Training on

Roads for Water and Resilience

RAINWATER RUNOFF FROM ROADS

Rainwater wasted on roads

Plenty of good rainwater was wasted on this newly graded murram road.

Rural roads have traffic jams during rainy seasons due to poorly drained roads.

Rainwater damage to roads

A good, but wasted, rain shower can erode a newly graded road – and it may take years to get it repaired.

Roads built on Black Cotton Soil may disappear overnight as this one which has not been rebuilt for four decades.

Rainwater damage to fords

The lower part of this road was eroded by rains overflowing a too short concrete ford (Irish Bridge).

This ford was almost ruined completely by rainwater eroding its downstream side.

HOW CAN WE CHANGE RAINWATER FROM RUINING OUR ROADS TO IMPROVE THE LIVELYHOOD OF RURAL PEOPLE?

THREE OPTIONS

1) WATER STORAGE ALONG ROADS FOR LIVESTOCK, IRRIGATION AND CONSTRUCTION WORKS.

2) SPATE IRRIGATION NEAR ROADS FOR IMPROVED FOOD PRODUCTION.

3) CONVERT FORDS TO SAND DAMS WHERE THEY CROSS RIVERBEDS FOR DOMESTIC WATER AND IRRIGATION.

WATER STORAGE
ALONG ROADS

Borrow pits

Borrow pits are abandoned excavations from road construction which are cheap to utilize for harvesting rainwater runoff from roads.

The only investment required for utilizing borrow pits is to dig a short trench from the ditch of a road to a borrow pit.

Pans

Pans are natural or man-made depressions that can be used for storage of runoff water from roads.

A ploughed furrow that slopes 3:100 can transport runoff water from a road to a pan without any erosion.

Ponds

Ponds are deepened pans where the excavated soil is placed on the downhill side of the reservoir to function as a small earth dam.

This pond is situated 100 m from a road and has a stone covered inlet and spillway to prevent erosion of these two entry and exit points.

Earth dams

A 300 m long trench from a road diverts rainwater runoff into an earth dam built manually recently.

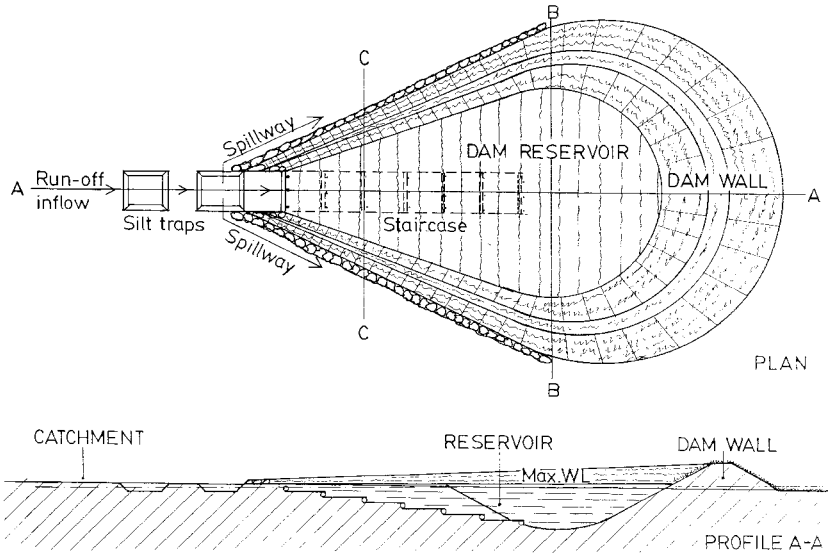
This dam was built of soil excavated from a natural depression that was 400 m from a small dirt road.

Charco dams in flat land

A Charco dam is the most suitable type of earth dam in flat land next to roads due to its hemi-spherical shape.

The standard storage capacity of a Charco dam is 1,000 m^3 and it takes some 800 working days to construct it manually.

