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INSTALLATION AND FIELD USE OF CUTTHROAT FLUMES FOR WATER MANAGEMENT

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INSTALLATION AND FIELD USE OF CUTTHROAT FLUMES FOR WATER MEASUREMENT

Water Management Technical Report No. 19

by

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ABSTRACT

INSTALLATION AND FIELD USE OF CUTTHROAT FLUMES FOR WATER MEASUREMENT

The Cutthroat flume has been developed for operation under both free flow and submerged flow conditions. The flume has a flat bottom and vertical walls. The most obvious advantage of a Cutthroat flume is economy, since fabrication is facilitated by the flat bottom and removal of the throat section. Another advantage is that any particular flume length has the same convergence, divergence, and wall lengths, thereby allowing the same forms or patterns to be used for any throat width. The use of a consistent geometric shape has facilitated the development of generalized free flow and submerged discharge relations using both English and metric units. Any flume length between 1.5 feet (0.45 meter) and 9 feet (2.7 meters) can be used, while throat widths between 1 inch (2.5 centimeters) and 6 feet (1.83 meters) have been investigated. The differences between free flow and submerged flow conditions are described, together with the necessary criteria for determining which flow regime exists. The transition submergences are listed for the range of flume sizes investigated. For free flow, the ratio of inlet flow depth to flume length should preferably be less than 0.4, while for submerged flow, the accuracy of discharge measurement rapidly deteriorates above submergences of 95 percent. Examples are given which illustrate the design procedure for determining flume size, as well as obtaining the free flow and submerged flow ratings. Proper installation and maintenance procedures for Cutthroat flumes are described.

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KEYWORDS - *drainage, flow measurement, *flumes, *hydraulics, hydraulic structures, *irrigation, *measuring instruments, open channel flow, subcritical flow.

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B: Entrance and exit width for Cutthroat flume, in English units

$\overset{*}{B}$: Entrance and exit width for Cutthroat flume, in metric units

C: Free flow coefficient, for English units

$\overset{*}{C}$: Free flow coefficient, for metric units

C_1: Submerged flow coefficient, for English units

$\overset{*}{C}_1$: Submerged flow coefficient, for metric units

h_a: Upstream flow depth, in English units

h_a^*: Upstream flow depth, in metric units

h_b: Downstream flow depth, in English units

h_b^*: Downwstream flow depth, in metric units

Δh: Difference in flow depth, $(h_a - h_b)$, in English units

Δh^*: Difference in flow depth, $(h_a^* - h_b^*)$, in metric units

K: Free flow flume length coefficient, in English units

$\overset{*}{K}$: Free flow flume length coefficient, in metric units

K_1: Submerged flow flume length coefficient, in English units

K_1^*: Submerged flow flume length coefficient, in metric units

L: Length of the Cutthroat flume, in English units

$\overset{*}{L}$: Length of the Cutthroat flume, in metric units

M: Constriction ratio for Cutthroat flume, (W/B), in English units

$\overset{*}{M}$: Constriction ratio for Cutthroat flume, $(\overset{*}{W}/\overset{*}{B})$, in metric units

n_1: Free flow exponent

n_2: Submerged flow exponent

Q: Discharge through the flume, in English units

$\overset{*}{Q}$: Discharge through the flume, in metric units

S: Submergence, (h_b/h_a), for English units, or (h_b^*/h_a^*), for metric units

S_t: Transition submergence, the value of submergence at which the flow changes from free flow to submerged flow

W: Flume throat width, English units

W^*: Flume throat width, metric units

INTRODUCTION

Procedures and methods for more accurate measurement and improved management of water are continually being sought to make better use of our water resources. Of all the devices and structures developed for measuring water, measuring flumes are among the most widely accepted and used. The most common measuring flume is the Parshall flume developed by Ralph Parshall (1926) at Colorado State University.

The problem of determining the flow rate in open channels is one which has been considered for many years. The rapidly increasing value of water is commanding new interest in the development of new open channel flow measuring devices. Water measuring devices are important for: (a) water conservation; (b) equitable distribution of water; (c) determining the amount of available water; (d) meeting legal requirements; and (e) successful management of the available supply.

A water measuring flume consists of an open channel structure containing a constricted section. The constriction is formed by either raising the floor or by reducing the width between the sidewalls. The discharge characteristics are the same for both types; however, the raised floor is usually classified as a weir rather than a flume. Also, unless great care is taken in designing the raised floor section, some of the self cleaning properties may be lost.

A flow measuring device which has been recently developed is the Cutthroat flume (Skogerboe, Hyatt, Anderson, and Eggleston, 1967). The original studies have been extended by Bennett (1972) in rating a group of Cutthroat flumes which have the same geometric shape. Then, since all of the flumes are basically similar, the flow behavior, or discharge characteristics, of other Cutthroat flume sizes can be predicted. Because of this similarity, the behavior of all flumes intermediate in size to those tested is capable of being predicted within a degree of accuracy suitable for field use.

In flat gradient channels, it may be desirable to install a flume to operate under conditions of submerged flow rather than free flow in order to: (1) reduce energy losses, and (2) place the flume on the channel bed to minimize the increase in water surface elevation upstream from the flume. The purpose of the research efforts reported herein was to develop a flume which would operate satisfactorily under both free flow and submerged flow conditions.

DEVELOPMENT OF FLUME

Previous studies by Robinson and Chamberlain (1960) and Hyatt (1965) indicate that a flume having a flat-bottom is satisfactory for both free flow and submerged flow operation. The advantages of a level flume floor, as opposed to the Parshall flume with an inclined floor in the throat and exit sections, are: (a) ease of construction; (b) the flume can be placed inside a concrete-lined channel; and (c) the flume can be placed on the channel bed.

Ackers and Harrison (1963) recommend a maximum convergence of 3:1 for a flume inlet section. Experimental work indicated that this recommendation had merit, and consequently a 3:1 convergence (Fig. 1) was used in developing a flat-bottomed flume.

Studies regarding the length of the throat section, discussed in a preceding report (Skogerboe, Hyatt and Eggleston, 1967), showed that flow depths measured in the exit section of the flume resulted in more accurate submerged flow calibration curves than calibrations employing flow depth measurements in the throat section. The water surface profile changes rapidly in the throat section as compared with the exit section where the water surface profile is more nearly horizontal. Consequently, a flow depth in the exit section of the flat-bottomed flume was selected for measurement.

The earlier study by Hyatt (1965) indicated that when the divergence of the flume exit section exceeded 6:1, flow separation would occur, and a major portion of the flow would adhere to one of the sidewalls. Although numerous divergences and lengths of exit section were tested, the 6:1 divergence proved most satisfactory as a balance between flow separation and fabrication costs.

Since the downstream flow depth was to be measured in the exit section, there appeared to be no apparent advantage in having a throat section. Consequently, testirg was initiated with a flat-bottomed flume having only an entrance and an exit section. The flume performed very well. One distinct advantage of removing the throat section was improved flow conditions in the exit section. The converging inlet section tended to confine the flow into a jet which traveled along the flume centerline, thus assisting in the prevention of flow separation.

The rectangular flat-bottomed flume, which resulted from the testing program, is illustrated in Fig. 1. Since the flume has no throat section (zero throat length), the flume was given the name "Cutthroat" by the developers (Skogerboe, Hyatt, Anderson, and Eggleston, 1967).

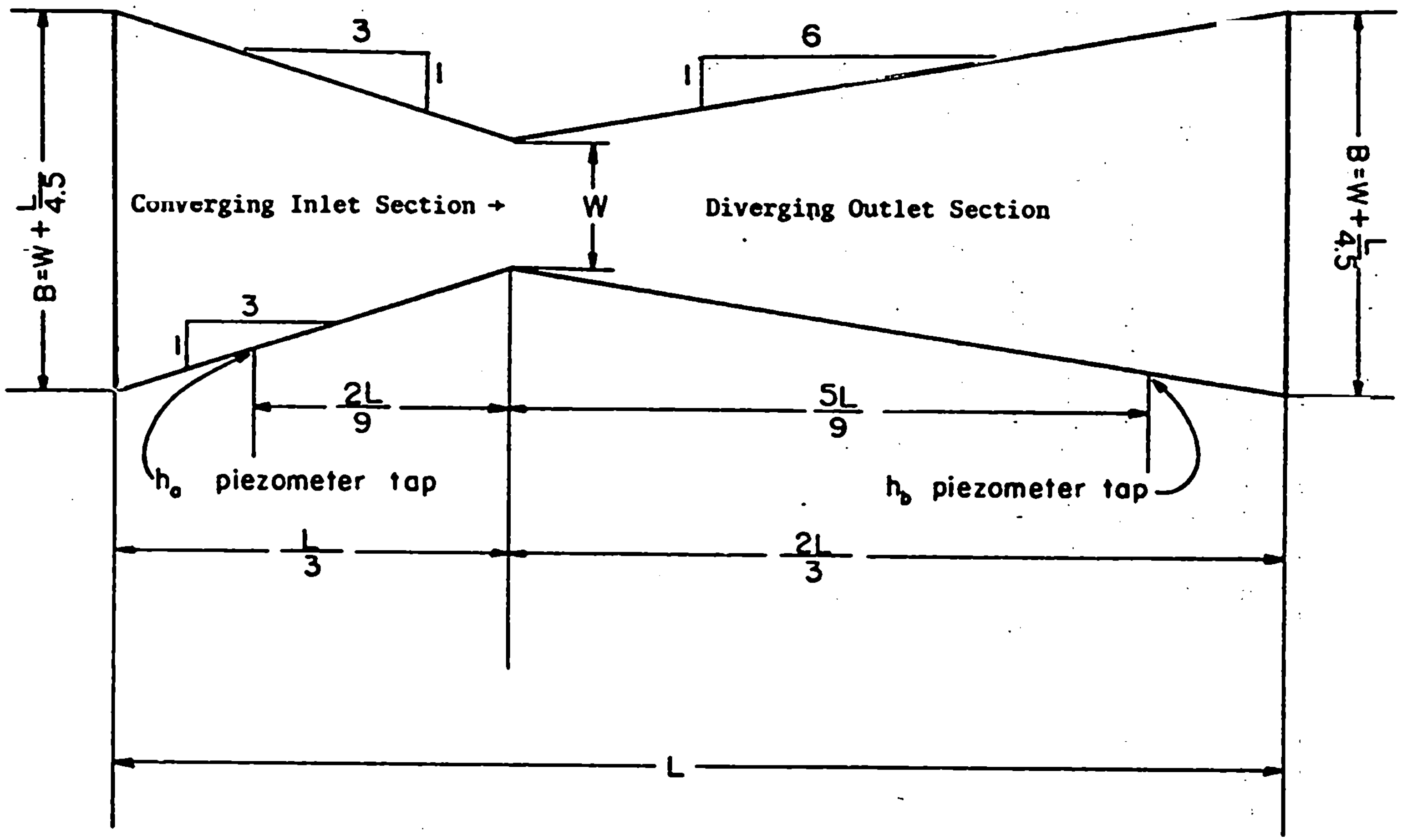


Fig. 1. Definition sketch of Cutthroat flume.

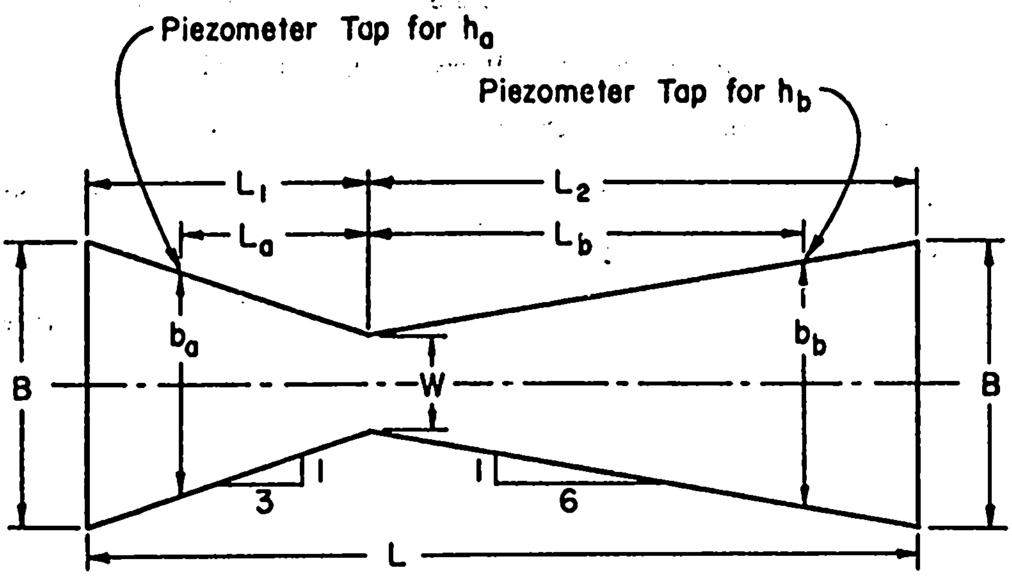
The most obvious advantage of a "Cutthroat" flume is economy, since fabrication is facilitated by a flat-bottom and removal of the throat section. Another advantage is that every flume length has the same entrance and exit section lengths, which allows the same forms or patterns to be used for any desired throat width.

The Cutthroat flume can operate either as a free or submerged flow structure as indicated in this report. Methods for obtaining submerged flow calibration curves and free flow tables are developed and their use illustrated. Discussion and examples regarding the practical aspects of installing, operating, and maintaining the structures are given.

APPROACH TO STUDY

The initial Cutthroat flume studies conducted by Skogerboe, Hyatt, Anderson, and Eggleston (1967) utilized a flume length, L, of 9 feet. The throat width, W, was varied from 1 to 6 feet, and the equations for both free flow and submerged flow conditions were developed.

An expansion of the initial studies has been recently completed by Bennett (1972). In this study, three flume lengths were used; namely, 1.5 feet, 3.0 feet and 4.5 feet. The throat widths selected were based on 4 width to length (W/L) ratios; namely, 1/18, 1/9, 2/9 and 4/9 (Fig. 2). By selecting these 4 width to length ratios, the throat widths of the flumes of any one length vary from each other by a factor of two. Also, the flumes of a given width to length ratio are scale models of each other with a scale factor of two. In addition, the smaller flumes are scale models of the larger flumes having the same width to length ratio. For example, the 2 in by 1.5 ft flume (2 in throat width, W, and 1.5 ft flume length, L) is a 1/2 model of the 4 in by 3 ft flume;



$$B = W + \frac{2}{3} L_1 = W + \frac{1}{3} L_2$$

Flume	W	L_1	L_2	L_a	L_b	L	B
3"x4.5'	3"	1'-6"	3'-0"	1'-0"	2'-5$\frac{1}{2}$"	4.5'	1'-3"
6"x4.5'	6"	1'-6"	3'-0"	1'-0"	2'-5$\frac{1}{2}$"	4.5'	1'-6"
12"x4.5'	12"	1'-6"	3'-0"	1'-0"	2'-5$\frac{1}{2}$"	4.5'	2'-0"
24"x4.5'	24"	1'-6"	3'-0"	1'-0"	2'-5$\frac{1}{2}$"	4.5'	3'-0"
2"x3.0'	2"	1'-0"	2'-0"	0'-8"	1'-7$\frac{5}{8}$"	3.0'	0'-10"
4"x3.0'	4"	1'-0"	2'-0"	0'-8"	1'-7$\frac{5}{8}$"	3.0'	1'-0"
8"x3.0'	8"	1'-0"	2'-0"	0'-8"	1'-7$\frac{5}{8}$"	3.0'	1'-4"
16"x3.0'	16"	1'-0"	2'-0"	0'-8"	1'-7$\frac{5}{8}$"	3.0'	2'-0"
1"x1.5'	1"	0'-6"	1'-0"	0'-4"	0'-9$\frac{7}{8}$"	1.5'	0'-5"
2"x1.5'	2"	0'-6"	1'-0"	0'-4"	0'-9$\frac{7}{8}$"	1.5'	0'-6"
4"x1.5'	4"	0'-6"	1'-0"	0'-4"	0'-9$\frac{7}{8}$"	1.5'	0'-8"
8"x1.5'	8"	0'-6"	1'-0"	0'-4"	0'-9$\frac{7}{8}$"	1.5'	1'-0"

Fig. 2. Dimensions of Cutthroat flumes used in experimental design.

a 1/3 model of the 6 in by 4.5 ft flume; and a 1/6 model of the 12 in by 9 ft flume. By designing the flumes using this criteria, it was possible to determine the effect of flume size on the flow conditions. Also, the development of the generalized discharge relationship among flume sizes was made possible. Furthermore, the data collected in the initial study could also be incorporated into the analysis for developing generalized discharge relations for Cutthroat flumes.

FREE FLOW ANALYSIS

Under free flow conditions, critical depth occurs in the vicinity of the flume neck. This critical depth makes it possible to determine the flow rate knowing only the upstream depth, h_a. This is possible because whenever critical depth occurs in the flume the upstream depth, h_a, is not affected by changes in the downstream depth, h_b, as shown in Fig. 3 (water surface profiles a and b), thereby resulting in a unique relation between discharge, Q, and upstream flow depth, h_a.

