CE-422

Experiment No. 3
MEASUREMENT OF CANAL SEEPAGE LOSS BY PONDING METHOD

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MEASUREMENT OF CANAL SEEPAGE LOSS BY PONDING METHOD

Objective

1) To get acquainted with the field testing procedure
2) To estimate the seepage loss in the test canal section
3) Interpretation of the test results.

Canal Seepage Loss

During the passage of water from the main canal to the outlet at the head of the watercourse, water may be lost either by evaporation from the surface or by seepage through the peripheries of the channels. These losses are sometimes very high of the order of 25% to 50% of the water diverted. Evaporation losses are generally of the order of 2 to 3 percent of the total loss and may be more but seldom exceed 7%. So the major portion of the total loss is seepage loss and a minor portion is evaporation loss.

Scope of the test

In determining the channel capacity a provision, for water loss must be made. In this regard measurement of seepage loss is very important. Moreover seepage of water from irrigation canals is a serious problem. Not only is water lost, but also drainage problems are often aggravated on adjacent or lower lands. Occasionally water that seeps out of canal re-enters the river valley where it can be rediverted, or enters in an aquifer where it can be reused. It is a more serious economic loss when the seepage losses are not recoverable. Also economic and legal problems may result from water seepage from canals causing drainage problems on the lower lying lands. So determination of canal seepage loss is of very importance to visualize the total loss as well as the other effects.

Factors affecting Canal Seepage Loss

- Type of seepage, i.e. whether "percolation" or absorption.
- Soil permeability.
- The condition of the canal. The seepage through a silted canal is less than that from a new canal.
- Amount of silt carried by the canal; the more the silt, the lesser are the losses.
- Velocity of canal water; the more the velocity, the lesser will be the losses.
- Cross-section of the canal and its wetted perimeter.

Methods of determining Canal Seepage Loss

Several methods used to measure seepage from canals are inflow-outflow, ponding method, seepage meters, laboratory tests of permeability of soil etc.

Ponding methods

The ponding measurements are well adapted to estimate the seepage loss in short canal sections. The measurement can be made by installing a check or a dam at both ends of a canal section, filling the section with water and observing the rate at which the water level recedes with time. The recession rate can be determined by plotting the water level against time and noting the slope of the resulting curve at the operating level. The seepage rate is computed as