Source: www.waterforaridland.com

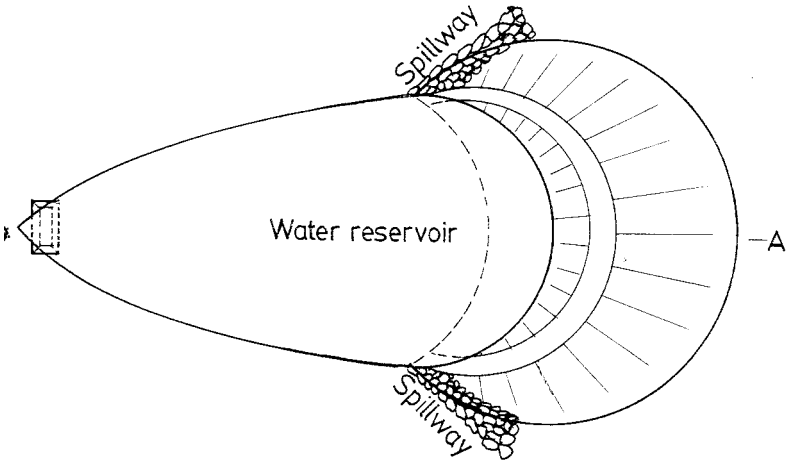


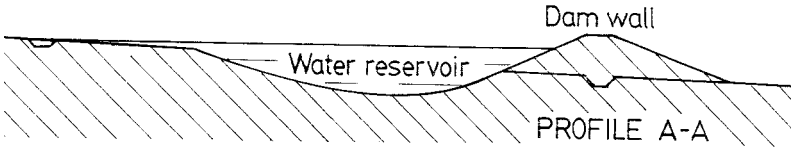
Hillside dams on sloping land

A Hillside dam is the best type of earth dam on sloping land near roads as its semi-circular reservoir stores a maximum of water for a minimum of its cost .

It takes some 600 working days to construct a Hillside dam manually with a storage capacity of 1,000 m^3

Source: www.waterforaridland.com



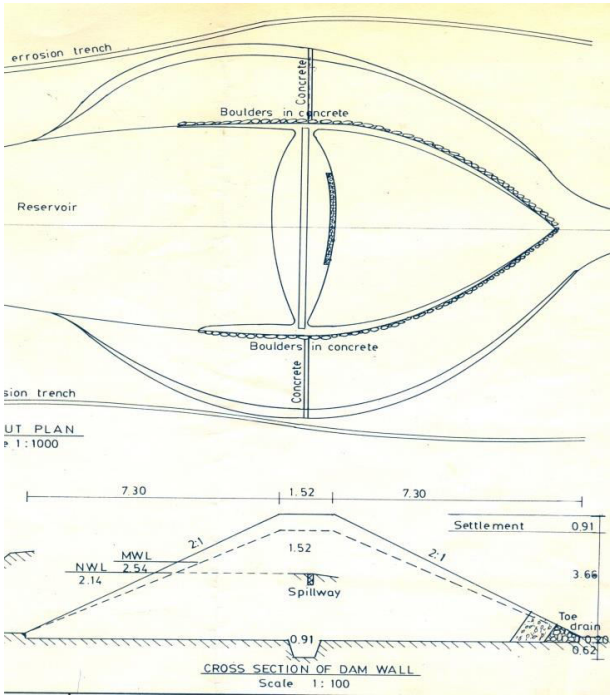


Valley dams

A Valley dam has a straight dam wall with a spillway at each end of the dam wall is the ideal type of earth dam in valleys situated near roads.

It takes about 400 working days to construct a water reservoir manually with a storage volume of 1,000 m^3

Source: www.waterforaridland.com



Fish ponds

Rainwater from roads can be drained into fish ponds and used for many purposes. It takes 200 working days to excavate a 500 m^3 unlined pond in clayey soil.

