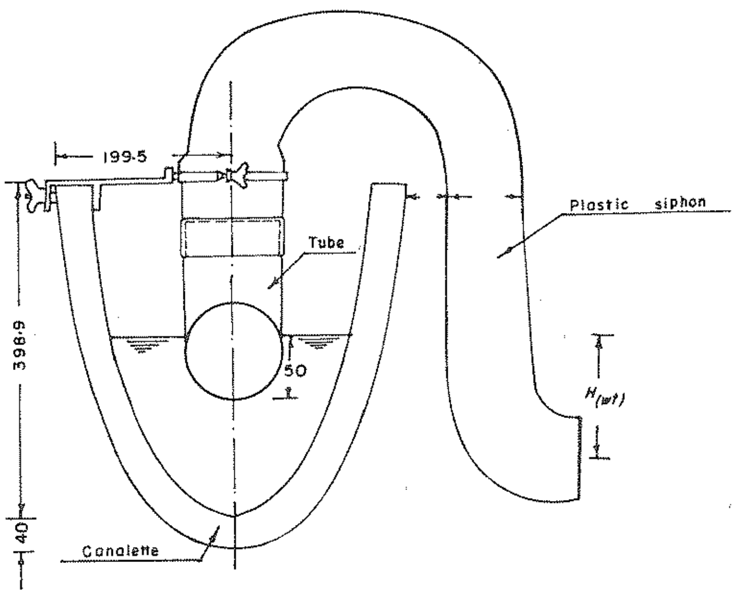
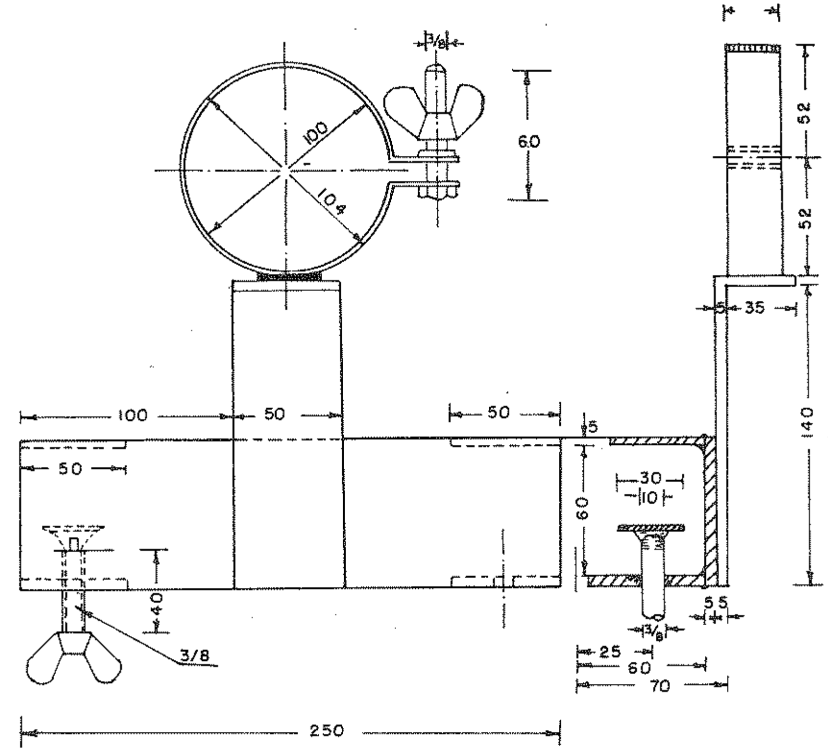
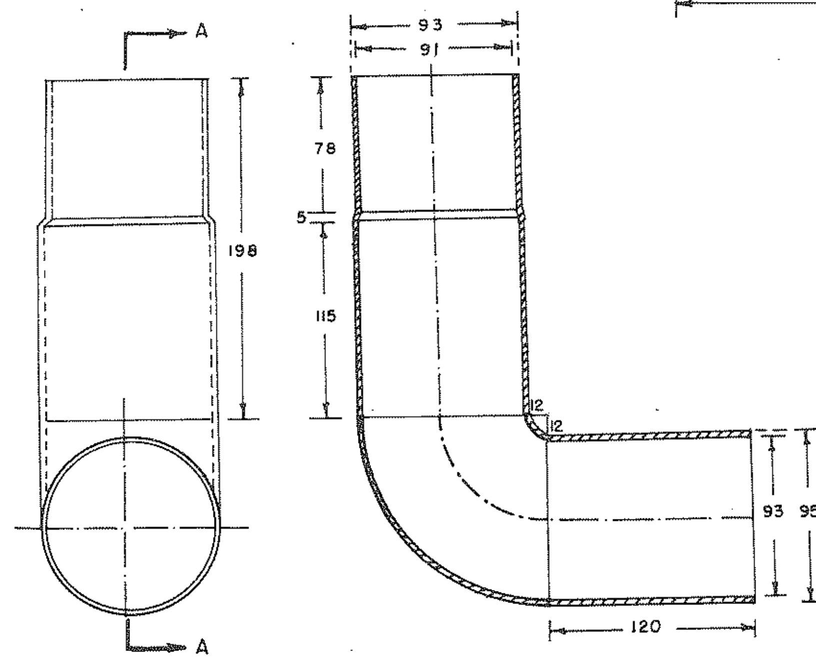


