SOME MANUAL METHODS OF RECORDING MAXIMUM WATER LEVEL.

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INTRODUCTION

Maximum, or peak, water levels may be determined by at least three common methods - viz. (a) automatic recording, (b) flood debris marks, and (c) manual recording.

Several types of manual recording installations are here briefly described and commented upon.

These may be classified as follows:-

1. Float and ratchet type.
2. Cup type.
3. Soluble paint types.
   - (i) strip method,
   - (ii) pole and sheath method -
     - individual pole
     - poles in series.

FLOAT AND RATCHET TYPE

This is shown in Fig.1 and requires little description. It is made of wood and each notch has a vertical interval of 0.2 ft. The minimum error in water level determination is therefore 0.2 ft. It is costly to make and, at many sites, is difficult to install satisfactorily. Naturally, the float is readily subject to interference so that a large degree of uncertainty accompanies its use. Overall it can only be classed as unsatisfactory.

CUP TYPE

Full details of this (Fig.2) are contained in a plan distributed by Soil Conservation and Rivers Control Council under the title "Jones Type".

As cup rims have a vertical interval of 0.1 ft., this figure is approximately the minimum error in water level determination. Where sediment is involved it is important to have the base of the sheathing pipe open so that it is self cleansing. Sediment will settle in the cups, and this is a good thing if inspection is delayed for some time after a fresh. For, if air temperatures are high, evaporation is rapid and only the sediment remains to indicate maximum water level. Where little or no sediment occurs in the water it is well to remember that evaporation can destroy the record of peak water level.

In Fig.2 the cup cable is housed in a 3" diameter pipe the outside of which is marked as a staff gauge. As long as the neoprene cups have a watertight seal with

Fig. 1

Float

and

Ratchet

Recorder

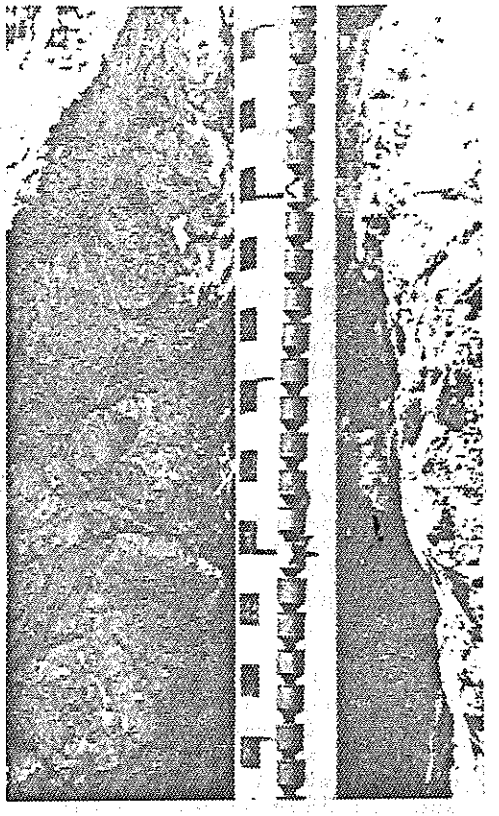


Fig. 2
Cup Type recorder: 3" diam. pipe, marked as a staff gauge, showing cable with series of neoprene cups withdrawn from pipe. At each foot level there is a red cup marked to correspond with staff gauge outside; other cups are black.

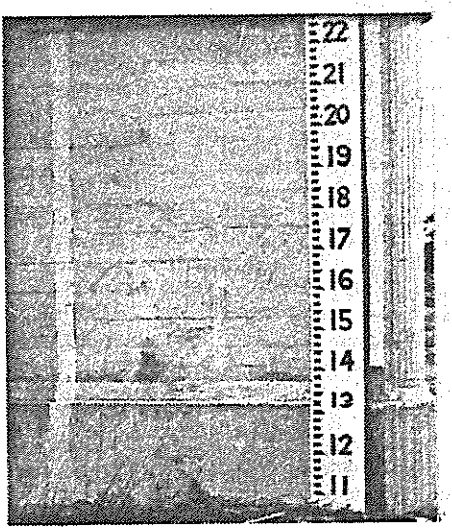
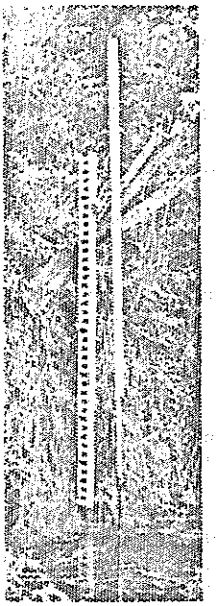


Fig. 3
On indicator strip adjoining staff gauge the soluble paint has been washed off (by the photographer) to the 14ft. level. The second strip is more sheltered from rain.

Fig. 4

Pole and sheath recorder adjoining a temporary staff gauge. The sheath has been raised to show the water soluble paint.



