

pond. They destroy vegetation of the pond-bank buffer strip, and their droppings overenrich the water. Grazing and trampling also weaken dams, embankments and spillways. If livestock watering is a purpose of the pond, pipe the water to an area where the animals won't harm the pond.

## Excavated or Dug Ponds

Dug ponds are built mostly in rather level areas not suited for ponds formed by dams. Many parts of Michigan are favorable for dug ponds because they are fairly flat, the soils are soft and porous, and groundwater lies close beneath the soil surface. The pond is then fed by water slowly seeping in one side of the pit and out the other. Dug ponds can also be positioned so that springs upwell within the pond or flow into it from a short distance up-slope. Groundwater can be pumped into ponds from nearby wells. Sometimes windmills are

used for this. Less desirably (see drawbacks in section on water supply), dug ponds can be catchment pits for overland runoff if soils are clay or other fine material that will hold water—or if clay or other sealants can be obtained to line the pond bed.

Groundwater seepage ponds are the most common in Michigan. They are generally located in sand or sand-gravel soils through which water easily percolates. Such ponds are possible even in many areas with rather non-sandy surface soils because water-bearing sands and gravels lie close beneath, and excavation reaches down into them.

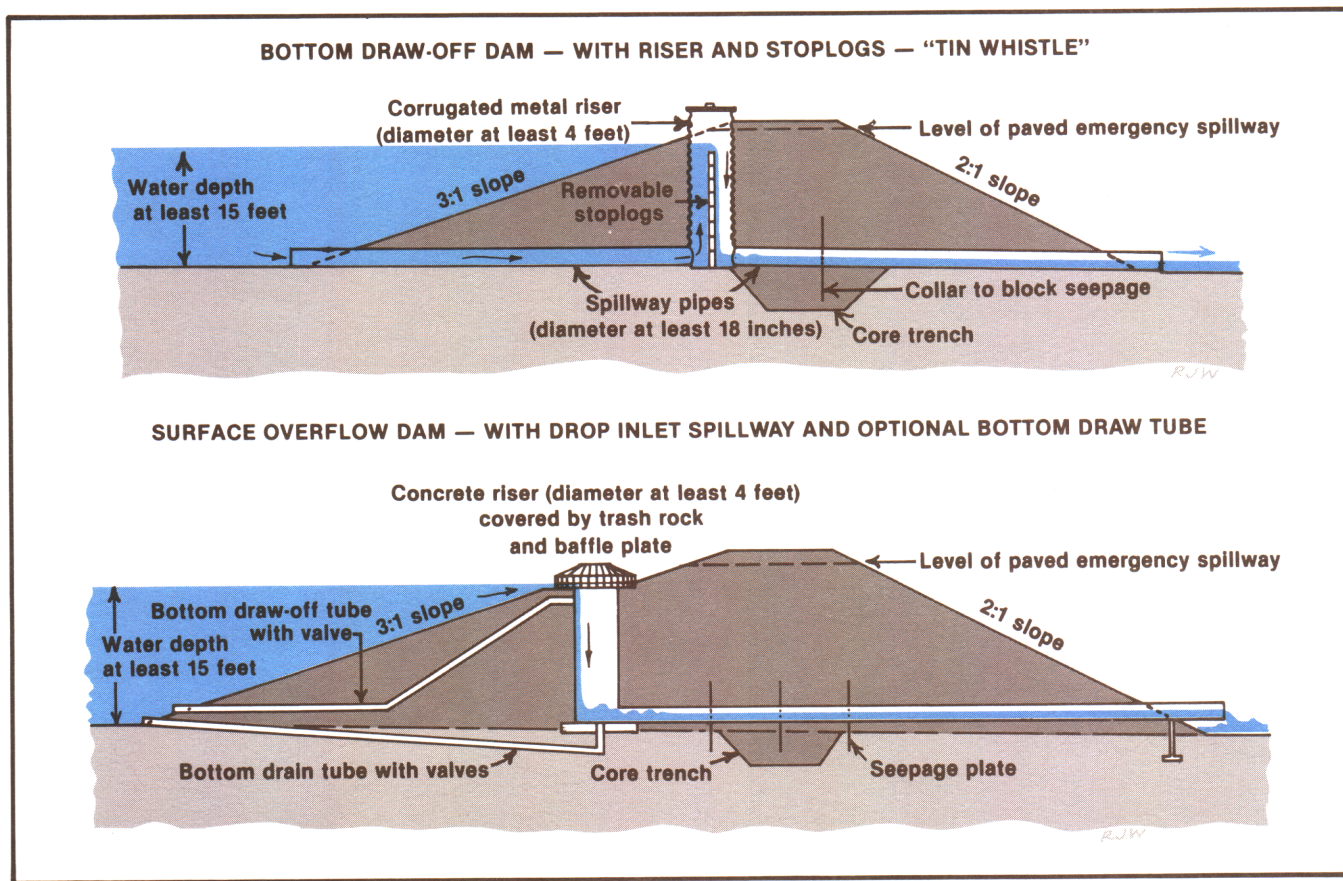
The water level may fluctuate significantly in seepage ponds as the groundwater table rises and falls—higher in wet years and wet seasons, lower during drought. Plan excavation depth to be more than 15 feet below the lowest level that the groundwater table reaches in a very dry year. Consult an SCS engineer, or other field personnel, for such a

determination. Make test borings to find the water table in late summer of a dry year.

When contracting for a dug seepage pond, obtain written agreement from the contractor as to the water depth that will be achieved. Contracting for a certain pit depth will do little good if the water doesn't rise sufficiently in it. Again, 15 feet or more depth during the low point of summer water levels is advisable, if soil conditions permit.

The type of equipment that is best for digging ponds depends largely upon pond size, site characteristics, and depth desired. Draglines or bulldozers are generally used. Bulldozers are more adapted to the dryer pond beds.

The material dug out of the pond, called the "spoil," should be smoothed back away from the pond edge or piled far enough from the pond that it won't erode back into the water. Using some of the spoil to build a gentle berm around the pond



Two common types of outlet structures for dams that form fish ponds. Riser-and-stoplog construction is the simplest design that allows controlled bottom draw-off. A drop-inlet spillway can accommodate greater variation of flow. It is needed where run-off from large land area supplies the pond and where sudden high water is expected.