Section



Structural detail to fix the siphon

Note:- All dimensions are in mm.



Section A–A

The detail of tube

F A O – I C I D

PLASTIC SIPHON OUTLET FITTED WITH AN INTAKE TUBE

Project, Region, Country
Turkey

Figure 5-9

the meter supply level. Even at the 3 inch control level the error increases to 6.7% at 42 l/s (1.5 ft^3/s).

The accuracy also drops off sharply for discharges lower than the minimum indicated above. For this reason the small meter is not suitable for measuring flows to areas under 2 ha (5 acres).

Considerable care should be taken to provide accurate setting of the wheel and clearance between the wheel and emplacement. The bottom clearance is the most critical. A clearance of 2.54 cm (1 inch) instead of the standard 0.64 cm (0.25 inch) would increase the volume passed by more than 10%.

For free outfall conditions, a "Pelton Wheel" situation occurs if the canal level is more than 76.2 cm (30 inches) above the upstream floor. A jet flow develops under the wheel without completely filling the swept volume beneath the vanes and drum such that the actual volume passed can be as much as 10% less than the rated volume.

This outlet is not suitable for canals carrying silt charged water as it cannot draw its share of the silt.

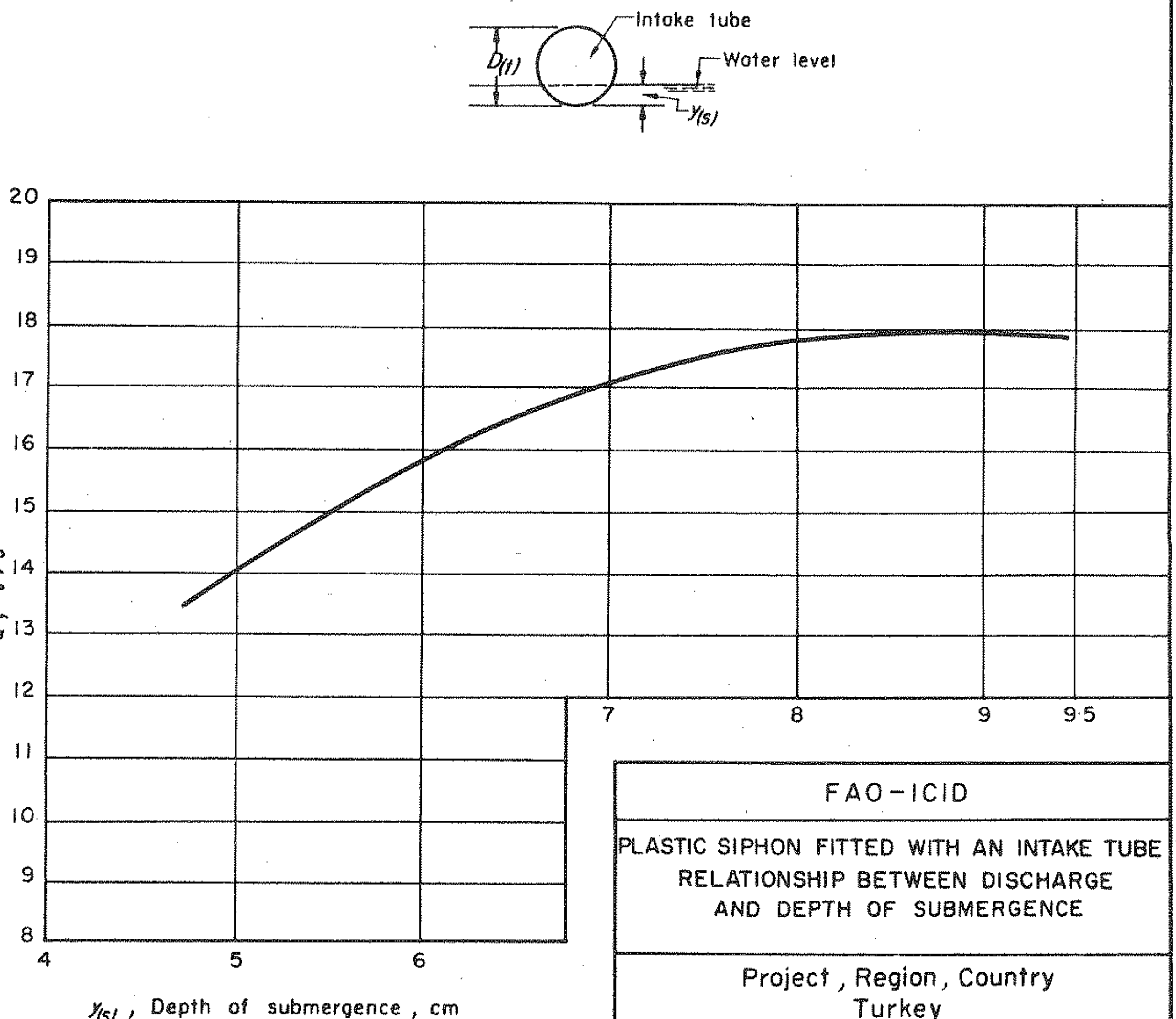
5.6 PLASTIC SIPHON OUTLET FITTED WITH AN INTAKE TUBE[1/]

