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BUREAU OF SPORT FISHERIES AND WILDLIFE
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CONSTRUCTION OF A GARDEN FISH POOL

Whether you are building a pool to harmonize with a formal or informal landscape, you will want to build a permanent structure. If water lilies are to be grown, the pool should be about 2 feet deep, at least 3 feet or more wide and as long as desired. In northern climates, it will be necessary to remove fish during the winter months.

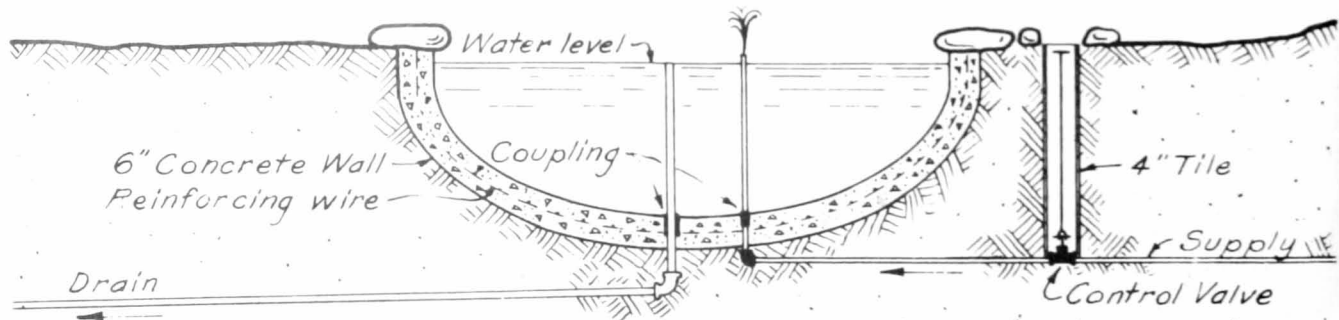
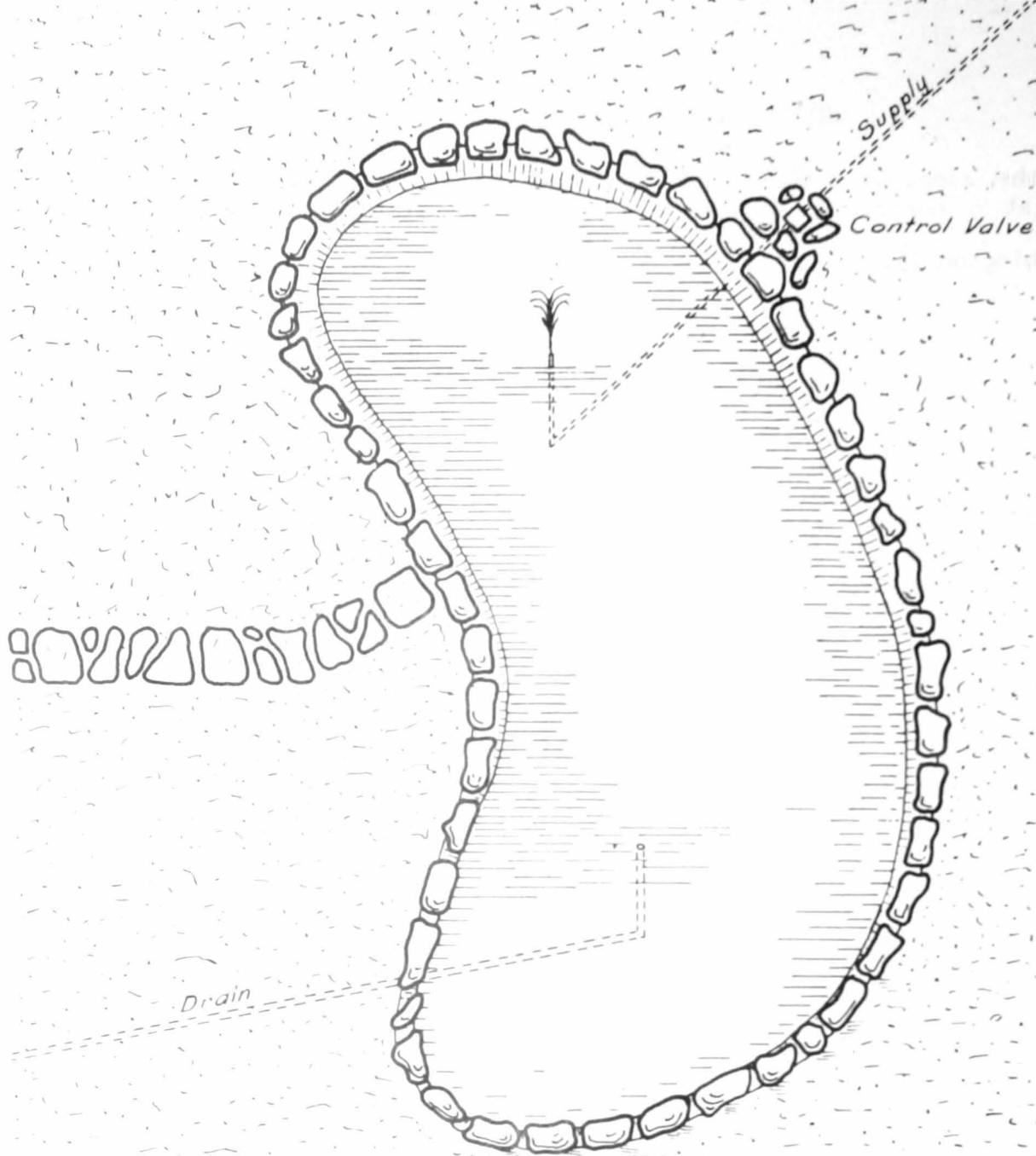
PREPARATION OF THE SITE

The pool should rest on well compacted soil. Do not attempt to build on filled ground as settling and consequent cracking of concrete may result. The sides and bottom of the excavation should be cut smooth and curved to the desired dimensions and contours, allowing 6 inches for the thickness of the concrete. Do not build under leafy trees or shrubs.