Fish ponds in sandy soil must be lined with a sheet of Geomembrane that costs about US $ 700 for a pond of 500 m^3

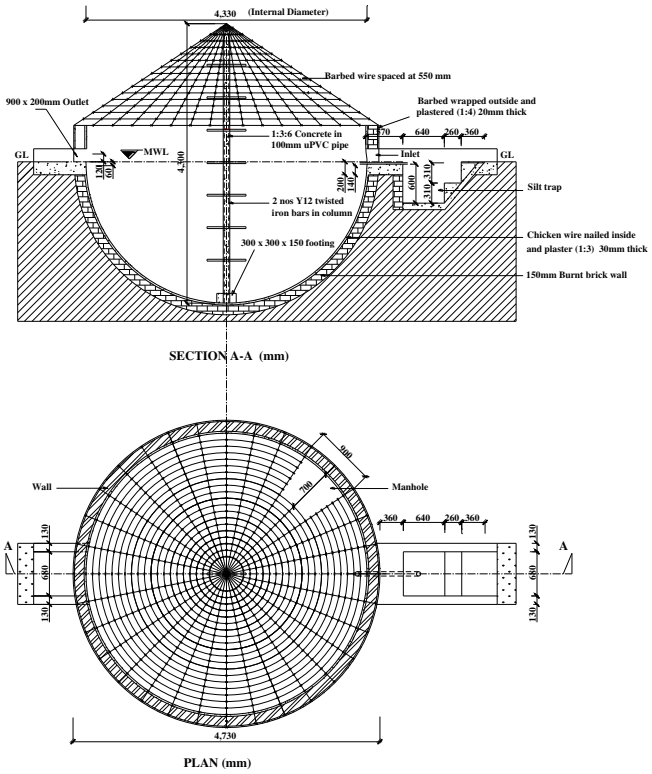
Source: www.waterforaridland.com

Small hemi-spherical tanks

Hemi-spherical water tanks are of the strongest design as both the internal and external pressure is equal everywhere.

Design of a 48 m^3 hemi-spherical tank built of burned bricks for about US$ 600.