$$S = \frac{RWL}{PL} \quad \text{---------- (1)}$$

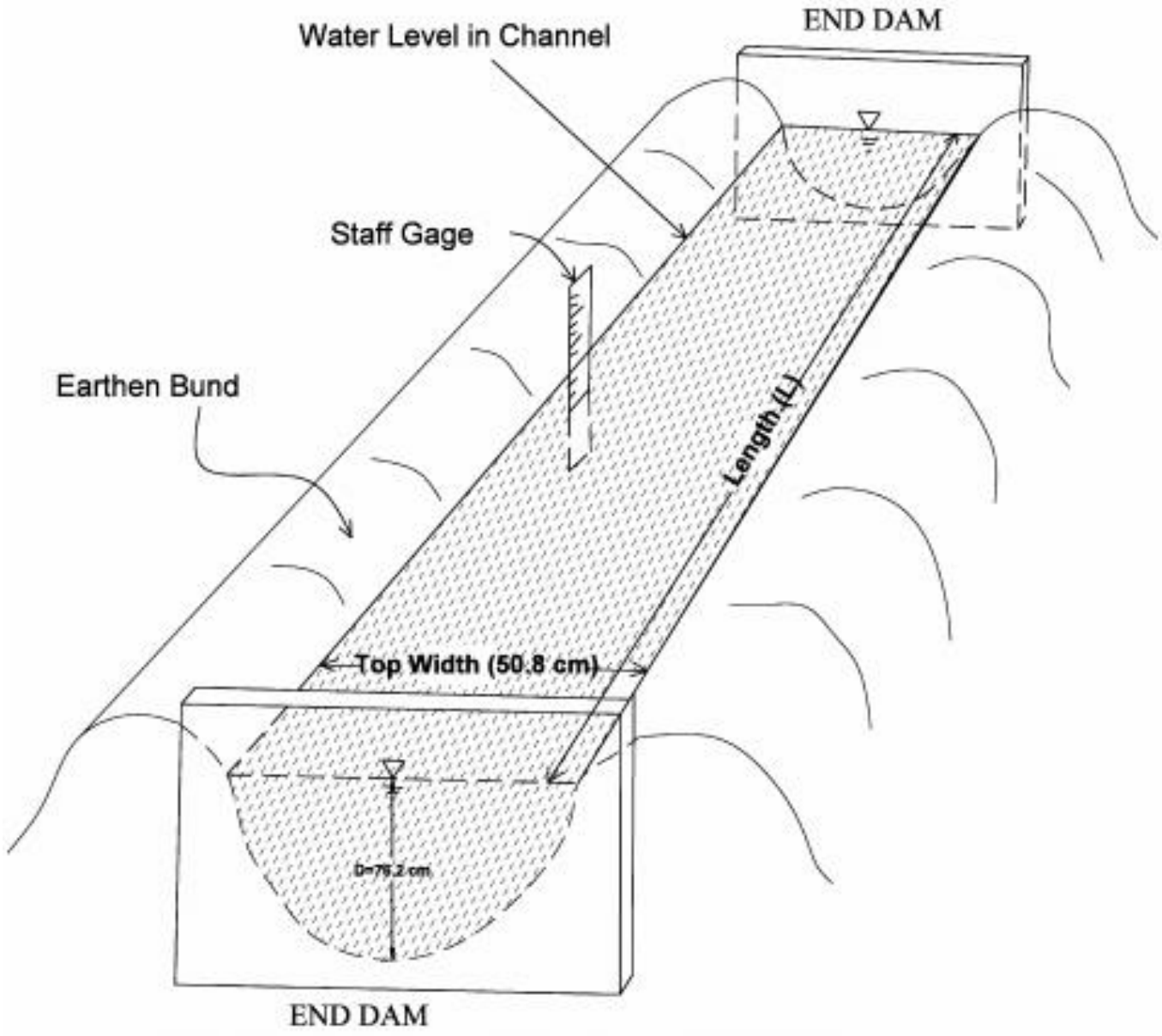
Where, S= seepage rate, m/day

R = Rate of recession or slope of water level versus elapsed time curve at operating level, m/day

W = Average top width of the water surface, m

P = Average wetted perimeter of the test section, m

L = Length of the test section, m


Water Level in Channel
END DAM
Staff Gage
Earthen Bund
Length (L)
Top Width (50.8 cm)
D=76.2 cm
END DAM

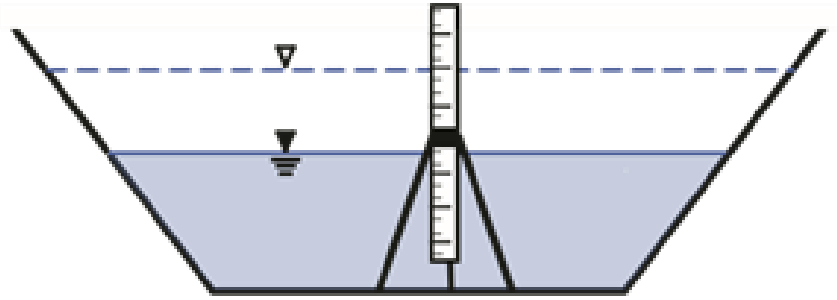


Fig: water level measuring at dam.


4.90
4.80
4.70
4.94
4.92
4.88
4.86
4.84
4.82
4.78
4.76
4.74
4.72
4.68

Procedure

1) At first construct a dam or check at the both ends of a short reach of the canal.