5.6.1 General

A Plastic Siphon Outlet fitted with an intake tube has been evolved in Turkey for delivering water to farm laterals from elevated flumed tertiary canals running under shooting flow conditions. Elevated flume irrigation systems are being increasingly used in Turkey because of the reduced construction time necessary (through prefabrication) and other economic advantages.

Delivery of the water to individual farms is effected by means of plastic siphons. Plastic siphons enable water to be delivered from any point along

[1/] Based on a note prepared by Ozden Bilen, Turkey, and supplied by the Turkish National Committee, ICID.



FAO-ICID

PLASTIC SIPHON FITTED WITH AN INTAKE TUBE
RELATIONSHIP BETWEEN DISCHARGE
AND DEPTH OF SUBMERGENCE

Project, Region, Country
Turkey

Figure No. 5-10

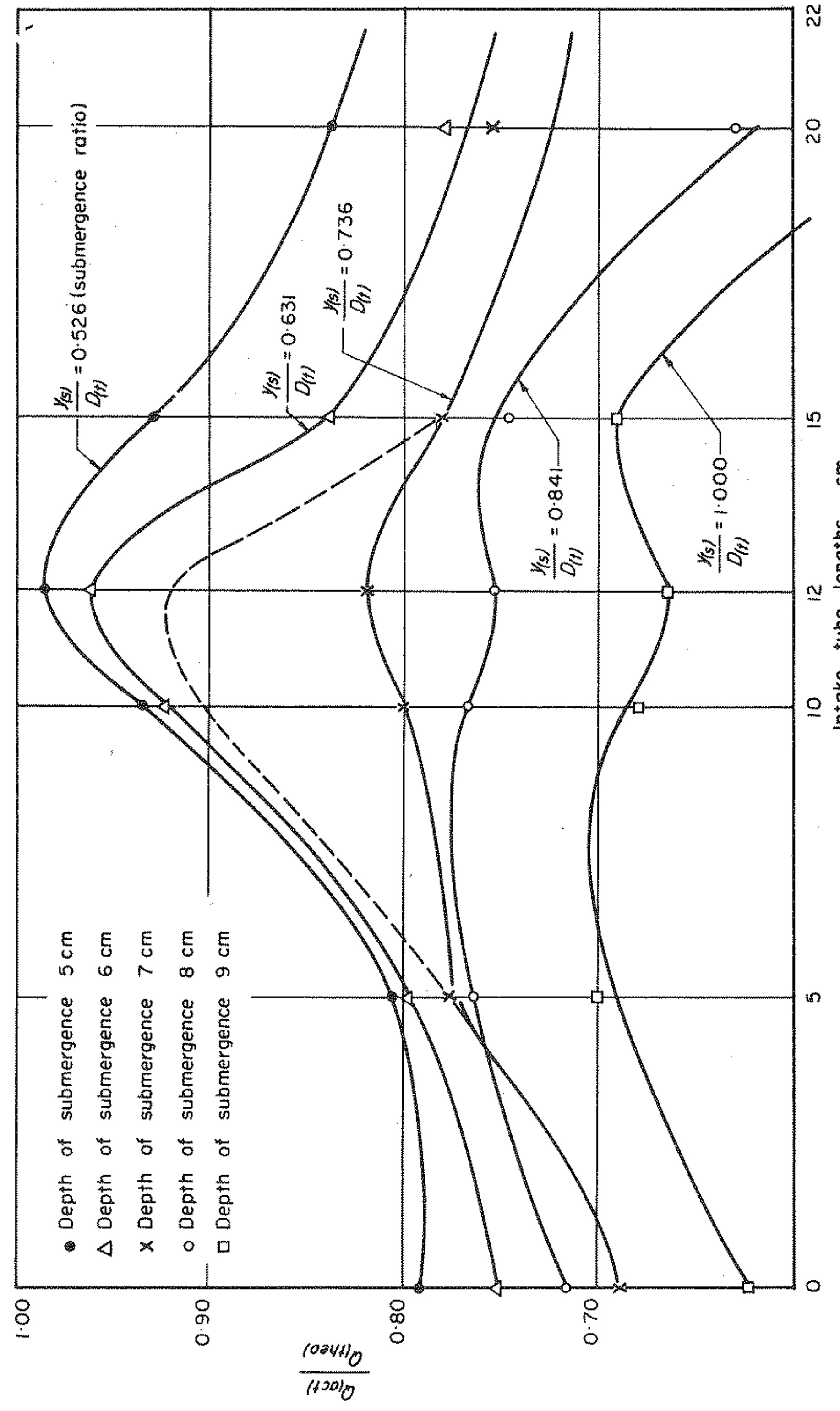


FIGURE 5-11. - Plastic siphon fitted with intake tube - Efficiency of siphon.

canals and thus they are adaptable to a wide range of farm layouts.

Economically, relatively steep slopes and high water velocities in elevated flume type tertiaries are desirable; on the other hand, this creates difficulty in withdrawing water under shooting flow conditions. To overcome this problem, the dynamic head ($\frac{v^2}{2g}$) developed by the velocity of flow in an elevated flume, has been utilized by connecting intake tubes to the siphons.

5.6.2 Structure

The outlet consists of a plastic siphon with an intake tube 12 cm long and 9.3 cm inside diameter (Figure 5-9).

The siphon is fixed to the sides of the elevated flume by means of a steel ring (2 mm thick) and mild steel plates (5 mm thick) as shown in Figure 5-9. The means for fixing the siphon is easily adjusted for different depths of submergence. The siphon has a free flow and discharges either directly into the farm lateral or into a small masonry or concrete receptacle from where the water flows on to the farm lateral. With this device it is possible to withdraw about 18 l/s of water under shooting flow conditions.

5.6.3 Hydraulics

The angle between the siphon inlet and the intake tube has been selected at 90^{o}. The discharge capacity of the siphon decreases with the increase of this angle.