For free flow operation, a plot is made of flow rate, Q, against upstream depth, h_a, with Q as the ordinate and h_a as the abscissa. When these two variables are plotted on logarithmic paper, all of the points will fall on a straight line as shown in Fig. 4. The equation for this free flow rating can be written as:

$$Q = C\, h_a^{n_1} \quad \text{...........................(1)}$$

where Q = flow rate, in cubic feet per second; C = free flow coefficient, which is the value of Q when h_a is 1.0 foot; h_a = upstream flow-depth, in feet; and n_1 = free flow exponent, which is the slope of the free flow rating when plotted on logarithmic paper. Eq. 1 can be rewritten in metric units as

$$\overset{*}{Q} = \overset{*}{C}\, \overset{*}{h}_a^{\,n_1} \quad \text{...........................(2)}$$

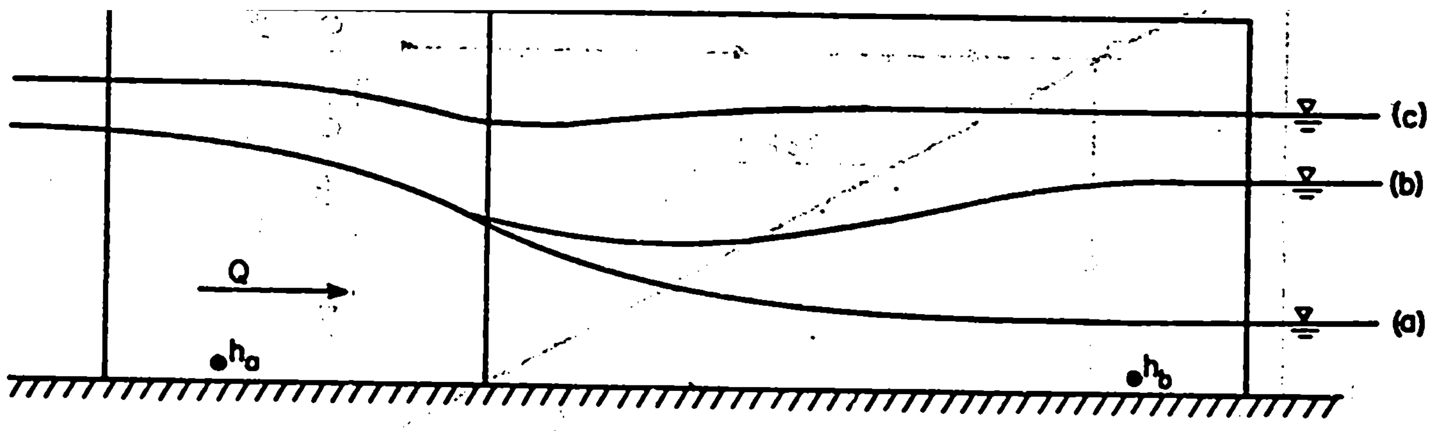


Fig. 3. Illustration of flow conditions in a Cutthroat flume.

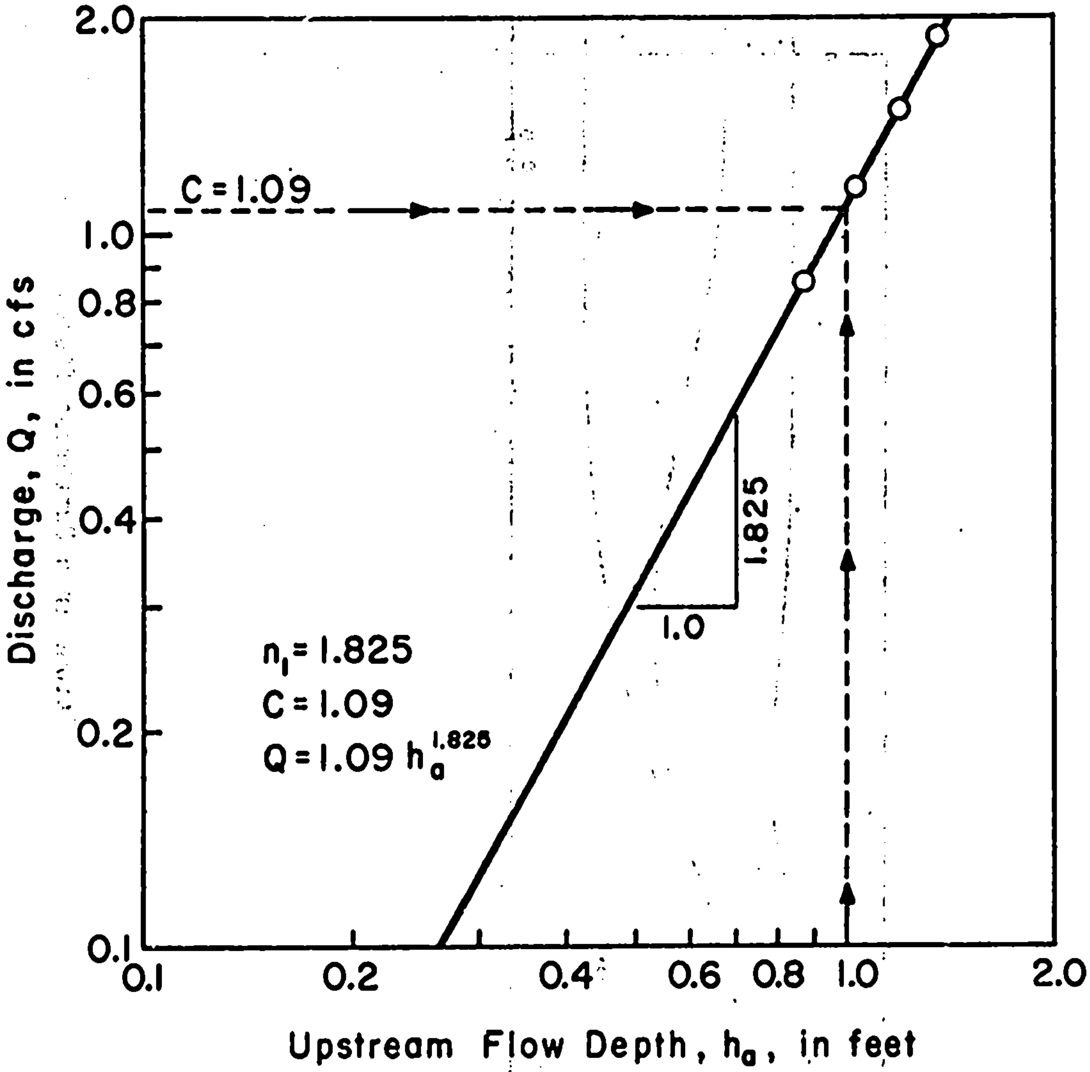


Fig. 4. Typical free flow rating curve showing actual data points and development of free flow equation.

where $\overset{*}{Q}$ = flow rate, in cubic meters per second; $\overset{*}{C}$ = free flow coefficient, which is the value of $\overset{*}{Q}$ when h_a is 1.0 meter; and $\overset{*}{h_a}$ = upstream flow depth, in meters.

The value of n_1 was found to be dependent only upon the flume length, L. Therefore, the value of n_1 is a constant for all Cutthroat flumes of the same length, regardless of the throat width, W. The values are also the same for both metric and English units. Furthermore, the values of n_1 for the flumes tested plotted on a smooth curve as shown in Figs. 5 and 6. Therefore, the value of n_1 can be determined for any flume length between 1.5 feet and 9 feet (0.45 meter and 2.7 meters) by simply reading the value from the graphs shown in Fig. 5 for English units and Fig. 6 for metric units.

The value of the free flow coefficient is a function of both flume length, L, and throat width, W. This relationship is:

$$C = K\,W^{1.025} \qquad \text{.....................(3)}$$

where C = the free flow coefficient, for English units; K = the flume length coefficient; and W = the throat width in feet. In metric units,

$$\overset{*}{C} = \overset{*}{K}\,\overset{*}{W}^{1.025} \qquad \text{.....................(4)}$$

where $\overset{*}{C}$ = the free flow coefficient for metric untis; $\overset{*}{K}$ = the flume length coefficient for metric units; and $\overset{*}{W}$ = the throat width in meters. The values of K can be obtained from Fig. 5, while the value of $\overset{*}{K}$ is obtained from Fig. 6.

Having obtained the values for n_1 and C for the flume being used, the discharge can now be calculated for any h_a by using Eq. 1 or 2, provided free flow conditions exist in the flume. For accurate discharge measurements, the recommended ratio of flow depth to flume length (h_a/L) should be equal to or less than 0.4, with increasing

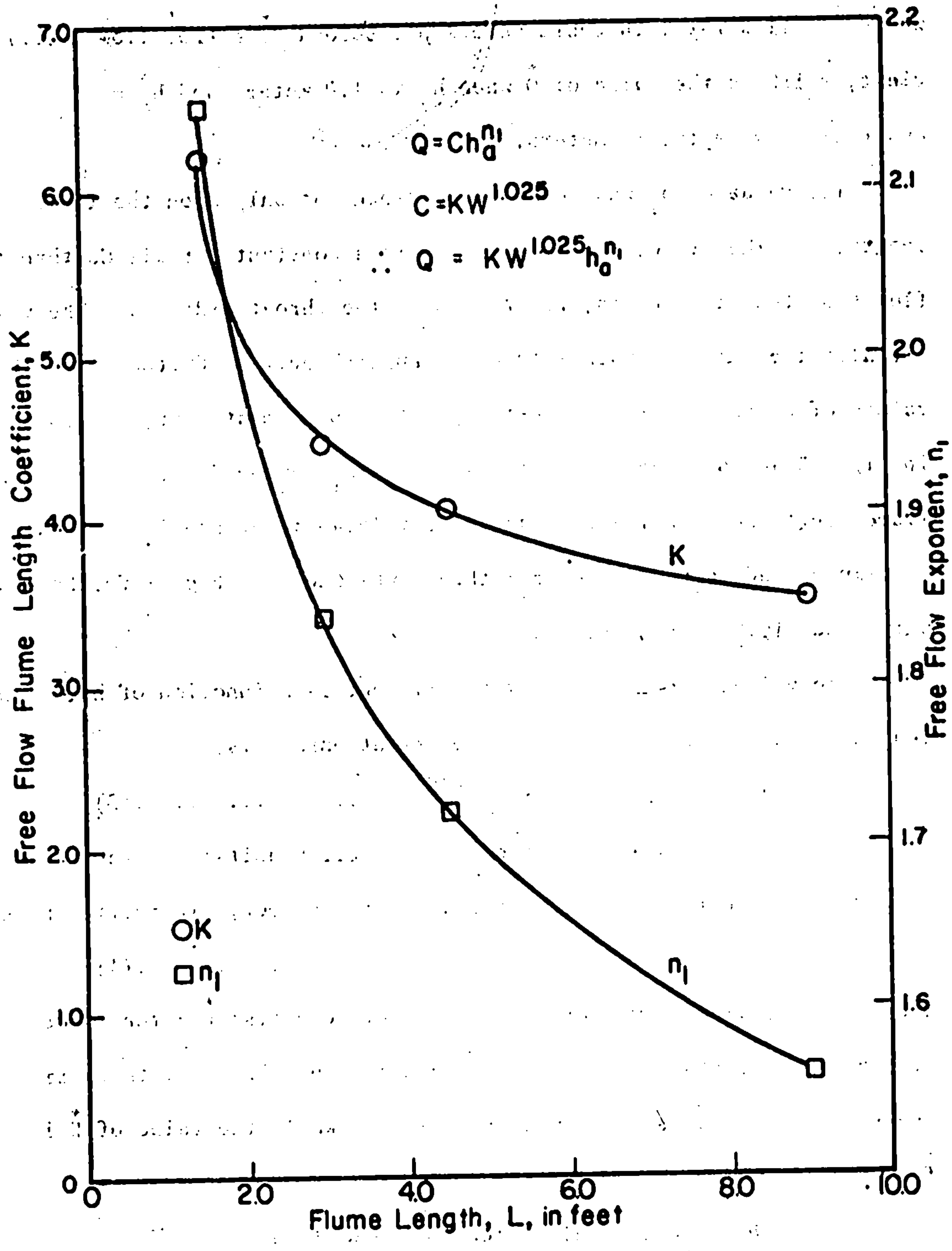


Fig. 5. Generalized free flow ratings for Cutthroat flumes, in English units.

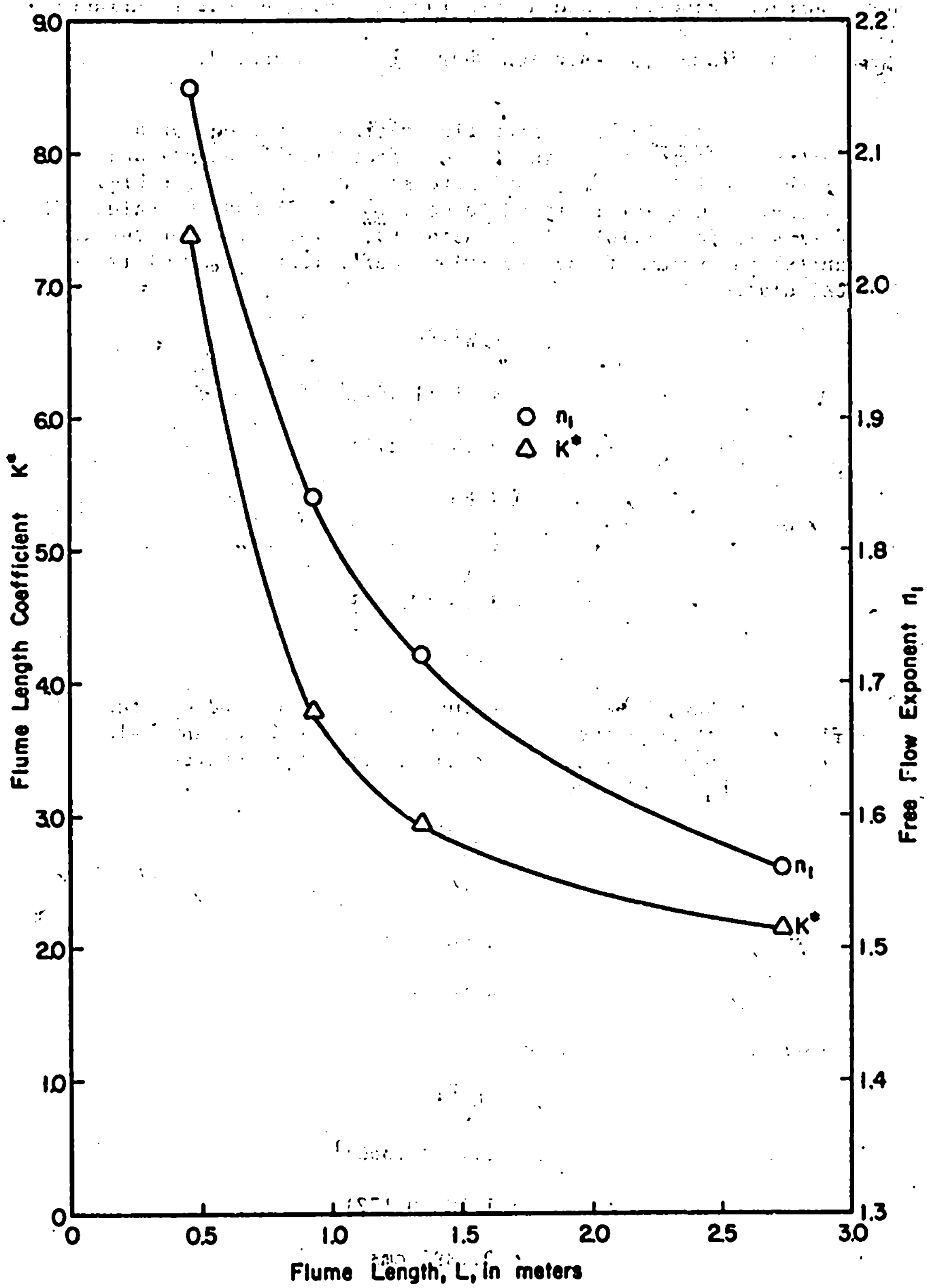


Fig. 6. Generalized free flow ratings for Cutthroat flumes, in metric units.

values of this ratio resulting in greater inaccuracies because of higher approach velocities and a more rapidly changing water surface profile at the flume cross-section where h_a is measured.

