

Dyke designing and construction

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- **Dyke**
- **Peripheral and internal dykes**
- Peripheral or main dyke high is determined by highest flood level.
- Top width of internal dykes 1.2 – 2.0 m.
- The height of the dyke is determined on the basis of the following consideration.
- Depth of water.
- Free board (30 cm for internal dyke)
- Wave height
- Settlement allowance
- Frost action / allowances

- **Free board**
- Free board may be defined as the vertical distance from the top of the dyke to pond water surface after settlement.

$$h_f = 0.3 \sqrt{h}$$

- Where h = height of the water in m.
Free board of 0.6m is safe for a dyke of 3 m height.

- **Wave allowance / height**
- Dam height must be sufficient to prevent over topping due to wave action.
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- Wave height is a function of fetch.
- Which is unobstructed straight distance from the furthest point of the pond to the dyke.

$$h_w = 0.014\sqrt{F}$$

F = Fetch in m

h_w = Wave height in m.

- **Settlement allowance**

- A newly constructed dyke keeps on settling for some time due to its huge height and compactness.
- The amount of settlement will depend on soil material used for construction, soil moisture content during construction, amount of compaction done during construction and speed of construction.
- The usual allowance for settlement allowance is approximately 10% of the height of the dyke. The rate of settlement of various soils is given below
- Ordinary earth - 1½ – 2” per foot of height
- Compact earth - 1” to 1½ “ per foot of height
- Black cotton soil - 2” to 3” per foot of height

- **Frost action**

The last allowance must be providing for dam height is frost action. Due to freezing and thawing, loosen soil making it unstable as a dam. So dam height is increased in sufficient amount depending on location.

$$\text{Height of the dyke} = H = h + h_f + h_w + h_s + h_{fa}$$

h = Depth of water

h_f = Height of free board

h_w = Dam height needed for wave action.

h_s = Height for settlement

h_{fa} = Height for frost action

Total height (H) = HFL or WL + FB ± Hs + Hw

Where, HFL = High Flood Level (for periphery dikes)

WL = Maximum Water Level in ponds (for periphery dikes)

FB = Free Board

Hs = Settlement Allowance

Hw = Allowance for Wave Action

BERM:

Berm is a step like structure constructed on the slope of a dike between its base and the crest. Berms are constructed for following purposes when there is excess soil.

1. The main purpose of Berm is to prevent the soil erosion from the slope the embankment.

- **Construction; -**
- **Construction of drainage systems**
- During construction of drainage channel the elevation of drainage channels bottom and pond bottom elevation place a vital role. The elevation of pond bottom should be above the elevation of channel bottom, so that the water can be drained completely from the pond.
- ***Construction of dykes***
All dykes should be raised dumping the earth layer by layer stretching right across the whole section and in such cases each layer should not exceed 30 cm thickness.

- When the dyke is to be constructed on a sandy, gravelly or marshy soil base the construction of **key trench** is essential to make water tight foundations.
- The key trench is a small ditch or furrow dug along the line of the centre of the walls about 0.5 to 1m wide and 0.5 m deep. This trench is filled in with a good clayey soil and is well rammed.

- **Lining of ponds and dyke**

The protection of slopes of the dyke against soil erosion is called as lining of the dykes. The following are the some of the important methods of lining

- Stone pitching
- Brick pitching
- Cement concrete lining
- Soil-cement lining
- Stone slab lining
- Polyethylene paper lining
- Grassing