WATER SUPPLY

Before the concrete is poured, inlet and outlet pipes should be put in place. The water supply pipe should be set over or through the sidewall or may come up through the floor of the pool. The drain pipe should be imbedded in the concrete bottom and must be placed at its lowest point in order to assure complete drainage. Both lines should have couplings within the concrete. A perpendicular length of pipe should be screwed into the drain. This "stand pipe" regulates the depth of the water. To drain the pool, the stand pipe is removed. A bulb shaped screen constructed of hardware cloth may be placed over the stand pipe to prevent clogging and the escape of fish. For permanence, all plumbing fittings must be rust proof.

If the topography does not permit drainage to a lower level, the water may be drained into a stone pit. The pit may be constructed at a convenient place near the pool by digging a hole below the level of the pool bottom. In this hole stones 3 to 6 inches in diameter should be placed. The amount of stone needed will vary with the volume of the pool and the porosity of the soil. Three to five cubic yards of stone should be adequate for a pool with a volume of 150 cubic feet of water. The drain pipe should be terminated in the middle of the upper level of the stones and the latter covered with soil. Drainage will be faster if there is considerable fall between the bottom of the pool and the drain outlet.



FORMS FOR THE CONCRETE

If the slope of the sides is not steeper than 1 foot in height to every 2 feet in horizontal distance, no forms will be needed for the inside wall. If the soil is firm, no outside forms will be required except for those portions of the pool wall above the ground line. If the earth is loose or the walls are steeper than just indicated, both inner and outer forms will be necessary. Forms are ordinarily made of wood. For curved parts, 20-gauge galvanized iron makes a flexible and very satisfactory form. Forms should be tight enough to avoid leakage of cement and strong enough to support the weight of the concrete and additional loads incident to construction without sagging or bulging. Forms may be removed in about 48 hours. Removal can be facilitated by oiling the inside surface of the forms before the concrete is placed.

REINFORCING THE CONCRETE

Any available woven wire or pieces of steel will be satisfactory for reinforcing. It is recommended that reinforcing materials be used at the rate of 80 pounds per cubic yard of concrete. The overlap of the ends of the reinforcing materials should be approximately 40 times its diameter. The reinforcing material should be bent to conform to the angle at the corners and to fit the curves. It should be laid, and wired in place if necessary, so that about 2 inches of concrete is outside.

MIXING AND PLACING CONCRETE

The concrete mixture recommended is made in the ratio of 1 sack of cement to $2\frac{1}{4}$ cubic feet of sand to 3 cubic feet of clean, hard gravel or crushed stone, with not more than 5 gallons of water added per sack of cement if damp sand is used. If the sand is dry, $5\frac{1}{2}$ gallons of water per sack of cement should be used; if the sand is very wet, 4 gallons of water per sack of cement. Concrete should be thoroughly mixed until it is uniform in color and consistency. It should be placed in layers of approximately 6 inches and puddled with a spade. Care should be taken that the reinforcing materials are not displaced. The placing of the concrete should be continued until it is completed. If natural rocks are to be used on the top and upper part of the wall, they should be set in the concrete before it has hardened. If no forms are used, the cement should be covered with burlap and kept wet for 7 days.

PREPARATION OF THE POOL FOR USE

New concrete is strongly alkaline and toxic to fish. When the pool has been completed, it should be flushed thoroughly, filled with water, and allowed to stand for 3 to 4 days. It may then be drained and filled with fresh water. The pool should be tested 2 or 3 days later by putting in

1 to 2 fish. If they survive, remove them, place 2 inches of sand in the bottom of the pool, plant the desired vegetation, and refill with water. After 3 to 4 days, the full quota of fish may be introduced.

Anacharis (Anacharis canadensis) and fanwort (Cabomba caroliniana) are excellent plants for garden pools. These and other plants are obtainable from most goldfish and aquarium dealers or from their natural habitat in lakes and ponds.

REFERENCES

Care of Goldfish. Fishery Leaflet 57. 6 p. Obtainable from U. S. Fish and Wildlife Service, Department of the Interior, Washington 25, D. C.

Care of Tropical Aquarium Fishes. Fishery Leaflet 411. 15 p. Obtainable from the U. S. Fish and Wildlife Service, Department of the Interior, Washington 25, D. C.

Exotic Aquarium Fishes. By Wm. T. Innes. 15th edition. 1955. 507 p. Innes Publishing Co., Philadelphia, Pennsylvania.

Handbook of Tropical Aquarium Fishes. By Herbert R. Axelrod and Leonard P. Schultz. 1955. 718 p. McGraw-Hill Publishing Co., New York, N. Y.