

TRAPEZOIDAL FLUMES FOR MEASURING FLOW IN OPEN CHANNELS SUCH AS IRRIGATION DITCHES, INDUSTRIAL EFFLUENT DITCHES AND SMALL STREAMS.

INTRODUCTION

Trapezoidal flumes were developed for use in agriculture and have been used for many years by the Agricultural Research Service, U.S. Dept. of Agriculture. Experience has shown that the trapezoidal flume is particularly good for measuring small flows.

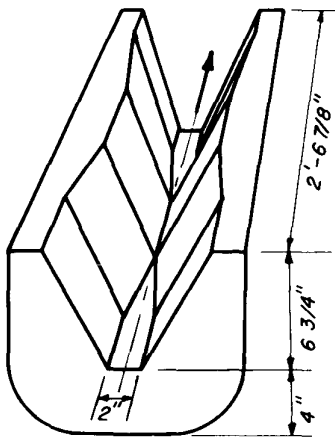
The shape is similar to many concrete lined ditches and close to that of many earthen ditches, so little or no transition is required. The sloping sides permit a very wide range of measurable flow and cause a minimal backwater, thus permitting a shallower ditch than with flumes that have rectangular throat sections. The fact that a trapezoidal flume will pass trash quite readily is of considerable importance in many applications.

DESIGN AND SIZE

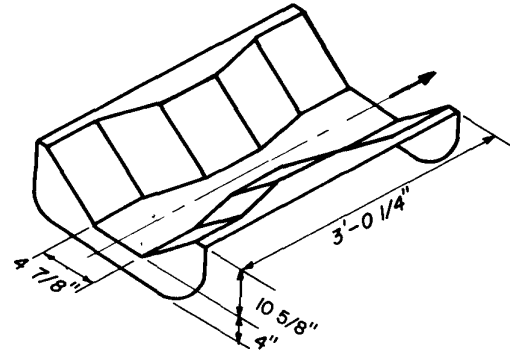
It is of particular interest to many users that the trapezoidal flume has a straight through bottom, that is, the bottom is not raised nor is there a drop in the bottom. This fact alone greatly reduces the problem of silt building up upstream of the flume.

Plasti-Fab offers three sizes of trapezoidal flumes as follows:

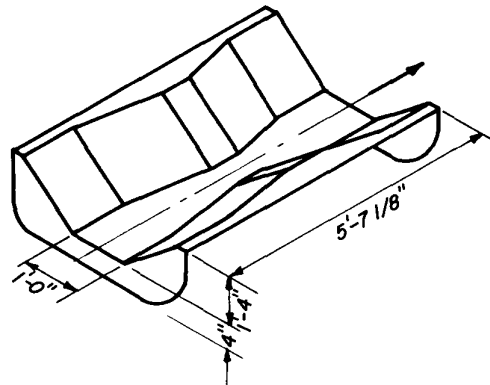
- a. **LARGE 60° V** having a capacity range of 0.01 to 0.2 CFS.



- b. **2" 45° WSC** with 45° side slope having a capacity range of 0.025 to 1.8 CFS.



- c. **12" 45° SRCRC** with 45° side slope having a capacity range of 0.16 to 7.1 CFS.



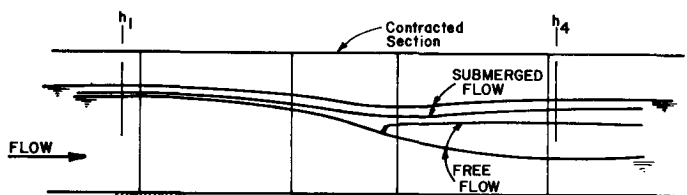
OPERATION

Plasti-Fab trapezoidal flumes are supplied with a head gage at the inlet and this location is called h_1 . There is also a head gage near the flume outlet which is referred to as h_4 .

Whenever possible the flume should be operated under "free flow" conditions at which time the flow may be figured directly from the h_1 gage. If it is necessary to raise the flume above the ditch bottom to assure free flow, this is permissible and will not affect the flume accuracy. (See Installation)

As a general rule you may consider the flume to be operating in a free flow condition when the level at h_4 is less than 70% the level at h_1 . (Use 80% as the error is small between 70% and 80%.)

If the downstream depth is too great (approximately 80% of h_1 , or more) the flume is said to be operating in a state of submerged flow and it is necessary to use the gage readings h_1 and h_4 and make corrections from tables. The flow diagram below shows the profile of free flow and submerged flow. Note that when operating at free flow there is a high velocity jet pattern as the water passes through the throat, but as the flow becomes submerged the velocity in the throat decreases appreciably and the head increases at h_1 . By reading the depth gages at h_1 and h_4 you may determine flow by using the depth at h_1 and making corrections as shown on a submergence flow correction curve or chart.



INSTALLATION

Flumes should be installed level. Occasionally flumes are installed with a slight slope at which time it is necessary to adjust the head gages so that zero level is at the same elevation as the flume throat.

If the flume is installed in an earth ditch the flume bottom should always be placed higher than the ditch bottom. If the flume is installed in a concrete ditch having a flat slope, that may cause submergence, then the flume should also be raised above the bottom.

USEAGE

The trapezoidal flume will probably continue to be used primarily in agriculture, but there are many uses in industry where it may be a wise choice. These may include monitoring flow in earthen ditches, channels where flow is very low or where channels are shallow and minimal upstream head is desired.

ACCESSORIES

Plasti-Fab trapezoidal flumes can be supplied with attached floatwells, taps for attaching separate wells, ultra sonic transducer support brackets and other special features for your particular needs.

FLUMES — GATES — WEIRS — BAFFLES

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Printed in U.S.A.

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BUL. T-1

RO 5M 5/95