Example 1. A free flow rating is needed for a Cutthroat flume of length, L = 4.0 feet (1.219 meters) and width W = 1.167 feet (0.356 meters). From Fig. 5 (or Fig. 6) the value of n_1 is found to be 1.75 (1.75) and the value K is 4.15 ($\overset{*}{K}$ = 3.16). Then, using Eq. 3 (or Eq. 4 for metric units) the value of the free flow coefficient, C (or $\overset{*}{C}$) is calculated.

$$C = K\,W^{1.025}$$

$$= 4.15\,(1.167)^{1.025}$$

$$= 4.15\,(1.172)$$

$$= 4.86$$

$$\overset{*}{C} = \overset{*}{K}\,(0.356)^{1.025}$$

$$= 3.16\,(0.347)$$

$$= 1.10$$

Now, knowing the values of n_1 and C (and $\overset{*}{C}$), the flow rate through the flume can be calculated for any value of h_a (or $\overset{*}{h}_a$) using Eq. 1 (or Eq. 2 for metric units). Assuming h_a = 1.20 feet

$$Q = Ch_a^{n_1}$$

$$= 4.86\,(1.20)^{1.75}$$

$$= 4.86\,(1.38)$$

$$= 6.70 \text{ cfs}$$

Assuming $\overset{*}{h}_a$ = 0.366 meters

$$\overset{*}{Q} = Ch_a^{n_1}$$

$$\overset{*}{Q} = 1.10\,(0.366)^{1.75}$$

$$= 1.10\,(0.172)$$

$$= 0.1892 \text{ cms}$$

SUBMERGED FLOW ANALYSIS

When the flow conditions are such that the downstream flow depth, h_b, is raised to the extent that the flow depths at every point through the structure become greater than critical depth, resulting in a change in the upstream depth, then the flume is operating under submerged flow conditions as shown in Fig. 3 (water surface profile c). A flume operating under submerged flow conditions requires that two flow depths be measured, one upstream, h_a, and one downstream, h_b, from the flume neck. The submergence, S, is defined as the ratio, often expressed as a percentage, of the downstream depth to the upstream depth.

$$S = h_b/h_a \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Submerged flow calibration curves are determined for the Cutthroat flume by preparing three-dimensional plots of the parameters describing submerged flow. The data is plotted on logarithmic paper with the discharge, Q, as the ordinate; difference in upstream and downstream depths of flow, h_a-h_b, as the abscissa; and the submergence, h_b/h_a, as the varying parameter (Fig. 7). Lines are then drawn connecting points of equal submergence. These are straight lines having a slope identical to the slope of the free flow rating curve (which is n_1) for the same geometry.

From the submerged flow plots, an equation has been developed (Skogerboe, Hyatt, Anderson, and Eggleston, 1967) which describes the flow rate through the Cutthroat flume. The equation is:

$$Q = \frac{C_1 \ (h_a-h_b)^{n_1}}{(-\log S)^{n_2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

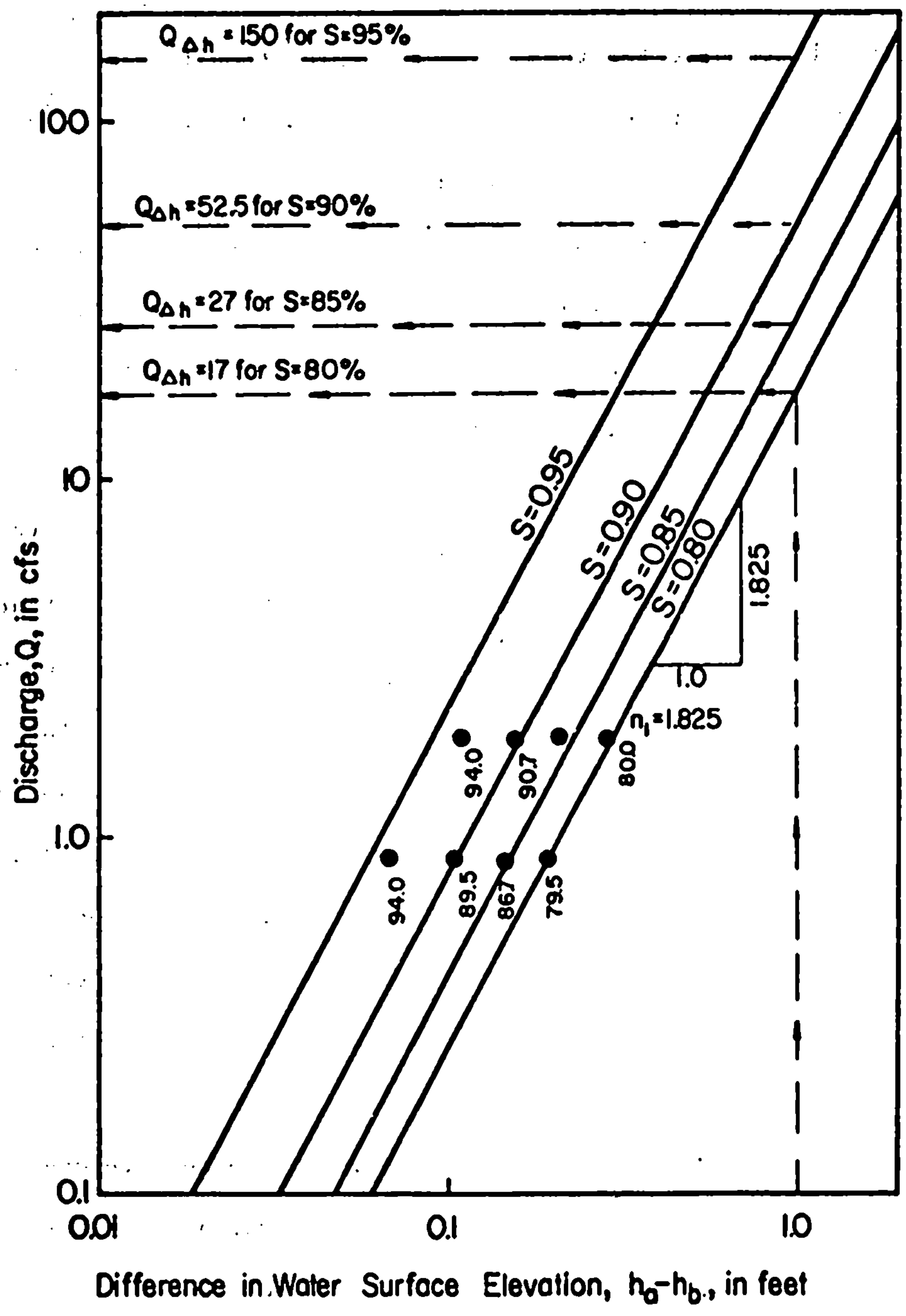


Fig. 7. Typical submerged flow rating curve

where h_b = downstream flow depth, in feet; C_1 = submerged flow coefficient for English units; and n_2 = submerged flow exponent. The same equation can be written in metric units as

$$\overset{*}{Q} = \frac{\overset{*}{C}_1 \, (\overset{*}{h}_a - \overset{*}{h}_b)^{n_1}}{(-\log S)^{n_2}} \quad \text{.................(7)}$$

where $\overset{*}{h}_b$ = downstream flow depth, in meters; and $\overset{*}{C}_1$ = submerged flow coefficient for metric units.

The value of C_1 and n_2 must be determined from a plot of the submerged flow data. This can be accomplished by determining the discharge intercept at h_a-h_b = 1.0 (Δh = 1.0), denoted by the symbol $Q_{\Delta h}$ and recognizing that $(h_a-h_b)^{n_1}$ is equal to one, when h_a-h_b = 1.0. Thus, Eq. 6 can be reduced to

$$Q_{\Delta h} = C_1 \, (-\log S)^{-n_2} \quad \text{....................(8)}$$

By plotting $Q_{\Delta h}$ against -log S on logarithmic paper as shown in Fig. 8, a linear relationship should result, where C_1 is the value of $Q_{\Delta h}$ at -log S = 1 and n_2 is the slope of the straight line.

The value of n_2 was also found to be dependent only on the flume length, L. Therefore, like n_1, the value of n_2 is constant for all Cutthroat flumes of the same length regardless of the throat width and is the same for both metric and English units. The values of n_2 for the experimental flumes are plotted on a smooth curve as shown in Figs. 9 and 10. Therefore, the value of n_2 can be obtained for any flume length between 1.5 feet and 9 feet (0.45 meter and 2.7 meters) by simply reading the value from the graphs in Figs. 9 and 10.

The submerged flow coefficient is a function of both flume length and throat width. This relationship is:

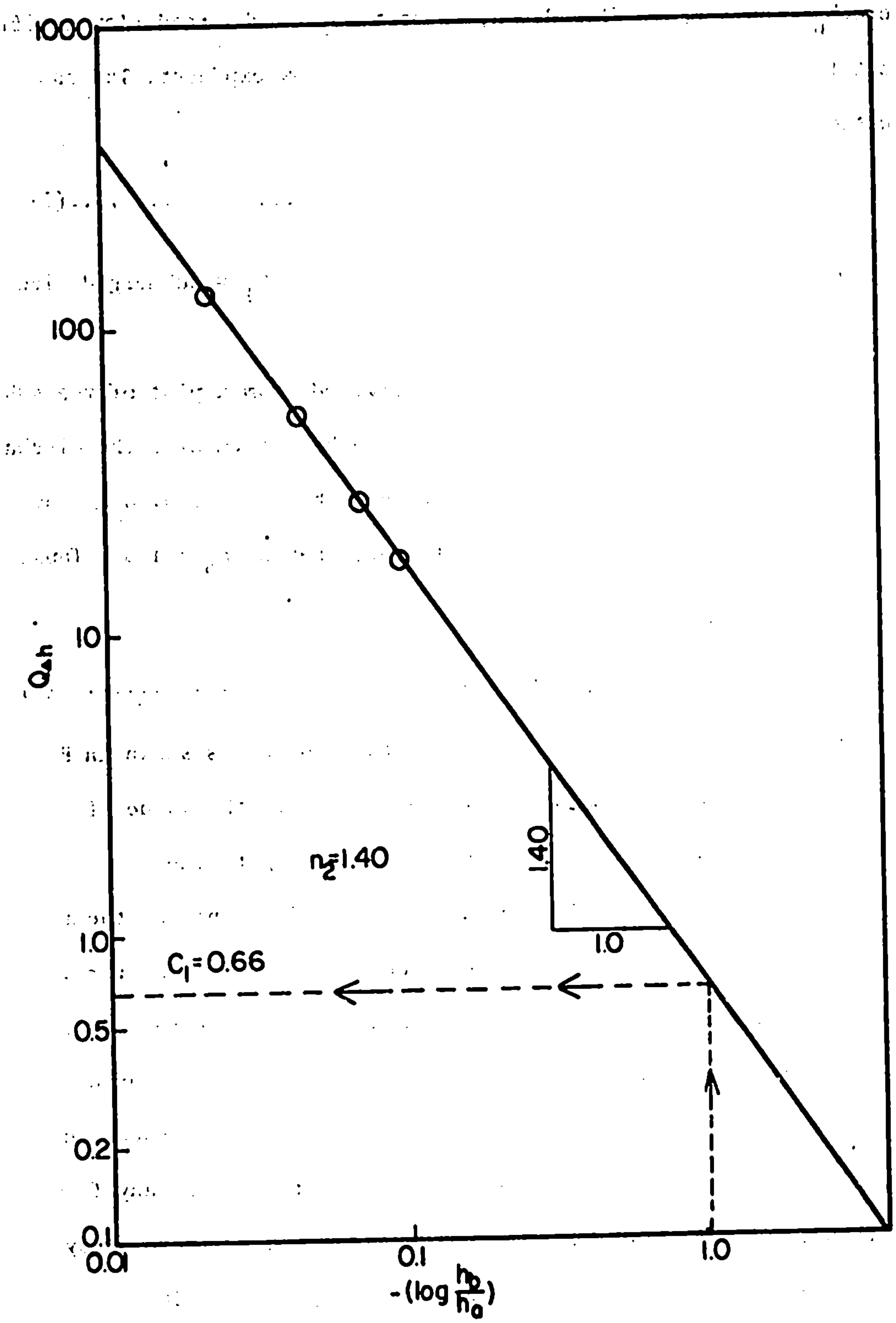


Fig. 8. Typical plot for developing submerged flow coefficient, C_1, and submerged flow exponent, n_2.

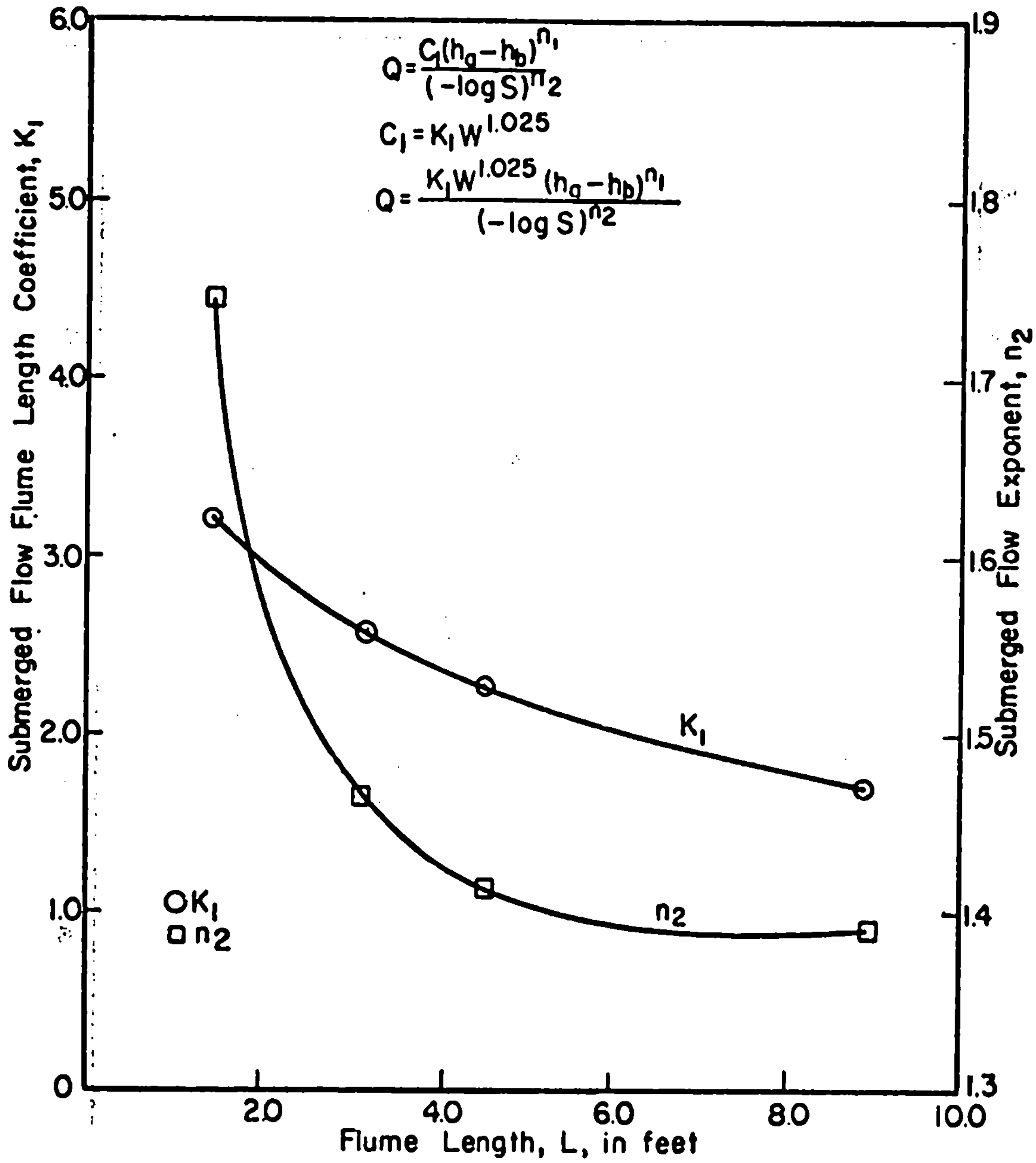


Fig. 9. Generalized submerged flow ratings for Cutthroat flume, in English units.