Figure 5-10 is a graph, developed from experiments, which shows the relation between discharge and depth of submergence. Figure 5-11 is a graph showing the relationship between the length of the intake tube and the efficiency of the siphon (ratio between the actual and theoretical discharges) for depths of submergence from 5 cm to 9 cm. The graphs are valid for an intake tube length of 12 cm and siphon of inside diameter of 9.3 cm. It will be seen from Figure 5-11 that with an intake tube of 12 cm in length and a depth of submergence of 5 cm (corresponding to $\frac{y_{(s)}}{D_{(t)}} = 0.552$) gives an efficiency of 98%. In the case of complete submergence ($\frac{y_{(s)}}{D_{(t)}} = 1.00$) efficiency is 66%. It is advisable to use a submergence depth between 5 cm and 8 cm.

In practice the water velocity under shooting flow conditions in tertiary canals varies between 2.5 m/s to 3.5 m/s, and the graphs in Figures 5-10 and 5-11 give satisfactory results and are valid for this velocity range.

5.6.4 Design

The submergence depth for a given discharge to be passed for a tube with an inside diameter of 9.3 cm is found from Figure 5-11. For this submergence depth and the adopted tube length, the efficiency of the outlet, as explained in 5.6.3, is found. This efficiency should be as high as possible.

For example:

let	Q of the outlet be	15 l/s
	diameter of inlet tube be	9.3 cm
	length of inlet tube	12 cm

From Figure 5-10, submergence depth for a discharge of 15 l/s = 5.5 cm. The efficiency for this design is about 97.5%.

5.7 OPEN FLUME OUTLET (INDIA AND PAKISTAN) [1/]

5.7.1 General

The open flume outlet is widely used with success in Punjab, Haryana and some other states of India, and the provinces of Sind and Punjab of Pakistan. (See Figure 5-12)

The earlier types of outlets developed in India - Kennedy's sill outlet, Kennedy's gauge outlet, the Harvey outlet, the Harvey Stoddard irrigation outlet - have been superseded either due to their not having been immune to

[1/] Based on a note prepared by A.D. Choudhry, Chief Engineer, Irrigation Works, Haryana (India), and K.C. Gupta, Executive Engineer, Central Designs Irrigation Works, Haryana (India).