on the dam.

Filling Pond with Water

Immediately upon completion of the dam and spillway, the valve may be closed and the pond filled with water. As soon as the pond begins to fill, Gambusia minnows should be added at the rate of 100 or more per acre of water. These Minnows may be secured from neighbor's ponds or from your County Health Officer. They must be added to all new ponds to help control the mosquitoes.

Within a week after the pond has been filled with water, the floating trash should be removed. This can be done best on a windy day when all the floatage will be concentrated on one bank. It then can easily be removed with forks, rakes or with short sections of chicken wire fencing. It is very important that this be done in order to make mosquito control by the fish more effective.