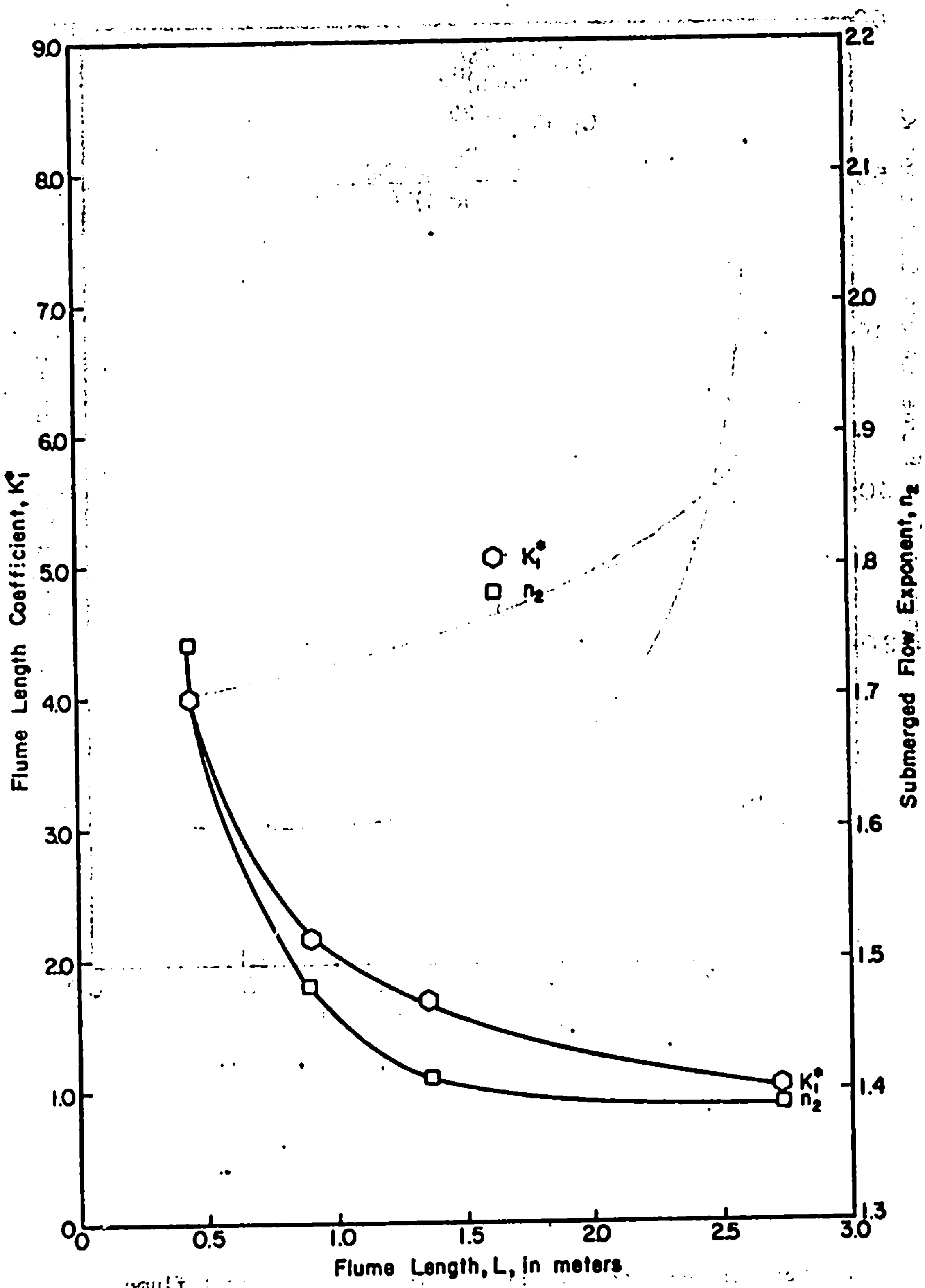


Fig. 10. Generalized submerged flow ratings for Cutthroat flume, in metric units.

$$C_1 = K_1 W^{1.025} \qquad \text{.......................(9)}$$

Where C_1 = the submerged flow coefficient, for English units; K_1 = the flume length coefficient, for English units; and W = the throat width, in feet. For metric units, Eq. 9 can be rewritten as

$$\overset{*}{C}_1 = \overset{*}{K}_1 \overset{*}{W}^{1.025} \qquad \text{......................(10)}$$

where $\overset{*}{C}_1$ = the submerged flow coefficient, for metric units; $\overset{*}{K}_1$ = the flume length coefficient, for metric units; and $\overset{*}{W}$ = the throat widths in meters. The values of K_1 and $\overset{*}{K}_1$ can be obtained from Figs. 9 and 10, respectively.

Having determined the values of n_2 and C_1 for the flume being used, the flow rate under submerged flow conditions can now be calculated for any combination of h_a and h_b (or h_a^* or h_b^*) by using Eq. 6 for English units or Eq. 7 for metric units. At high values of submergence (above 95 percent), small errors in reading h_a and h_b result in significant errors in calculating the discharge. Thus, as the submergence is increased above 95 percent, the discharge error becomes greater.

<u>Example 2.</u> A submerged flow rating is needed for a Cutthroat flume of length, L = 4.0 feet (1.219 meters) and width, W = 1.167 feet (0.356 meters). From Fig. 5 (or Fig. 6) the value of n_1 is found to be 1.75 (1.75). The values of n_2 and K_1 are found from Fig. 9 (Fig. 10 for metric units) and are equal to 1.43 (1.43) and 2.37 ($\overset{*}{K}_1$ = 1.80), respectively. Knowing K_1 (or $\overset{*}{K}_1$), the value of C_1 (or $\overset{*}{C}_1$) can be calculated using Eq. 9 (Eq. 10 for metric units).

$$C_1 = K_1 (W)^{1.025}$$
$$= 2.37 (1.167)^{1.025}$$
$$= 2.37 (1.172)$$
$$= 2.78$$

For metric units,

$$\overset{*}{C}_1 = \overset{*}{K}_1\ (W)^{1.025}$$

$$= 1.80\ (0.356)^{1.025}$$

$$= 1.80\ (0.347)$$

$$= 0.625$$

Knowing the values of n_1, n_2, and C_1 (or $\overset{*}{C}_1$), the flow rate through the flume can be calculated for any value of h_a and h_b (or $\overset{*}{h}_a$ and $\overset{*}{h}_b$). Assuming h_a = 1.20 feet and h_b = 1.10 feet,

$$S = 1.10/1.20$$

$$= 0.92$$

$$Q = \frac{C_1\ (h_a-h_b)^{n1}}{(-\log S)^{n2}}$$

$$= \frac{2.78\ (0.1)^{1.75}}{(-\log 0.92)^{1.43}}$$

$$= \frac{2.78(0.1)^{1.75}}{(0.0362)^{1.43}}$$

$$= \frac{2.78(0.0178)}{0.0088}$$

$$= 5.63 \text{ cfs}$$

Assuming $\overset{*}{h}_a$ = 0.3658 meter and $\overset{*}{h}_b$ = 0.3353 meter,

$$S = 0.3353/0.3658$$

$$= 0.92$$

$$\overset{*}{Q} = \frac{\overset{*}{C}_1\ (\overset{*}{h}_a-\overset{*}{h}_b)^{n1}}{(-\log S)^{n2}}$$

$$= \frac{0.625\ (0.3658-0.3353)^{1.75}}{(-\log 0.92)^{1.43}}$$

$$= \frac{0.625\ (0.0305)^{1.75}}{(0.0362)^{1.43}}$$

$$= \frac{0.625(0.0022)}{(0.0088)}$$

$$= 0.0386 \text{ cms}$$

TRANSITION SUBMERGENCE

The transition submergence, S_t, is the value of submergence at which the discharge passes from free flow to submerged flow, or vice versa (Fig. 3, water surface profile b). Under this unique condition, both the free flow equation and the submerged flow equation will predict the same value of discharge.

To determine the transition submergence, S_t, the free flow and submerged flow equations are set equal to one another.

$$Ch_a^{n_1} = \frac{C_1 (h_a - h_b)^{n_1}}{-\log (h_b/h_a)^{n_2}} \quad \ldots\ldots\ldots\ldots\ldots (11)$$

Dividing both sides of Eq. 11 by $h_a^{n_1}$ in order to obtain an expression containing only the submergence and known values of coefficients and exponents, and then recognizing that the submergence is really the transition submergence, Eq. 11 can be reduced to:

$$(-\log S_t)^{n_2} = (C_1/C)(1-S_t)^{n_1} \quad \ldots\ldots\ldots (12)$$

Eq. 12 can be solved by trial and error to obtain a value of the transition submergence.

In order to determine whether free flow or submerged flow conditions exist in a Cutthroat flume, or any flow measuring flume, it is necessary to calculate the submergence, which is then compared with the transition submergence to determine which flow equation should be used. If the submergence is less than the transition submergence, then free flow conditions exist. The flume is operating under submerged flow conditions if the submergence is greater than the transition submergence.

The values obtained for the coefficients and exponents for the flumes tested are listed in Table 1 for English units and Table 2 for metric units. The relationships of these values with flume length are shown in Figs. 11 and 12 for English and metric units, respectively. Table 3 has been prepared to provide a ready reference for converting the submergence, S (or transition submergence, S_t) to -log S.

INSTALLATION OF CUTTHROAT FLUMES

Any water measuring device must be properly installed to yield adequate results. The first consideration prior to installing a flume is the location or site of the structure. The flume should be placed in a straight section of channel. If operating conditions require frequent changing of the discharge, the flume may be conveniently located near a point of diversion or regulting gate. However, care should be taken to see that the flume is not located too near a gate because of unstable or surging effects which might result from the gate operation. Also, a Cutthroat flume should not be located immediately downstream from a culvert, or any other type of constriction.

After the site has been selected for the flume, it is necessary to determine certain design criteria. The maximum quantity of water to be measured, the depth of flow necessary to obtain this discharge, and the allowable head loss through the flume must be determined. For design purposes, the head loss may be taken as the change in water surface elevation between the flume entrance and exit. The downstream depth of flow will remain essentially the same after installation of the flume as it was prior to installation, but the upstream depth will increase by the amount of head loss. The allowable increase in upstream depth may be limited by the height of canal banks upstream from the flume. Such a

Table 1. Summary of coefficients, exponents, and transition submergences for experimental Cutthroat flumes, for English units.

Flume	12" x 9.0'	3" x 4.5'	2" x 3.0'	1" x 1.5'
C	3.500	0.960	0.719	0.494
n_1	1.560	1.720	1.840	2.150
K	3.500	3.980	4.500	6.100
C_1	1.688	0.548	0.413	0.261
n_2	1.390	1.410	1.480	1.741
K_1	1.700	2.250	2.580	3.250
S_t	0.800	0.700	0.650	0.600

Flume	24" x 9.0'	6" x 4.5'	4" x 3.0'	2" x 1.5'
C	7.110	1.960	1.459	0.974
n_1	1.560	1.720	1.840	2.150
K	3.500	3.980	4.500	6.100
C_1	3.430	1.120	0.837	0.516
n_2	1.390	1.410	1.480	1.741
K_1	1.700	2.250	2.580	3.250
S_t	0.800	0.700	0.650	0.600

Flume	48" x 9.0'	12" x 4.5'	8" x 3.0'	4" x 1.5'
C	14.490	3.980	2.979	1.975
n_1	1.560	1.720	1.840	2.150
K	3.500	3.980	4.500	6.100
C_1	6.970	2.275	1.705	1.048
n_2	1.390	1.410	1.480	1.741
K_1	1.700	2.250	2.580	3.250
S_t	0.800	0.700	0.650	0.600

Flume	72" x 9.0'	24" x 4.5'	16" x 3.0'	8" x 1.5'
C	22.000	8.010	6.040	4.030
n_1	1.560	1.720	1.840	2.150
K	3.500	3.980	4.500	6.100
C_1	10.600	4.575	3.465	2.140
n_2	1.390	1.410	1.480	1.741
K_1	1.700	2.250	2.580	3.250
S_t	0.800	0.700	0.650	0.600

Table 2. Summary of coefficients, exponents, and transition submergences for experimental Cutthroat flumes, for metric units.

Flume	0.0305 x 2.74	0.076 x 1.37	0.051 x 0.91	0.025 x 0.46
$\dot{C}$	0.6322	0.2103	0.1811	0.1802
n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1383	2.9394	3.7758	7.4791
$\dot{C}_1$	0.3049	0.1200	0.1040	0.0952
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600
Flume	0.610 x 2.74	0.152 x 1.37	0.102 x 0.91	0.050 x 0.46
$\dot{C}$	1.2843	0.4293	0.3675	0.3553
n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1383	2.9394	3.7758	7.4791
$\dot{C}_1$	0.6196	0.2453	0.2108	0.1882
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600
Flume	1.219 x 2.74	0.304 x 1.37	0.203 x 0.91	0.101 x 0.46
$\dot{C}$	2.6175	0.8718	0.7503	0.7205
n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1383	2.9394	3.7758	7.4791
$\dot{C}_1$	1.2591	0.4983	0.4294	0.3823
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600
Flume	1.829 x 2.74	0.609 x 1.37	0.406 x 0.91	0.203 x 0.46
$\dot{C}$	3.9741	1.7545	1.5213	1.4701
n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1383	2.9394	3.7758	7.4791
$\dot{C}_1$	1.9148	1.0021	0.8727	0.7806
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600

Table 2. Summary of coefficients, exponents, and transition submergences for experimental Cutthroat Flumes, for Metric units.

Flume	0.0305 x 2.74	0.076 x 1.37	0.051 x 0.91	0.025 x 0.46
$\dot{C}$	0.6322	0.2103	0.1811	0.1802
n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1383	2.9394	3.7758	7.4791
$\dot{C}_1$	0.3049	0.1200	0.1040	0.0952
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600
Flume	0.610 x 2.74	0.152 x 1.37	0.102 x 0.91	0.050 x 0.46
$\dot{C}$	1.2843	0.4293	0.3675	0.3553
n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1383	2.9394	3.7758	7.4791
$\dot{C}_1$	0.6196	0.2453	0.2108	0.1882
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600
Flume	1.219 x 2.74	0.304 x 1.37	0.203 x 0.91	0.101 x 0.46
$\dot{C}$	2.6175	0.8718	0.7503	0.7205
n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1393	2.9394	3.7758	7.4791
$\dot{C}_1$	1.2591	0.4983	0.4294	0.3823
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600
Flume	1.829 x 2.74	0.609 x 1.37	0.406 x 0.91	0.203 x 0.46
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n_1	1.560	1.720	1.840	2.150
$\dot{K}$	2.1383	2.9394	3.7758	7.4791
$\dot{C}_1$	1.9148	1.0021	0.8727	0.7806
n_2	1.390	1.410	1.480	1.741
$\dot{K}_1$	1.0303	1.6789	2.1402	3.9830
S_t	0.800	0.700	0.650	0.600

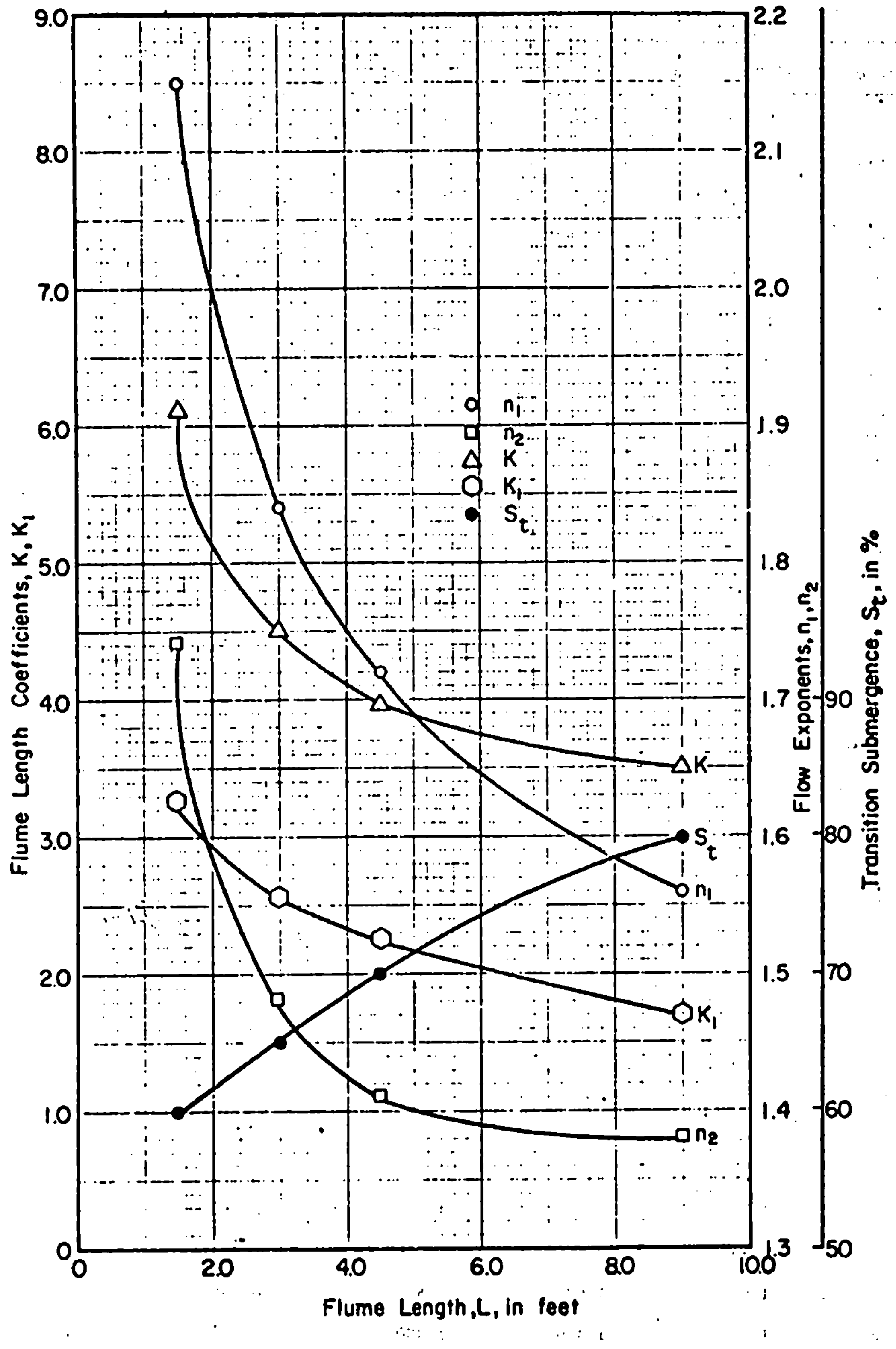

Fig. 11. Generalized free flow and submerged flow coefficients and exponents and S_t for Cutthroat flumes, in English units.