Source: www.waterforaridland.com

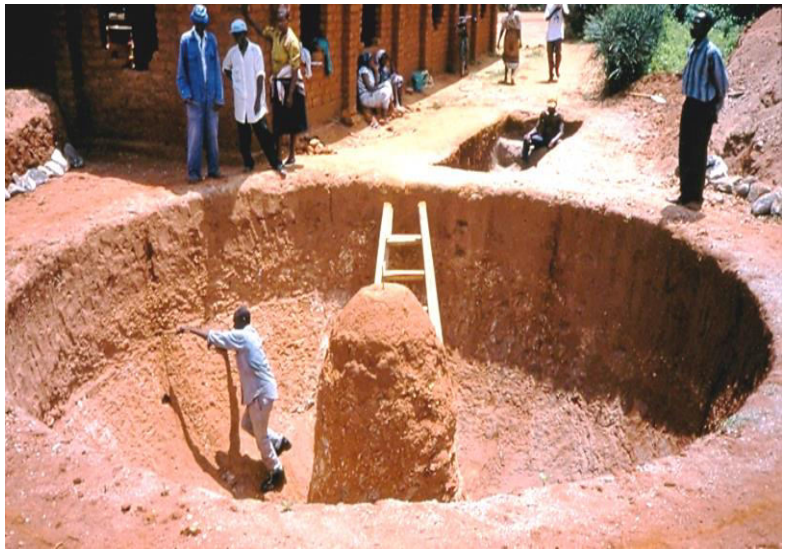


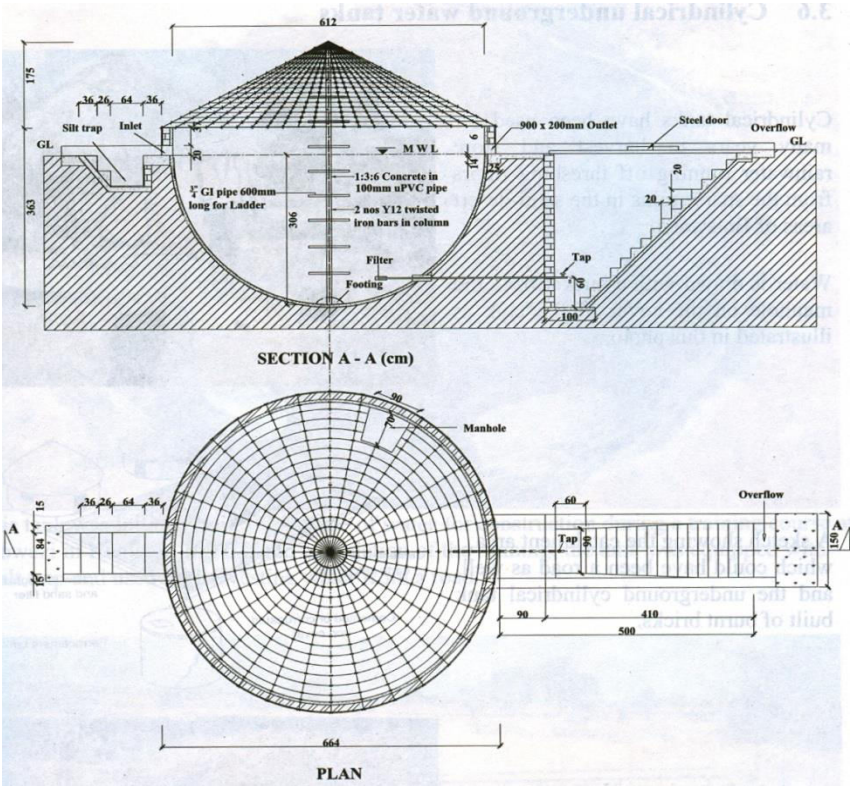
Large hemi-spherical tanks

Hemi-spherical ground tanks are built of ferro-cement that is plastered onto an excavated semi-sphere.

Design of a 60 m^3 ground tank of ferro-cement for US$ 2,000.

Source: www.waterforaridland.com





Somali berkads

Berkad ground tanks are very popular in Somaliland although many crack occur due to their rectangular shape and poor workmanship.

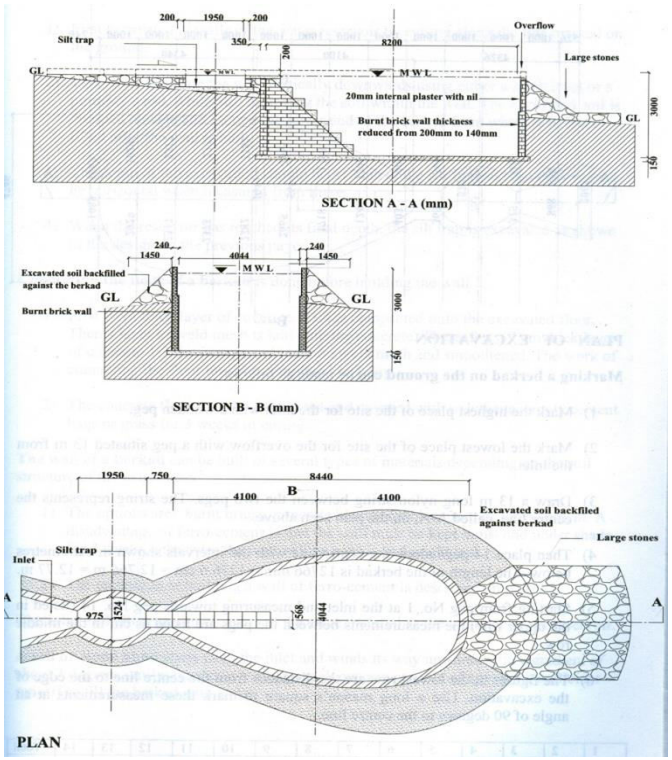
The sides of rectangular and square water reservoirs crack when dry due to external soil pressure.

Kenya berkads

The Kenyan berkad is oval-shaped to resist external soil pressure when dry.

Design of a 140 m^3 berkad tank built of burnt bricks costs about US$ 1,200.

Source: www.waterforaridland.com



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