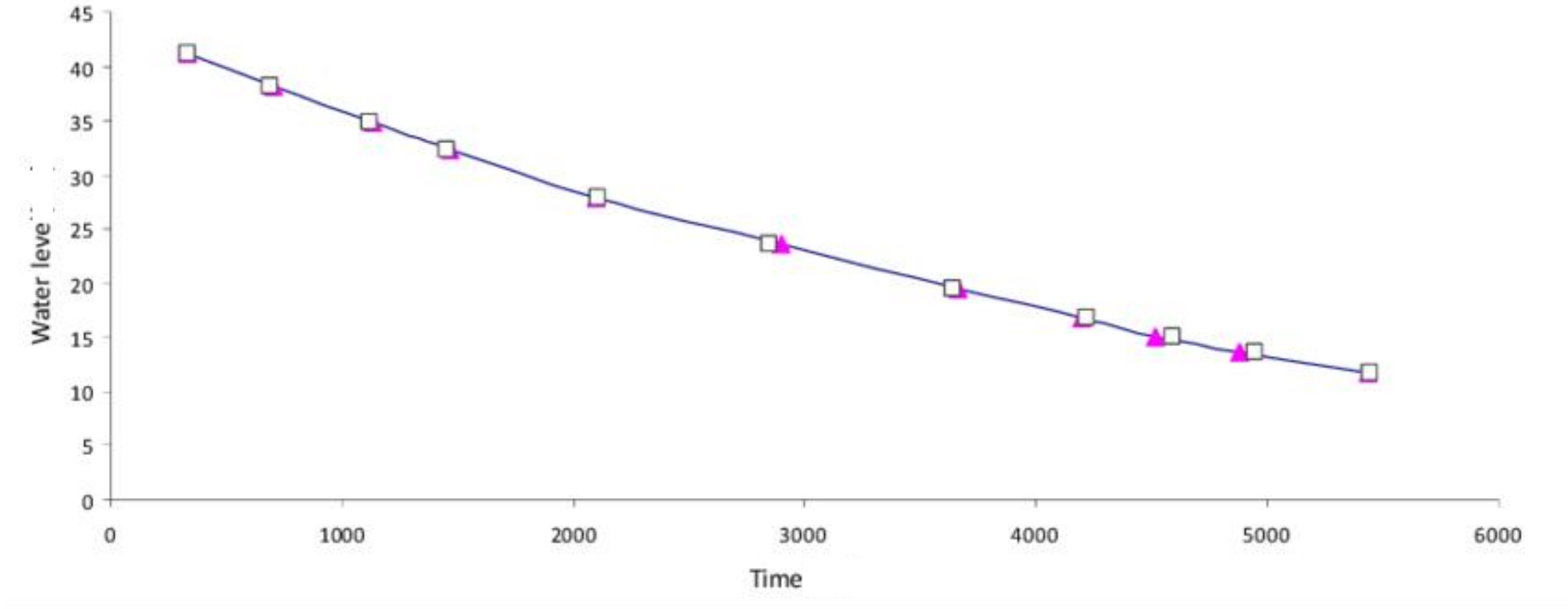
2) Fill the section with water

3) Observe the rate at which the water level recedes with time.

4) Plot the water level against time

5) Find the slope of resulting curve at operating level. The value of the slope is called recession constant.

6) Determine channel seepage loss using equation (1).


45
40
35
30
25
20
15
10
5
0
0
1000
2000
3000
4000
5000
6000
Time

Data Sheet

MEASUREMENT OF CANAL SEEPAGE LOSS BY PONDING METHOD

A. Test Section Characterization

Canal: _____ Section No: _____

Soil Type: _____

Canal condition:_____

Section Length: _____ Operating Level: _____

B. Cross-sectional Profile:

Cross section 1 Cross section 2 Cross section 3

W= _____ W= _____ W= _____

Average width, w= _____

Time			Scale Reading	Water Level (mm)
Actual time	Difference(min)	Cumulative		