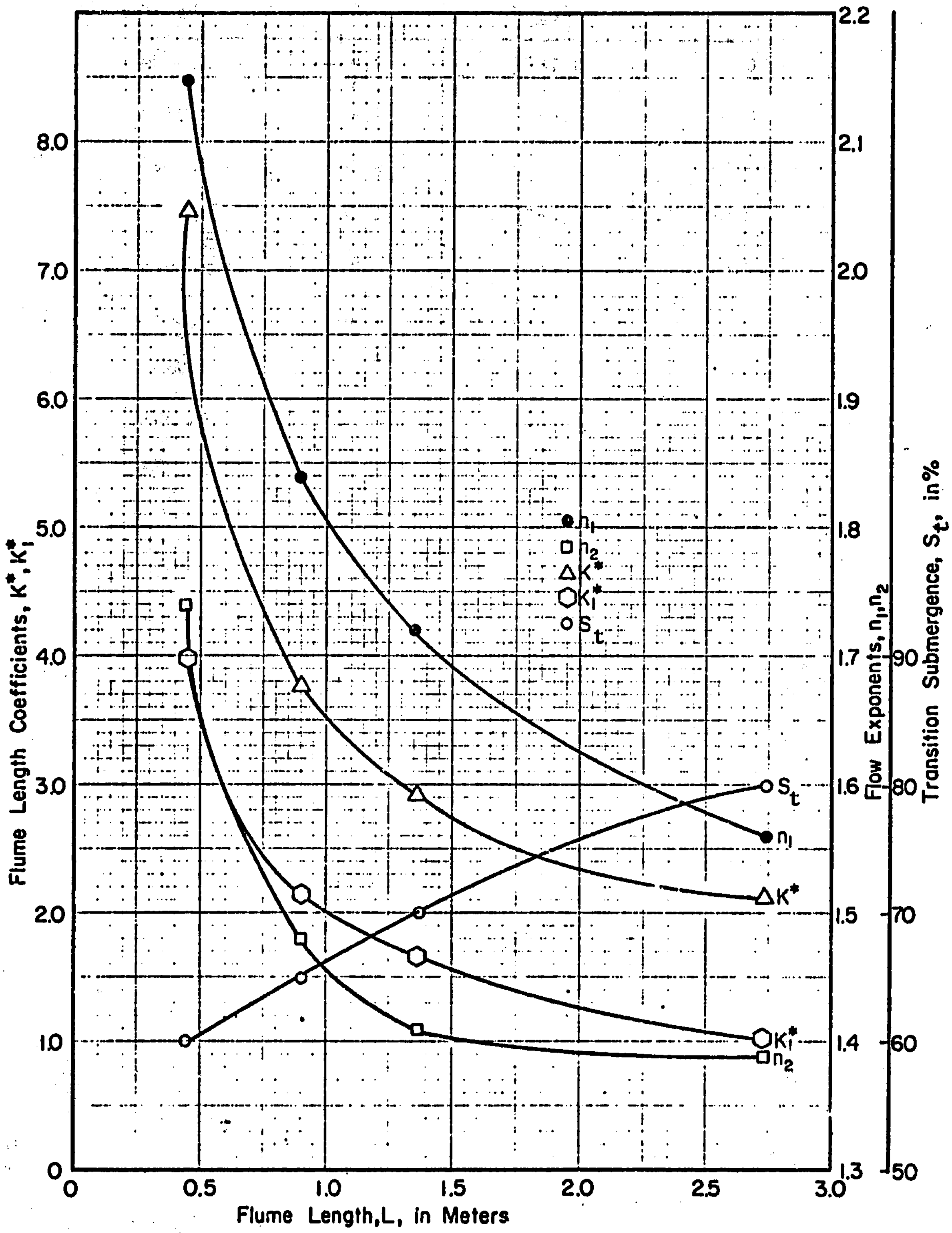

Fig. 12. Generalized free flow and submerged flow coefficients and exponents and S_t for Cutthroat flumes, in metric units.

Table 3. Values of -log S knowing the submergence, S.

S	-log S	S	-log S
0.65	0.1871	0.83	0.0809
0.66	0.1805	0.84	0.0757
0.67	0.1739	0.85	0.0706
0.68	0.1675	0.86	0.0655
0.69	0.1612	0.87	0.0605
0.70	0.1549	0.88	0.0555
0.71	0.1487	0.89	0.0506
0.72	0.1427	0.90	0.0458
0.73	0.1367	0.91	0.0458
0.74	0.1308	0.92	0.0362
0.75	0.1249	0.93	0.0315
0.76	0.1192	0.94	0.0269
0.77	0.1132	0.95	0.0223
0.78	0.1079	0.96	0.0177
0.79	0.1024	0.97	0.0132
0.80	0.0969	0.98	0.0088
0.81	0.0915	0.90	0.0044
0.82	0.0862		

limiting condition may require increasing the flume size, or operating the flume as a submerged flow structure. Economic factors play a determining role in the flume size selected.

Proper installation requires the flume be placed level in the channel. The flume should be aligned straight with the channel and should be level longitudinally and laterally. Note that with time the tendency is for the flume to settle with the exit becoming lower than the entrance.

The most important dimension in constructing a Cutthroat flume is the throat width, W. One of the principal advantages of a Cutthroat flume is that an error in constructing the throat width can be taken into account by writing new free flow and submerged flow ratings using either Eq. 3 or Eq. 4 for free flow and Eq. 9 or Eq. 10 for submerged flow. If a particular throat width is desired for a Cutthroat flume to be constructed with concrete, a steel angle could be placed at the throat cross-section which would be embedded in the concrete.

The experience of the authors, both in the laboratory and with field installations, indicates that a transition structure between the open channel and Cutthroat flume is not necessary. The only restriction is to follow the guideline of using a flow depth to flume length ratio (h_a/L) of 0.4, or less. For usual installations in flat gradient channels, this will insure that approach conditions will satisfy the conditions under which the laboratory ratings were developed.

Measurements may be made in the flume by the use of staff gages or stilling wells (Fig. 13). Only fair accuracy is obtained from the use of staff gages. When used, a staff gage should be set vertically at the specified location for h_a and h_b along the converging or diverging

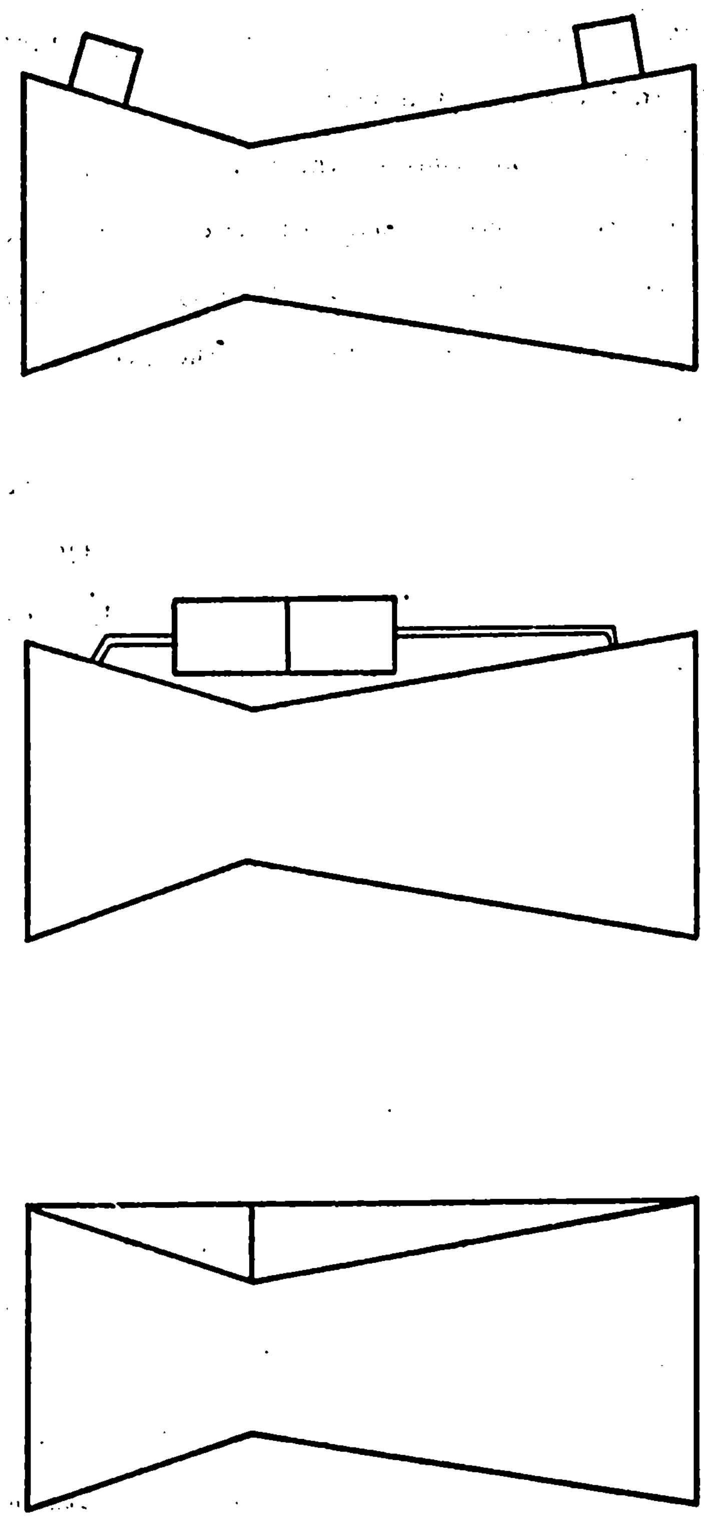

Fig. 13. Plan view of Cutthroat flume showing various methods for using stilling wells.

wall. The staff gage must be carefully referenced to the elevation of the flume bottom. Use of stilling wells is recommended, however, for accuracy. Stilling wells havc the advantage of providing a calm water surface compared with the fluctuation of "bounce" of the water surface that may exist within the flume. Stilling wells are also necessary if continuous recording instruments are to be used. Under submerged flow conditions, two stilling wells placed adjacent to each other are very desirable and facilitate the use of a double head recording instrument for obtaining a continuous record with time of h_a and h_b.

FLUME INSTALLATION TO INSURE FREE FLOW

If circumstances allow, it is preferable to have a flow measuring device operate under free flow conditions. The obvious advantage is that only an upstream flow depth need be measured to determine the discharge. The procedure to follow for installing a Cutthroat flume to operate under free flow conditions is listed below.

1. Ascertain the maximum flow rate to be measured.
2. At the site selected for installing the flume, locate the high water line on the canal bank and determine the maximum depth of flow.
3. Using Eq. 1(or Eq. 2 for metric units), calculate the depth of water that corresponds to the maximum discharge capacity of the canal for the flume being used.
4. Place the floor of the flume at a depth which does not exceed h_a multiplied by the transition submergence ($S_t h_a$) below the high water line (Fig.14). Generally, the flume bottom should

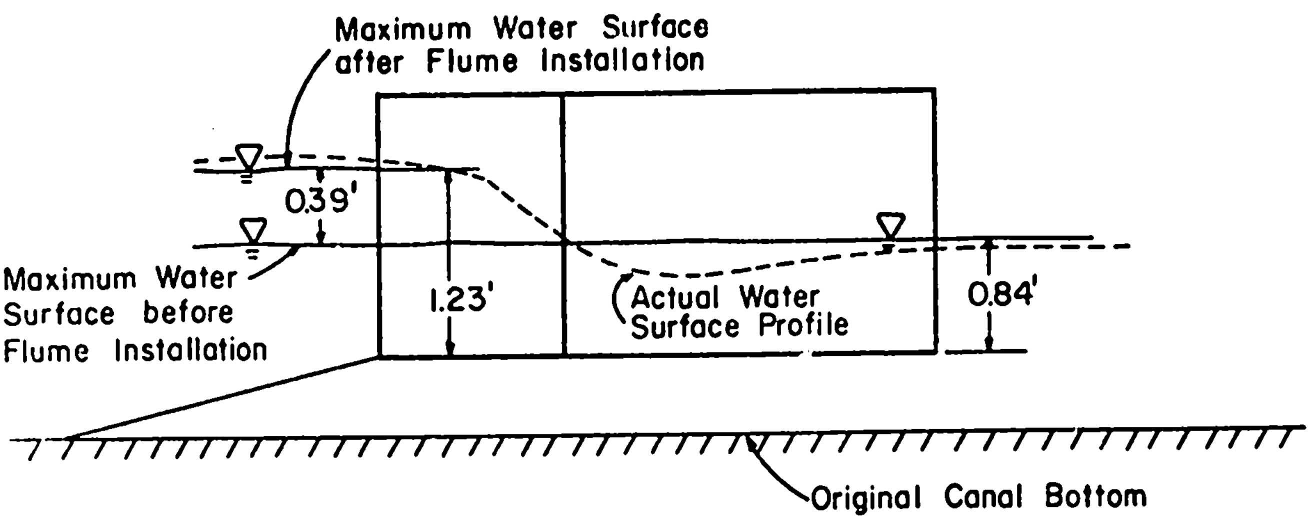

Fig. 14. Installation of 14 inch throat width and 4-foot length Cutthroat flume.

be placed as high in the canal as grade and other conditions permit to insure free flow.

Example 3. A Cutthroat flume of length, L, = 4.0 feet (1.219 meters) and throat width, W = 1.167 feet (0.356 meter) is to be installed for free flow operations (Fig. 14). The maximum flow rate in the channel is 7 cfs (0.1982 cms).

The transition submergence for this flume can be determined from either Fig. 11 or Fig. 12 as S_t = 68.2%. From Eq. 1 (or Eq. 2 for metric units), the value of h_a that corresponds to 7 cfs (0.1982 cms) can be calculated.

$$h_a = \left(\frac{Q}{C}\right)^{1/n_1}$$

$$h_a = \left(\frac{7}{4.86}\right)^{1/1.75} = (1.44)^{0.57} = 1.23 \text{ feet}$$

$$h_a^* = \left(\frac{Q^*}{C^*}\right)^{1/n_1}$$

$$h_a^* = \left(\frac{0.1982}{1.1}\right)^{1/1.75} = (0.180)^{0.57} = 0.375 \text{ meter}$$

The downstream flow depth, h_b (or h_b^* in metric units), becomes
$h_b = h_a S_t$ = 1.23 feet (.682) = 0.84 feet

$$h_b^* = h_a^* S_t = (0.375)\ (.682) = 0.256 \text{ meter}$$

Therefore, the floor of the flume should be placed no lower than 0.84 feet (0.256 meter) below the high water line in the canal.

Example 4. Suppose the logical Cutthroat Flume size nessesary to measure a maximum discharge of 12.5 cfs under free flow conditions must be found. Presently, the maximum flow depth in the canal is 0.95 foot and the head loss is not to exceed 0.33 foot. Under these conditions, the maximum downstream flow depth would be 0.95 foot and the maximum upstream flow depth 1.28 feet (0.95 + 0.33 = 1.28). The submergence would be 74 precent (0.95 ÷ 1.28 = 0.74). From Fig. 11, we find that the only flumes with a transition submergence greater than 74 percent are those with a length of 6 feet. Therefore, a 9-foot flume length could be used. To select the proper flume size, enter Table 12 under 2-foot flume to obtain a value of h_a corresponding to a discharge of 12.5 cfs. For this discharge value, the upstream depth is 1.44 feet, which is greater than the allowable maximum upstream depth of 1.28 feet. Hence, the 2-foot flume will have the capacity to measure the desired discharge, but will produce too great a head loss (1.44-0.95 = 0.49 foot). Consequently, a larger flume size is nessesary to satisfy the imposed conditions. From Table 13, we find that the

3-foot flume has an upstream depth of 1.18 feet for a discharge of 12.50 cfs, and since this value is less than the restrictive depth of 1.28, it would be selected for use in this particular situation. A larger flume could be used, but the economic factors would make such a selection undesirable.

FLUME INSTALLATION FOR SUBMERGED FLOW

The existence of certain conditions, such as insufficient grade or the growth of moss and vegetation, sometimes makes it impossible or impractical to install a flume to operate under free flow conditions. Where such situations exist, a flume may be set in the canal to operate under submerged flow conditions. The principal advantage of submerged flow operation is the smaller head loss which occurs in the flume as compared with free flow. This reduction in head loss may mean that the canal banks upstream from the flume do not have to be raised to enable the same maximum flow capacity in the canal that existed prior to the installation of the flume. When a flat-bottomed Cutthroat flume is installed to operate under submerged flow conditions, the flume floor may be placed level on the canal bottom. This placement will allow quicker drainage of the canal section upstream from the flume, and reduced seepage losses upstream from the flume, particularly for the flow rates which are less than the maximum discharge. The following procedure should be used in placing a Cutthroat flume to operate under submerged flow conditions.