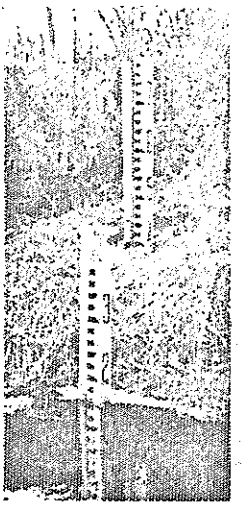


Fig. 5

Pole and sheath recorders adjoining stepped staff gauges.

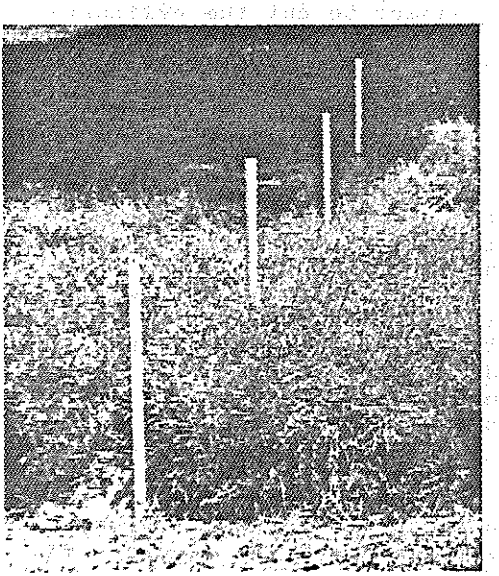


Fig. 6

Pole and sheath recorders in a vertical series.

the cable this installation is very satisfactory.

SOLUBLE PAINT TYPES

The water-soluble paint used is based on dextrin, a vegetable starch. Incorporated in the paint ("Kumzoff") now in use in Hawke's Bay, is a water-soluble red dye. In the event of the paint not washing off sufficiently to clearly indicate water level - and this is likely if the paint has not been thoroughly mixed prior to application - the solution of the red dye will indicate maximum water level.

Strip Method -

This is particularly suitable for bridge piers, where the paint is sheltered from rain (Fig.3). In Hawke's Bay the practice has been adopted of firstly painting a glossy black strip on the pier to which the Kumzoff is applied. The indicator strip should be sited close to a staff gauge, and if adjoining, on the downstream side of it for preference, so that the gauge does not become stained by the red dye. Fig.3 shows an indicator strip adjacent to the staff gauge and another indicator strip farther away but more sheltered.

Pole and Sheath Method -

Kumzoff is applied to suitable poles which are firstly painted glossy black. To shelter the Kumzoff from rain, the indicator poles are covered with metal sheathing. In Hawke's Bay this has been made up in 8 ft. galvanised cylinders, 2½" in diameter, (not tapered as for down piping). Each length is sealed at both ends. In the field it is only necessary to cut the cylinders in half, or to the required lengths, and each sheath then has a sealed end. There is very little wastage. Near the top of each sheath several holes are punched to permit the escape of displaced air.

Fig.4 illustrates an individual indicator pole adjoining an 8 ft. staff gauge at an investigation site. The pole is 1 inch galvanised piping. At another investigation site where the staff gauges are stepped (Fig.5), the indicator poles are installed in like manner to facilitate the determination of maximum stage.

Particularly for the determination of high water gradients it is often desirable to install several groups of indicator poles in vertical series (Fig.6). For this method steel waratah standards are very suitable as indicator poles. It is important when driving them that the longest steel rib points downstream parallel with the line of flood flow at that point. Under water pressure this permits the sheath to rest firmly against the other two equal ribs. Otherwise, considerable agitation of the sheath takes place and results in excessive internal wave action which reduces the accuracy of water level determination.

Where sediment deposition is likely about the indicator poles the base of the sheath needs to be well

clear of the ground surface. The sheath may be wired at the base to the indicator pole.

A level value (in terms of the site survey) should be obtained for the top of each indicator pole to facilitate the determination of peak stage.

When carefully installed and results are interpreted with caution this simple method has much to commend it.

Notes on other useful methods of recording maximum water level would be welcomed for publication.

Ed.

NOTES

ANALYSIS OF RIVERBED MATERIALS BY PHOTOGRAPHS

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A knowledge of river bed materials is basic for the study of channel characteristics and stability.

The method of taking satisfactory riverbed photographs is quick, simple and cheap and can be carried out by an unskilled person without any knowledge of photography. The equipment consists of a camera, tripod and scale frame. The tripod is necessary to get the camera axis truly vertical and needs to be about seven feet high to allow a sufficiently representative area of bed material to be photographed. Any of the common types of camera may be used with satisfactory results and when full plate enlargements are made a permanent record is obtained that can be studied and analysed in the office.

From the photographs various types of information may be taken, some of which are listed below.

1. By counting the stones per unit area a "photo average size" can be determined that appears, at this stage, to have a good linear correlation with the sieve grading curve and the Wolman method of analysis.

2. The roundness of the stones may be determined directly.

3. It is hoped to be able to determine the "sphericity" of the stones by measuring the axes appearing in the photographs.

4. Some idea of the cementing of the bed material may be obtained but no actual figures can be placed on the degree of cementing.