1. Establish the maximum flow rate to be measured.
2. On the canal bank, where the flume is to be installed, locate the high water line to determine the maximum flow depth.
3. Giving consideration to the amount of free-board in the canal at maximum discharge and maximum flow depth, determine how much higher the water surface can be raised in the canal upstream from the flume location.

4. With the floor of the flume being placed at essentially the same elevation as the bottom of the canal, the maximum depth of flow (step 2) becomes h_b (or h_b^*), and the additional amount that the water surface in the canal can be raised (step 3), becomes $h_a - h_b$ (or $h_a^* - h_b^*$). Using this information, the submergence, h_b/h_a (which has the same value as h_b^*/h_a^*), can be computed.

5. Select the flume length desired. Then, from Fig. 11 (or Fig. 12 for metric units) determine the values of S_t, n_1, K_1, and n_2 (or S_t, n_1, K_1^*, and n_2 if Fig. 12 is used) that correspond to the chosen flume length.

6. Calculate the value of C_1 using the following equation

$$C_1 = \frac{Q(-\log S_t)^{n_2}}{(h_a - h_b)^{n_1}}$$

or, C_1^* can be calculated using the following equation,

$$C_1^* = \frac{Q^* (-\log S_t)^{n_2}}{(h_a^* - h_b^*)^{n_1}}$$

7. The throat width, W, can now be calculated by,

$$W = \left(\frac{C_1}{K_1}\right)^{0.976}$$

The value of W (or W^*) obtained from these equations is the smallest value that can be used and not exceed the upstream depth which was determined in step 4. If this value is not a convenient dimension, it should always be rounded upward. If the throat width is rounded downward, the head loss will be increased.

<u>Example 5.</u> A Cutthroat flume is to be installed for submerged flow operation. The maximum flow rate in the channel is 7 cfs. (0.1982 cms). The maximum flow depth in the channel is 1.5 feet (0.457 meter). The maximum amount that the upstream depth can be raised is 0.2 feet.
A flume length of 9 feet (2.743 meters) is selected.
From Figs. 11 or 12 the values of S_t, n_1, n_2, and K_1 (S_t, n_1, n_2, $\overset{*}{K}_1$) are determined as follows:

English units	metric units
$S_t = 0.80$	$S_t = 0.80$
$n_1 = 1.560$	$n_1 = 1.560$
$n_2 = 1.390$	$n_2 = 1.390$
$K_1 = 1.70$	$\overset{*}{K}_1 = 1.03$
$h_a = 1.7$ feet	$\overset{*}{h}_a = 0.518$ meter
$h_b = 1.5$ feet	$\overset{*}{h}_b = 0.457$ meter

<u>English units</u>

$$C_1 = \frac{Q(-\log S_t)^{n_2}}{(h_a - h_b)^{n_1}}$$

$$= \frac{7(0.0969)^{1.390}}{(0.2)^{1.560}}$$

$$= \frac{7(0.0390)}{(0.081)}$$

$$= 3.37$$

$$W = \left(\frac{C_1}{K_1}\right)^{0.976}$$

$$= \left(\frac{3.37}{1.70}\right)^{0.976}$$

$$= (1.98)^{0.976}$$

$$= 1.95 \text{ feet}$$

<u>metric units</u>

$$\overset{*}{C}_1 = \frac{\overset{*}{Q}(-\log S_t)^{n_2}}{(\overset{*}{h}_a - \overset{*}{h}_b)^{n_1}}$$

$$= \frac{0.1982(0.0969)^{1.390}}{(0.0610)^{1.560}}$$

$$= \frac{0.1982(0.039)}{(0.0126)}$$

$$= 0.611$$

$$\overset{*}{W} = \left(\frac{\overset{*}{C}_1}{\overset{*}{K}_1}\right)^{0.976}$$

$$= \left(\frac{0.611}{1.03}\right)^{0.976}$$

$$= (0.593)^{0.976}$$

$$= 0.60 \text{ Meters}$$

Therefore, a flume width of 2 feet (say 60 centimeters) should be used.

MAINTENANCE OF CUTTHROAT FLUMES

After a Cutthroat flume has been properly installed, periodic maintenance is required to insure satisfactory operation. Moss may collect on the walls of the entrance section and must be removed. In certain channels, debris may collect on the floor of the entrance section, and should be removed. Walls of steel Cutthroat flumes may become encrusted and the encrustation should be removed with a steel-wire brush. Once the walls have been scraped clean, applying asphaltic paint will add to the life of the flume and delay the build-up of encrustation.

Commonly, Cutthroat flumes (or any other type of flow measuring flumes) will "settle" after being in operation for a period of time. The levelness of the entrance floor should be checked after a few months of operation, and again at the end of the season or year.

Either "settling" or improper installation can cause a flume to tilt sideways as illustrated in Fig. 15. If the settling is minor, the discharge can still be estimated with fair accuracy by measuring the flow depths on both sides of the flume. By employing the average of the two readings when using the discharge equations or rating tables, the discharge can be determined.

Settlement near the entrance section of a Cutthroat flume is illustrated in Fig. 16. And again, if the settlement is not too great, the discharge can be estimated with fair accuracy.

Settlement occurs most commonly near the exit section, as illustrated in Fig. 17. Settlement is more likely at the outlet because of channel erosion immediately downstream from the flume caused by the jetting action of the water. Use of the flow depths h_a or h_a and h_b to obtain the

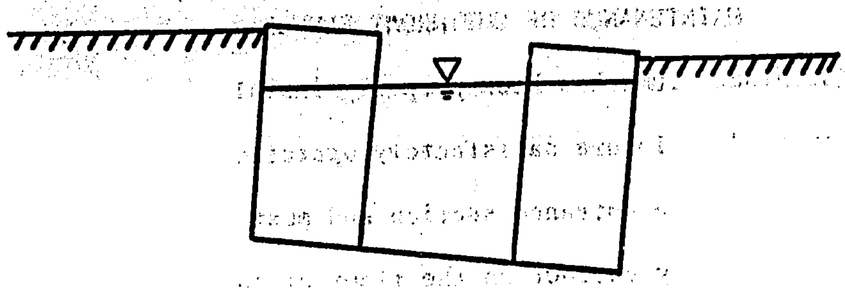

Fig. 15. Cutthroat flume tilted sideways.

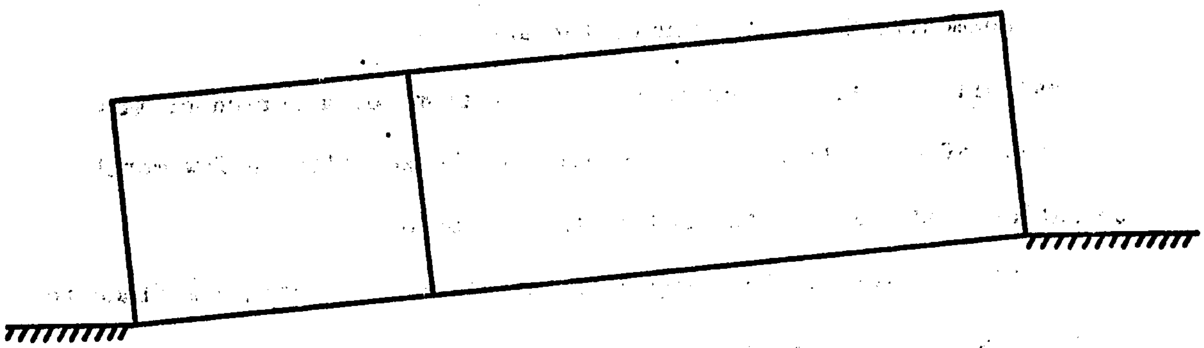

Fig. 16. Settlement of Cutthroat flume at inlet section.

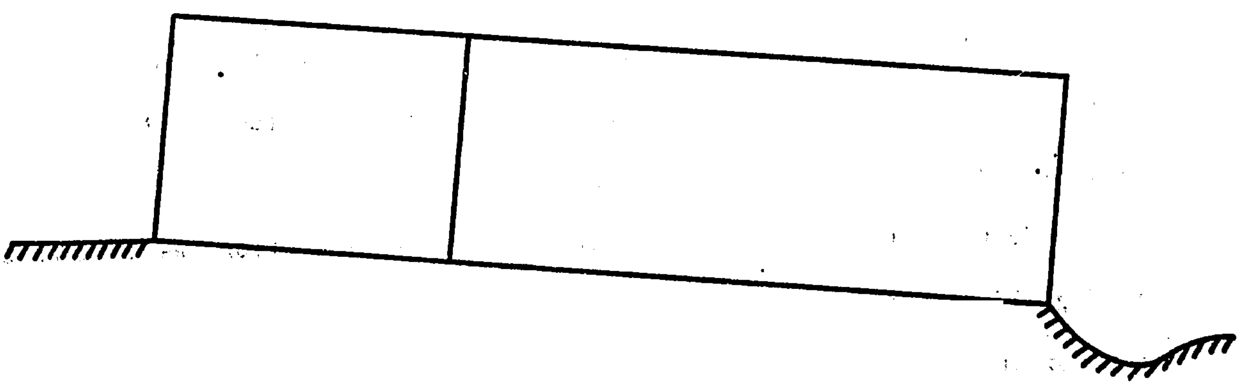

Fig. 17. Settlement of Cutthroat flume at exit section.

discharge from the equations or tables will yield values less than the true discharge. This discrepancy between the estimated discharge and the true discharge becomes greater as the amount of settlement increases. Satisfactory solutions to this problem include raising the lower end of the flume so that it is level again or placing a new level floor in the flume.

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APPENDIX A

DISCHARGE RATINGS IN ENGLISH UNITS

Table 4 Free flow calibrations for selected Cutthroat flumes, English units (Q, cfs)

h_a	4INX3FT	8INX3FT	12INX3FT	8INX6FT	16INX6FT	24INX6FT	12INX9FT	24INX9FT	36INX9FT
.02	.00	.00	.00	.00	.01	.01	.01	.02	.02
.04	.00	.01	.01	.01	.02	.04	.02	.05	.07
.06	.01	.02	.03	.02	.05	.07	.04	.09	.13
.08	.01	.03	.05	.04	.08	.12	.07	.14	.21
.10	.02	.04	.08	.06	.11	.17	.10	.20	.30
.12	.03	.06	.11	.07	.15	.23	.13	.26	.39
.14	.04	.08	.14	.10	.20	.30	.16	.33	.50
.16	.05	.10	.18	.12	.24	.37	.20	.41	.62
.18	.05	.13	.23	.15	.30	.45	.24	.49	.74
.20	.08	.15	.28	.17	.35	.54	.28	.58	.88
.22	.09	.18	.33	.20	.41	.63	.33	.67	1.02
.24	.11	.22	.39	.24	.48	.73	.38	.77	1.16
.26	.12	.25	.45	.27	.55	.83	.43	.87	1.32
.28	.14	.29	.51	.30	.62	.94	.48	.98	1.48
.30	.16	.33	.58	.34	.69	1.05	.54	1.09	1.65
.32	.18	.37	.66	.38	.77	1.17	.59	1.20	1.82
.34	.20	.41	.73	.42	.85	1.30	.65	1.32	2.00
.36	.22	.45	.82	.46	.94	1.42	.71	1.44	2.19
.38	.25	.50	.90	.50	1.02	1.56	.77	1.57	2.38
.40	.27	.55	.99	.55	1.11	1.70	.84	1.70	2.58
.42	.30	.60	1.08	.59	1.21	1.84	.90	1.84	2.79
.44	.32	.66	1.18	.64	1.30	1.98	.97	1.98	3.00
.46	.35	.71	1.28	.69	1.40	2.14	1.04	2.12	3.21
.48	.38	.77	1.38	.74	1.50	2.29	1.11	2.26	3.43
.50	.41	.83	1.49	.79	1.61	2.45	1.19	2.41	3.66
.52	.44	.89	1.60	.84	1.72	2.62	1.26	2.56	3.89
.54	.47	.96	1.72	.90	1.83	2.78	1.34	2.72	4.12
.56	.50	1.03	1.84	.95	1.94	2.96	1.42	2.88	4.36
.58	.54	1.09	1.96	1.01	2.06	3.13	1.50	3.04	4.61
.60	.57	1.16	2.09	1.07	2.18	3.31	1.58	3.20	4.86
.62	.61	1.24	2.22	1.13	2.30	3.50	1.66	3.37	5.11
.64	.64	1.31	2.35	1.19	2.42	3.69	1.74	3.54	5.37
.66	.68	1.39	2.49	1.25	2.55	3.88	1.83	3.72	5.64
.68	.72	1.47	2.63	1.32	2.68	4.08	1.92	3.90	5.91
.70	.75	1.55	2.77	1.38	2.81	4.28	2.01	4.08	6.18
.72	.80	1.63	2.92	1.45	2.94	4.48	2.10	4.26	6.46
.74	.84	1.71	3.07	1.51	3.08	4.69	2.19	4.44	6.74
.76	.88	1.80	3.23	1.58	3.22	4.90	2.28	4.63	7.03
.78	.92	1.89	3.38	1.65	3.36	5.11	2.38	4.83	7.32
.80	.97	1.98	3.55	1.72	3.50	5.33	2.47	5.02	7.61
.82	1.01	2.07	3.71	1.79	3.65	5.55	2.57	5.22	7.91
.84	1.06	2.16	3.88	1.87	3.80	5.78	2.67	5.42	8.21
.86	1.11	2.26	4.05	1.94	3.95	6.01	2.77	5.62	8.52
.88	1.15	2.35	4.22	2.01	4.10	6.24	2.87	5.82	8.83
.90	1.20	2.45	4.40	2.09	4.25	6.48	2.97	6.03	9.15
.92	1.25	2.56	4.58	2.17	4.41	6.72	3.07	6.24	9.47
.94	1.30	2.66	4.77	2.25	4.57	6.96	3.18	6.46	9.79
.96	1.35	2.76	4.96	2.33	4.73	7.21	3.28	6.67	10.11
.98	1.41	2.87	5.15	2.41	4.90	7.46	3.39	6.89	10.45
1.00	1.46	2.98	5.34	2.49	5.06	7.71	3.50	7.11	10.78

Table 4 (continued)

h_a	4INX3FT	8INX3FT	12INX3FT	6INX6FT	16INX6FT	24INX6FT	12INX9FT	24INX9FT	36INX9FT
1.02	1.51	3.09	5.54	2.57	5.23	7.97	3.61	7.33	11.12
1.04	1.57	3.20	5.74	2.65	5.40	8.23	3.72	7.56	11.46
1.06	1.62	3.32	5.95	2.74	5.57	8.49	3.83	7.79	11.81
1.08	1.68	3.43	6.16	2.83	5.75	8.76	3.95	8.02	12.16
1.10	1.74	3.55	6.37	2.91	5.93	9.03	4.06	8.25	12.51
1.12	1.80	3.67	6.58	3.00	6.11	9.30	4.18	8.48	12.86
1.14	1.86	3.79	6.80	3.09	6.29	9.57	4.29	8.72	13.22
1.16	1.92	3.91	7.02	3.18	6.47	9.85	4.41	8.96	13.59
1.18	1.98	4.04	7.25	3.27	6.66	10.14	4.53	9.20	13.96
1.20	2.04	4.17	7.48	3.36	6.84	10.42	4.65	9.45	14.33
1.22	2.10	4.30	7.71	3.46	7.03	10.71	4.77	9.70	14.70
1.24	2.17	4.43	7.94	3.55	7.22	11.00	4.90	9.95	15.08
1.26	2.23	4.55	8.18	3.65	7.42	11.30	5.02	10.20	15.46
1.28	2.30	4.69	8.42	3.74	7.61	11.60	5.14	10.45	15.84
1.30	2.36	4.83	8.66	3.84	7.81	11.90	5.27	10.71	16.23
1.32	2.43	4.97	8.91	3.94	8.01	12.20	5.40	10.96	16.62
1.34	2.50	5.10	9.16	4.04	8.21	12.51	5.53	11.22	17.02
1.36	2.57	5.25	9.41	4.14	8.42	12.82	5.65	11.49	17.42
1.38	2.64	5.39	9.67	4.24	8.62	13.13	5.78	11.75	17.82
1.40	2.71	5.53	9.93	4.34	8.83	13.45	5.92	12.02	18.22
1.42	2.78	5.68	10.19	4.44	9.04	13.77	6.05	12.29	18.63
1.44	2.85	5.83	10.46	4.55	9.25	14.09	6.18	12.56	19.04
1.46	2.93	5.98	10.72	4.65	9.46	14.41	6.32	12.83	19.45
1.48	3.00	6.13	11.00	4.76	9.68	14.74	6.45	13.11	19.87
1.50	3.08	6.28	11.27	4.86	9.90	15.07	6.59	13.38	20.29
1.52	3.15	6.44	11.55	4.97	10.12	15.40	6.73	13.66	20.72
1.54	3.23	6.59	11.83	5.08	10.34	15.74	6.86	13.94	21.14
1.56	3.31	6.75	12.11	5.19	10.56	16.08	7.00	14.23	21.57
1.58	3.39	6.91	12.40	5.30	10.78	16.42	7.14	14.51	22.01
1.60	3.46	7.07	12.69	5.41	11.01	16.77	7.29	14.80	22.44
1.62	3.54	7.24	12.99	5.52	11.24	17.12	7.43	15.09	22.88
1.64	3.63	7.40	13.28	5.64	11.47	17.47	7.57	15.38	23.32
1.66	3.71	7.57	13.58	5.75	11.70	17.82	7.72	15.68	23.77
1.68	3.79	7.74	13.88	5.87	11.94	18.18	7.86	15.97	24.22
1.70	3.87	7.91	14.19	5.98	12.17	18.53	8.01	16.27	24.67
1.72	3.96	8.08	14.50	6.10	12.41	18.90	8.16	16.57	25.12
1.74	4.04	8.25	14.81	6.22	12.65	19.26	8.30	16.87	25.58
1.76	4.13	8.43	15.12	6.33	12.89	19.63	8.45	17.17	26.04
1.78	4.22	8.61	15.44	6.45	13.13	20.00	8.60	17.48	26.50
1.80	4.30	8.79	15.76	6.57	13.38	20.37	8.76	17.79	26.97
1.82	4.39	8.97	16.09	6.69	13.62	20.75	8.91	18.10	27.44
1.84	4.48	9.15	16.41	6.82	13.87	21.13	9.06	18.41	27.91
1.86	4.57	9.33	16.74	6.94	14.12	21.51	9.22	18.72	28.38
1.88	4.66	9.52	17.08	7.06	14.37	21.89	9.37	19.04	28.86
1.90	4.75	9.70	17.41	7.19	14.63	22.28	9.53	19.35	29.34
1.92	4.85	9.89	17.75	7.31	14.88	22.66	9.68	19.67	29.82
1.94	4.94	10.08	18.09	7.44	15.14	23.06	9.84	19.99	30.31
1.96	5.03	10.28	18.44	7.57	15.40	23.45	10.00	20.31	30.80
1.98	5.13	10.47	18.79	7.70	15.66	23.85	10.16	20.64	31.29
2.00	5.22	10.67	19.14	7.82	15.92	24.25	10.32	20.96	31.79

Table 4 (continued)

h_a	4INx3FT	8INx3FT	12INx3FT	8INx6FT	16INx6FT	24INx6FT	12INx9FT	24INx9FT	36INx9FT
2.02	***	***	***	7.95	16.19	24.65	10.48	21.29	32.28
2.04	***	***	***	8.08	16.45	25.05	10.64	21.62	32.78
2.06	***	***	***	8.22	16.72	25.46	10.81	21.95	33.29
2.08	***	***	***	8.35	16.99	25.87	10.97	22.29	33.79
2.10	***	***	***	8.48	17.26	26.28	11.14	22.62	34.30
2.12	***	***	***	8.62	17.53	26.70	11.30	22.96	34.81
2.14	***	***	***	8.75	17.81	27.12	11.47	23.30	35.32
2.16	***	***	***	8.89	18.08	27.54	11.64	23.64	35.84
2.18	***	***	***	9.02	18.36	27.96	11.80	23.98	36.36
2.20	***	***	***	9.16	18.64	28.38	11.97	24.32	36.88
2.22	***	***	***	9.30	18.92	28.81	12.14	24.67	37.40
2.24	***	***	***	9.44	19.20	29.24	12.32	25.02	37.93
2.26	***	***	***	9.58	19.49	29.68	12.49	25.37	38.46
2.28	***	***	***	9.72	19.77	30.11	12.66	25.72	38.99
2.30	***	***	***	9.86	20.06	30.55	12.83	26.07	39.53
2.32	***	***	***	10.00	20.35	30.99	13.01	26.43	40.07
2.34	***	***	***	10.14	20.64	31.43	13.18	26.78	40.61
2.36	***	***	***	10.29	20.93	31.88	13.36	27.14	41.15
2.38	***	***	***	10.43	21.23	32.32	13.54	27.50	41.69
2.40	***	***	***	10.58	21.52	32.78	13.72	27.86	42.24
2.42	***	***	***	10.72	21.82	33.23	13.89	28.22	42.79
2.44	***	***	***	10.87	22.12	33.68	14.07	28.59	43.35
2.46	***	***	***	11.02	22.42	34.14	14.25	28.96	43.90
2.48	***	***	***	11.17	22.72	34.60	14.43	29.32	44.46
2.50	***	***	***	11.31	23.03	35.06	14.62	29.69	45.02
2.52	***	***	***	***	***	***	14.80	30.06	45.58
2.54	***	***	***	***	***	***	14.98	30.44	46.15
2.56	***	***	***	***	***	***	15.17	30.81	46.72
2.58	***	***	***	***	***	***	15.35	31.19	47.29
2.60	***	***	***	***	***	***	15.54	31.57	47.86
2.62	***	***	***	***	***	***	15.73	31.95	48.44
2.64	***	***	***	***	***	***	15.91	32.33	49.01
2.66	***	***	***	***	***	***	16.10	32.71	49.59
2.68	***	***	***	***	***	***	16.29	33.09	50.18
2.70	***	***	***	***	***	***	16.48	33.48	50.76
2.72	***	***	***	***	***	***	16.67	33.87	51.35
2.74	***	***	***	***	***	***	16.86	34.26	51.94
2.76	***	***	***	***	***	***	17.06	34.65	52.53
2.78	***	***	***	***	***	***	17.25	35.04	53.13
2.80	***	***	***	***	***	***	17.44	35.44	53.73
2.82	***	***	***	***	***	***	17.64	35.83	54.33
2.84	***	***	***	***	***	***	17.83	36.23	54.93
2.86	***	***	***	***	***	***	18.03	36.63	55.53
2.88	***	***	***	***	***	***	18.23	37.03	56.14
2.90	***	***	***	***	***	***	18.43	37.43	56.75
2.92	***	***	***	***	***	***	18.62	37.83	57.36
2.94	***	***	***	***	***	***	18.82	38.24	57.97
2.96	***	***	***	***	***	***	19.02	38.64	58.59
2.98	***	***	***	***	***	***	19.22	39.05	59.21
3.00	***	***	***	***	***	***	19.43	39.46	59.83

Table 5 Submerged flow calibration for 4 in × 3 ft Cutthroat flume, (Q, cfs)

h_a \ $h_a - h_b$	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.06	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.08	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.10	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.12	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.14	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.16	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.18	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.20	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.22	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.24	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.26	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.28	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.30	.1	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.32	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.34	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.36	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.38	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.40	.2	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.42	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.44	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.46	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.48	.2	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.50	.2	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.52	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.54	.3	.3	.4	.4	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.56	.3	.4	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.58	.3	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.60	.3	.4	.5	.5	.5	.5	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.62	.3	.4	.5	.5	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.64	.4	.4	.5	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.66	.4	.5	.5	.6	.6	.6	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.68	.4	.5	.6	.6	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.70	.4	.5	.6	.6	.7	.7	.7	.7	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.72	.4	.5	.6	.7	.7	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.74	.4	.6	.6	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.76	.5	.6	.7	.7	.8	.8	.8	.8	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.78	.5	.6	.7	.7	.8	.8	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.80	.5	.6	.7	.8	.8	.9	.9	.9	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.82	.5	.6	.7	.8	.9	.9	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.84	.5	.7	.8	.8	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.86	.6	.7	.8	.9	.9	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.88	.6	.7	.8	.9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2
.90	.6	.7	.8	.9	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.92	.6	.8	.9	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3
.94	.6	.8	.9	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.96	.7	.8	.9	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4
.98	.7	.8	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
1.00	.7	.9	1.0	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5

Table 5 (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	.7	.9	1.0	1.1	1.2	1.3	1.3	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
1.04	.7	.9	1.1	1.2	1.2	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6
1.06	.8	1.0	1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
1.08	.8	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7
1.10	.8	1.0	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
1.12	.8	1.0	1.2	1.3	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8
1.14	.8	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9
1.16	.9	1.1	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9
1.18	.9	1.1	1.3	1.4	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0
1.20	.9	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1.22	.9	1.2	1.4	1.5	1.6	1.7	1.7	1.8	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1
1.24	1.0	1.2	1.4	1.5	1.6	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
1.26	1.0	1.2	1.4	1.6	1.7	1.8	1.8	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
1.28	1.0	1.3	1.5	1.6	1.7	1.8	1.9	1.9	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3
1.30	1.0	1.3	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3
1.32	1.0	1.3	1.5	1.7	1.8	1.9	2.0	2.0	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4
1.34	1.1	1.4	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.5	2.5
1.36	1.1	1.4	1.6	1.7	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5
1.38	1.1	1.4	1.6	1.8	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6
1.40	1.1	1.5	1.7	1.8	2.0	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.7	2.7
1.42	1.2	1.5	1.7	1.9	2.0	2.1	2.2	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7
1.44	1.2	1.5	1.7	1.9	2.0	2.2	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.7	2.8	2.8	2.8	2.8
1.46	1.2	1.5	1.8	1.9	2.1	2.2	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.8	2.8	2.8	2.8	2.9	2.9
1.48	1.2	1.6	1.8	2.0	2.1	2.3	2.4	2.4	2.5	2.6	2.6	2.7	2.7	2.8	2.8	2.9	2.9	2.9	2.9	2.9
1.50	1.3	1.6	1.8	2.0	2.2	2.3	2.4	2.5	2.6	2.6	2.7	2.8	2.8	2.9	2.9	2.9	3.0	3.0	3.0	3.0
1.52	1.3	1.6	1.9	2.1	2.2	2.3	2.5	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.1	3.1
1.54	1.3	1.7	1.9	2.1	2.3	2.4	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.0	3.0	3.1	3.1	3.1	3.1	3.2
1.56	1.3	1.7	2.0	2.2	2.3	2.4	2.6	2.7	2.7	2.8	2.9	2.9	3.0	3.0	3.1	3.1	3.2	3.2	3.2	3.2
1.58	1.4	1.7	2.0	2.2	2.4	2.5	2.6	2.7	2.8	2.9	2.9	3.0	3.1	3.1	3.1	3.2	3.2	3.2	3.3	3.3
1.60	1.4	1.8	2.0	2.2	2.4	2.5	2.7	2.8	2.8	2.9	3.0	3.1	3.1	3.2	3.2	3.3	3.3	3.3	3.3	3.4
1.62	1.4	1.8	2.1	2.3	2.4	2.6	2.7	2.8	2.9	3.0	3.1	3.1	3.2	3.2	3.3	3.3	3.4	3.4	3.4	3.4
1.64	1.4	1.8	2.1	2.3	2.5	2.6	2.8	2.9	3.0	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.4	3.5	3.5	3.5
1.66	1.5	1.9	2.2	2.4	2.5	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.3	3.4	3.4	3.5	3.5	3.5	3.6	3.6
1.68	1.5	1.9	2.2	2.4	2.6	2.7	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.4	3.5	3.5	3.6	3.6	3.6	3.7
1.70	1.5	1.9	2.2	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.4	3.5	3.6	3.6	3.6	3.7	3.7	3.7
1.72	1.6	2.0	2.3	2.5	2.7	2.8	3.0	3.1	3.2	3.3	3.4	3.4	3.5	3.6	3.6	3.7	3.7	3.7	3.8	3.8
1.74	1.6	2.0	2.3	2.5	2.7	2.9	3.0	3.1	3.3	3.3	3.4	3.5	3.6	3.6	3.7	3.7	3.8	3.8	3.9	3.9
1.76	1.6	2.0	2.4	2.6	2.8	2.9	3.1	3.2	3.3	3.4	3.5	3.6	3.6	3.7	3.8	3.8	3.9	3.9	3.9	4.0
1.78	1.6	2.1	2.4	2.6	2.8	3.0	3.1	3.3	3.4	3.5	3.6	3.6	3.7	3.8	3.8	3.9	3.9	4.0	4.0	4.0
1.80	1.7	2.1	2.4	2.7	2.9	3.0	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.8	3.9	3.9	4.0	4.0	4.1	4.1
1.82	1.7	2.2	2.5	2.7	2.9	3.1	3.2	3.4	3.5	3.6	3.7	3.8	3.8	3.9	4.0	4.0	4.1	4.1	4.2	4.2
1.84	1.7	2.2	2.5	2.8	3.0	3.1	3.3	3.4	3.5	3.7	3.7	3.8	3.9	4.0	4.0	4.1	4.1	4.2	4.2	4.3
1.86	1.7	2.2	2.6	2.8	3.0	3.2	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.0	4.1	4.2	4.2	4.3	4.3	4.3
1.88	1.8	2.3	2.6	2.9	3.1	3.3	3.4	3.5	3.7	3.8	3.9	4.0	4.0	4.1	4.2	4.2	4.3	4.3	4.4	4.4
1.90	1.8	2.3	2.6	2.9	3.1	3.3	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.3	4.4	4.4	4.5	4.5
1.92	1.8	2.3	2.7	2.9	3.2	3.4	3.5	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.6
1.94	1.9	2.4	2.7	3.0	3.2	3.4	3.6	3.7	3.9	4.0	4.1	4.2	4.3	4.3	4.4	4.5	4.5	4.6	4.6	4.7
1.96	1.9	2.4	2.8	3.0	3.3	3.5	3.6	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.5	4.6	4.7	4.7	4.7
1.98	1.9	2.4	2.8	3.1	3.3	3.5	3.7	3.8	4.0	4.1	4.2	4.3	4.4	4.5	4.5	4.6	4.7	4.7	4.8	4.8
2.00	1.9	2.5	2.8	3.1	3.4	3.6	3.7	3.9	4.0	4.2	4.3	4.4	4.5	4.5	4.6	4.7	4.8	4.8	4.9	4.9

Table 5 (continued)

h_a	h_a-h_b .42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66	.68	.70
1.04	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
1.06	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
1.08	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
1.10	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
1.12	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
1.14	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
1.16	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
1.18	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1.20	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1.22	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
1.24	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
1.26	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
1.28	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
1.30	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
1.32	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
1.34	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
1.36	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
1.38	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
1.40	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1.42	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
1.44	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
1.46	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
1.48	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1.50	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
1.52	3.1	3.1	3.1	3.1	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
1.54	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
1.56	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
1.58	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1.60	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1.62	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1.64	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
1.66	3.6	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
1.68	3.7	3.7	3.7	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
1.70	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9
1.72	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0
1.74	3.9	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1.76	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
1.78	4.1	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
1.80	4.1	4.2	4.2	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1.82	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
1.84	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5
1.86	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.6	4.6	4.6
1.88	4.5	4.5	4.5	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.7	4.7	4.7
1.90	4.5	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.8	4.8
1.92	4.6	4.7	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
1.94	4.7	4.7	4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
1.96	4.8	4.8	4.9	4.9	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1.98	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
2.00	4.9	5.0	5.0	5.1	5.1	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2

Table 6 Submerged flow calibration for 8in × 3ft Cutthroat flume, (Q, cfs)

h_a	h_a-h_b																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.06	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.08	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.10	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.12	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.14	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.16	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.18	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.20	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.22	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.24	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.26	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.28	.2	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.30	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.32	.3	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.34	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.36	.3	.4	.4	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.38	.3	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.40	.4	.4	.5	.5	.5	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.42	.4	.5	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.44	.4	.5	.6	.6	.6	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.46	.4	.5	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.48	.5	.6	.7	.7	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.50	.5	.6	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.52	.5	.7	.7	.8	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.54	.6	.7	.8	.8	.9	.9	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.56	.6	.7	.8	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.58	.6	.8	.9	.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.60	.7	.8	.9	1.0	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.62	.7	.9	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.64	.7	.9	1.0	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.66	.8	.9	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.68	.8	1.0	1.1	1.2	1.3	1.3	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
.70	.8	1.0	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
.72	.9	1.1	1.2	1.3	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.74	.9	1.1	1.3	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.76	.9	1.2	1.3	1.4	1.5	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.78	1.0	1.2	1.4	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
.80	1.0	1.3	1.4	1.6	1.7	1.7	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
.82	1.0	1.3	1.5	1.6	1.7	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1
.84	1.1	1.4	1.6	1.7	1.8	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
.86	1.1	1.4	1.6	1.8	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3
.88	1.2	1.5	1.7	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4
.90	1.2	1.5	1.7	1.9	2.0	2.1	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5
.92	1.2	1.6	1.8	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6
.94	1.3	1.6	1.8	2.0	2.1	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7
.96	1.3	1.7	1.9	2.1	2.2	2.3	2.4	2.5	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8
.98	1.4	1.7	2.0	2.2	2.3	2.4	2.5	2.6	2.6	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9
1.00	1.4	1.8	2.0	2.2	2.4	2.5	2.6	2.7	2.7	2.8	2.8	2.9	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.0

Table 6 (continued)

h_a	h_a-h_b																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	1.5	1.6	2.1	2.3	2.4	2.6	2.7	2.8	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1
1.04	1.5	1.9	2.2	2.4	2.5	2.6	2.8	2.8	2.9	3.0	3.0	3.1	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2
1.06	1.5	1.9	2.2	2.4	2.6	2.7	2.8	2.9	3.0	3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.3
1.08	1.6	2.0	2.3	2.5	2.7	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4
1.10	1.6	2.1	2.4	2.6	2.7	2.9	3.0	3.1	3.2	3.3	3.3	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.6
1.12	1.7	2.1	2.4	2.6	2.6	3.0	3.1	3.2	3.3	3.4	3.4	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.7
1.14	1.7	2.2	2.5	2.7	2.9	3.1	3.2	3.3	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.8	3.8	3.8
1.16	1.8	2.2	2.5	2.8	3.0	3.1	3.3	3.4	3.5	3.6	3.6	3.7	3.7	3.8	3.8	3.8	3.9	3.9	3.9	3.9
1.18	1.8	2.3	2.6	2.9	3.1	3.2	3.4	3.5	3.6	3.7	3.7	3.8	3.8	3.9	3.9	4.0	4.0	4.0	4.0	4.0
1.20	1.9	2.3	2.7	2.9	3.1	3.3	3.5	3.6	3.7	3.8	3.8	3.9	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.1
1.22	1.9	2.4	2.8	3.0	3.2	3.4	3.5	3.7	3.8	3.9	3.9	4.0	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.3
1.24	1.9	2.5	2.8	3.1	3.3	3.5	3.6	3.8	3.9	4.0	4.1	4.1	4.2	4.2	4.3	4.3	4.3	4.4	4.4	4.4
1.26	2.0	2.5	2.9	3.2	3.4	3.6	3.7	3.9	4.0	4.1	4.2	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.5	4.5
1.28	2.0	2.6	3.0	3.2	3.5	3.7	3.8	4.0	4.1	4.2	4.3	4.3	4.4	4.5	4.5	4.6	4.6	4.6	4.6	4.6
1.30	2.1	2.6	3.0	3.3	3.6	3.8	3.9	4.1	4.2	4.3	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.7	4.8	4.8
1.32	2.1	2.7	3.1	3.4	3.6	3.8	4.0	4.2	4.3	4.4	4.5	4.6	4.6	4.7	4.8	4.8	4.8	4.9	4.9	4.9
1.34	2.2	2.8	3.2	3.5	3.7	3.9	4.1	4.3	4.4	4.5	4.6	4.7	4.8	4.8	4.9	4.9	5.0	5.0	5.0	5.0
1.36	2.2	2.8	3.2	3.6	3.8	4.0	4.2	4.4	4.5	4.6	4.7	4.8	4.9	4.9	5.0	5.0	5.1	5.1	5.1	5.2
1.38	2.3	2.9	3.3	3.6	3.9	4.1	4.3	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.1	5.2	5.2	5.3	5.3	5.3
1.40	2.3	3.0	3.4	3.7	4.0	4.2	4.4	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.2	5.3	5.3	5.4	5.4	5.4
1.42	2.4	3.0	3.5	3.8	4.1	4.3	4.5	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.4	5.5	5.5	5.6	5.6
1.44	2.4	3.1	3.5	3.9	4.2	4.4	4.6	4.8	4.9	5.0	5.2	5.3	5.4	5.4	5.5	5.6	5.6	5.7	5.7	5.7
1.46	2.5	3.2	3.6	4.0	4.2	4.5	4.7	4.9	5.0	5.2	5.3	5.4	5.5	5.6	5.6	5.7	5.7	5.8	5.8	5.9
1.48	2.5	3.2	3.7	4.0	4.3	4.6	4.8	5.0	5.1	5.3	5.4	5.5	5.6	5.7	5.8	5.8	5.9	5.9	6.0	6.0
1.50	2.6	3.3	3.8	4.1	4.4	4.7	4.9	5.1	5.2	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.0	6.1	6.1	6.1
1.52	2.6	3.4	3.8	4.2	4.5	4.8	5.0	5.2	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.1	6.2	6.2	6.3
1.54	2.7	3.4	3.9	4.3	4.6	4.9	5.1	5.3	5.5	5.6	5.8	5.9	6.0	6.1	6.1	6.2	6.3	6.3	6.4	6.4
1.56	2.7	3.5	4.0	4.4	4.7	5.0	5.2	5.4	5.6	5.7	5.9	6.0	6.1	6.2	6.3	6.4	6.4	6.5	6.5	6.6
1.58	2.8	3.6	4.1	4.5	4.8	5.1	5.3	5.5	5.7	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.6	6.7	6.7
1.60	2.8	3.6	4.1	4.6	4.9	5.2	5.4	5.6	5.8	6.0	6.1	6.2	6.4	6.5	6.5	6.6	6.7	6.8	6.8	6.9
1.62	2.9	3.7	4.2	4.6	5.0	5.3	5.5	5.7	5.9	6.1	6.2	6.4	6.5	6.6	6.7	6.8	6.8	6.9	7.0	7.0
1.64	3.0	3.8	4.3	4.7	5.1	5.4	5.6	5.8	6.0	6.2	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.0	7.1	7.2
1.66	3.0	3.8	4.4	4.8	5.2	5.5	5.7	6.0	6.2	6.3	6.5	6.6	6.7	6.9	7.0	7.0	7.1	7.2	7.3	7.3
1.68	3.1	3.9	4.5	4.9	5.3	5.6	5.8	6.1	6.3	6.4	6.6	6.7	6.9	7.0	7.1	7.2	7.3	7.3	7.4	7.5
1.70	3.1	4.0	4.5	5.0	5.4	5.7	5.9	6.2	6.4	6.6	6.7	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.6
1.72	3.2	4.0	4.6	5.1	5.5	5.8	6.1	6.3	6.5	6.7	6.9	7.0	7.1	7.3	7.4	7.5	7.6	7.6	7.7	7.8
1.74	3.2	4.1	4.7	5.2	5.6	5.9	6.2	6.4	6.6	6.8	7.0	7.1	7.3	7.4	7.5	7.6	7.7	7.8	7.9	7.9
1.76	3.3	4.2	4.8	5.3	5.7	6.0	6.3	6.5	6.7	6.9	7.1	7.3	7.4	7.5	7.7	7.8	7.8	7.9	8.0	8.1
1.78	3.3	4.2	4.9	5.4	5.8	6.1	6.4	6.6	6.9	7.1	7.2	7.4	7.5	7.7	7.8	7.9	8.0	8.1	8.2	8.2
1.80	3.4	4.3	5.0	5.4	5.9	6.2	6.5	6.8	7.0	7.2	7.4	7.5	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4
1.82	3.4	4.4	5.0	5.5	6.0	6.3	6.6	6.9	7.1	7.3	7.5	7.7	7.8	8.0	8.1	8.2	8.3	8.4	8.5	8.5
1.84	3.5	4.5	5.1	5.6	6.1	6.4	6.7	7.0	7.2	7.4	7.6	7.8	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7
1.86	3.6	4.5	5.2	5.7	6.2	6.5	6.8	7.1	7.3	7.6	7.8	7.9	8.1	8.2	8.4	8.5	8.6	8.7	8.8	8.9
1.88	3.6	4.6	5.3	5.8	6.3	6.6	6.9	7.2	7.5	7.7	7.9	8.1	8.2	8.4	8.5	8.6	8.7	8.8	8.9	9.0
1.90	3.7	4.7	5.4	5.9	6.4	6.7	7.1	7.3	7.6	7.8	8.0	8.2	8.4	8.5	8.7	8.8	8.9	9.0	9.1	9.2
1.92	3.7	4.8	5.5	6.0	6.5	6.8	7.2	7.5	7.7	8.0	8.2	8.3	8.5	8.7	8.8	8.9	9.1	9.2	9.3	9.3
1.94	3.8	4.8	5.5	6.1	6.6	6.9	7.3	7.6	7.8	8.1	8.3	8.5	8.7	8.8	9.0	9.1	9.2	9.3	9.4	9.5
1.96	3.8	4.9	5.6	6.2	6.7	7.1	7.4	7.7	8.0	8.2	8.4	8.6	8.8	9.0	9.1	9.2	9.4	9.5	9.6	9.7
1.98	3.9	5.0	5.7	6.3	6.8	7.2	7.5	7.8	8.1	8.3	8.6	8.8	8.9	9.1	9.3	9.4	9.5	9.6	9.7	9.8
2.00	4.0	5.1	5.8	6.4	6.9	7.3	7.6	7.9	8.2	8.5	8.7	8.9	9.1	9.3	9.4	9.5	9.7	9.8	9.9	10.0

Table 6 (continued)

h_a	$h_a - h_b$ .42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66	.68	.70
1.04	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
1.06	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
1.08	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1.10	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
1.12	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
1.14	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
1.16	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
1.18	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1.20	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
1.22	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1.24	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
1.26	4.5	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
1.28	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
1.30	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
1.32	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1.34	5.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
1.36	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
1.38	5.3	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
1.40	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
1.42	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
1.44	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
1.46	5.9	5.9	5.9	5.9	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1.48	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
1.50	6.2	6.2	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
1.52	6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
1.54	6.5	6.5	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
1.56	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
1.58	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
1.60	6.9	6.9	7.0	7.0	7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
1.62	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
1.64	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4
1.66	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6
1.68	7.5	7.5	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
1.70	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9
1.72	7.8	7.9	7.9	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.1
1.74	8.0	8.0	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3
1.76	8.1	8.2	8.2	8.3	8.3	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.4
1.78	8.3	8.3	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.6	8.6	8.6	8.6
1.80	8.4	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.7	8.7	8.7	8.8	8.8	8.8	8.8
1.82	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.9	8.9	8.9	8.9	9.0	9.0	9.0	9.0
1.84	8.8	8.8	8.9	8.9	9.0	9.0	9.0	9.0	9.1	9.1	9.1	9.1	9.1	9.1	9.1
1.86	8.9	9.0	9.0	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.3	9.3	9.3
1.88	9.1	9.1	9.2	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.5	9.5	9.5
1.90	9.2	9.3	9.4	9.4	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7
1.92	9.4	9.5	9.5	9.6	9.6	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.9	9.9
1.94	9.6	9.6	9.7	9.8	9.8	9.9	9.9	9.9	9.9	10.0	10.0	10.0	10.0	10.1	10.1
1.96	9.7	9.8	9.9	9.9	10.0	10.0	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.3
1.98	9.9	10.0	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.5
2.00	10.1	10.2	10.2	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.6	10.6	10.6	10.7

Table 7 Submerged flow calibration for 16 in × 3 ft Cutthroat flume, (Q, cfs)

h_a	$h_a - h_b$ .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.06	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.08	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.10	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.12	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.14	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.16	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.18	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.20	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.22	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.24	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.26	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.28	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.30	.4	.5	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.32	.4	.5	.6	.6	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.34	.5	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.36	.5	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.38	.6	.7	.8	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.40	.6	.8	.9	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.42	.7	.8	.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.44	.7	.9	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.46	.8	1.0	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.48	.8	1.0	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.50	.9	1.1	1.2	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
.52	.9	1.2	1.3	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.54	1.0	1.2	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.56	1.0	1.3	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.58	1.1	1.4	1.6	1.7	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
.60	1.2	1.5	1.6	1.8	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
.62	1.2	1.5	1.7	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
.64	1.3	1.6	1.8	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
.66	1.3	1.7	1.9	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
.68	1.4	1.8	2.0	2.2	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
.70	1.5	1.8	2.1	2.3	2.4	2.5	2.6	2.6	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
.72	1.5	1.9	2.2	2.4	2.5	2.6	2.7	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
.74	1.6	2.0	2.3	2.5	2.6	2.7	2.8	2.9	2.9	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
.76	1.7	2.1	2.4	2.6	2.7	2.8	2.9	3.0	3.1	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
.78	1.7	2.2	2.5	2.7	2.8	3.0	3.1	3.1	3.2	3.3	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4
.80	1.8	2.3	2.6	2.8	3.0	3.1	3.2	3.3	3.3	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
.82	1.9	2.3	2.7	2.9	3.1	3.2	3.3	3.4	3.5	3.5	3.6	3.6	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7
.84	1.9	2.4	2.8	3.0	3.2	3.3	3.5	3.6	3.6	3.7	3.7	3.8	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9
.86	2.0	2.5	2.9	3.1	3.3	3.5	3.6	3.7	3.8	3.8	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0
.88	2.1	2.6	3.0	3.2	3.4	3.6	3.7	3.8	3.9	4.0	4.0	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2
.90	2.1	2.7	3.1	3.3	3.6	3.7	3.9	4.0	4.1	4.1	4.2	4.3	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.4
.92	2.2	2.8	3.2	3.5	3.7	3.9	4.0	4.1	4.2	4.3	4.4	4.4	4.5	4.5	4.5	4.5	4.6	4.6	4.6	4.6
.94	2.3	2.9	3.3	3.6	3.8	4.0	4.2	4.3	4.4	4.5	4.5	4.6	4.6	4.6	4.7	4.7	4.8	4.8	4.8	4.8
.96	2.4	3.0	3.4	3.7	3.9	4.1	4.3	4.4	4.5	4.6	4.7	4.8	4.8	4.8	4.8	4.9	5.0	5.0	5.0	5.0
.98	2.4	3.1	3.5	3.8	4.1	4.3	4.4	4.6	4.7	4.8	4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.1	5.1	5.1
1.00	2.5	3.2	3.6	3.9	4.2	4.4	4.6	4.7	4.8	4.9	5.0	5.1	5.1	5.2	5.2	5.2	5.2	5.3	5.3	5.3

Table 7 (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	2.6	3.3	3.7	4.1	4.3	4.5	4.7	4.9	5.0	5.1	5.2	5.3	5.3	5.4	5.4	5.4	5.4	5.5	5.5	5.5
1.04	2.7	3.4	3.8	4.2	4.5	4.7	4.9	5.0	5.2	5.3	5.4	5.4	5.5	5.6	5.6	5.6	5.6	5.6	5.7	5.7
1.06	2.7	3.5	3.9	4.3	4.6	4.8	5.0	5.2	5.3	5.4	5.5	5.6	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.9
1.08	2.8	3.6	4.1	4.4	4.7	5.0	5.2	5.4	5.5	5.6	5.7	5.8	5.9	5.9	6.0	6.0	6.0	6.0	6.2	6.2
1.10	2.9	3.7	4.2	4.6	4.9	5.1	5.3	5.5	5.7	5.8	5.9	6.0	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.4
1.12	3.0	3.8	4.3	4.7	5.0	5.3	5.5	5.7	5.8	6.0	6.1	6.2	6.2	6.3	6.4	6.4	6.4	6.4	6.4	6.6
1.14	3.0	3.9	4.4	4.8	5.1	5.4	5.6	5.8	6.0	6.1	6.3	6.4	6.4	6.5	6.6	6.6	6.6	6.6	6.7	6.8
1.16	3.1	4.0	4.5	4.9	5.3	5.6	5.8	6.0	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.8	6.8	6.9	6.9	6.9
1.18	3.2	4.1	4.6	5.1	5.4	5.7	6.0	6.2	6.3	6.5	6.6	6.7	6.8	6.9	7.0	7.0	7.0	7.1	7.1	7.1
1.20	3.3	4.2	4.8	5.2	5.6	5.9	6.1	6.3	6.5	6.7	6.8	6.9	7.0	7.1	7.2	7.2	7.3	7.3	7.3	7.3
1.22	3.4	4.3	4.9	5.3	5.7	6.0	6.3	6.5	6.7	6.9	7.0	7.1	7.2	7.3	7.4	7.4	7.5	7.5	7.5	7.5
1.24	3.4	4.4	5.0	5.5	5.9	6.2	6.4	6.7	6.9	7.0	7.2	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.8	7.8
1.26	3.5	4.5	5.1	5.6	6.0	6.3	6.6	6.8	7.0	7.2	7.4	7.5	7.6	7.7	7.8	7.9	7.9	7.9	8.0	8.0
1.28	3.6	4.6	5.2	5.7	6.2	6.5	6.8	7.0	7.2	7.4	7.6	7.7	7.8	7.9	8.0	8.1	8.1	8.2	8.2	8.2
1.30	3.7	4.7	5.4	5.9	6.3	6.6	6.9	7.2	7.4	7.6	7.8	7.9	8.0	8.1	8.2	8.3	8.3	8.4	8.4	8.5
1.32	3.8	4.8	5.5	6.0	6.5	6.8	7.1	7.4	7.6	7.8	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.6	8.7	8.7
1.34	3.9	4.9	5.6	6.2	6.6	7.0	7.3	7.5	7.8	8.0	8.1	8.3	8.4	8.5	8.6	8.7	8.8	8.8	8.9	8.9
1.36	4.0	5.0	5.8	6.3	6.8	7.1	7.4	7.7	8.0	8.2	8.3	8.5	8.6	8.8	8.9	8.9	9.0	9.1	9.1	9.2
1.38	4.0	5.1	5.9	6.4	6.9	7.3	7.6	7.9	8.1	8.4	8.5	8.7	8.8	9.0	9.1	9.2	9.2	9.3	9.4	9.4
1.40	4.1	5.2	6.0	6.6	7.1	7.5	7.8	8.1	8.3	8.6	8.7	8.9	9.1	9.2	9.3	9.4	9.5	9.5	9.6	9.6
1.42	4.2	5.4	6.1	6.7	7.2	7.6	8.0	8.3	8.5	8.7	8.9	9.1	9.3	9.4	9.5	9.6	9.7	9.8	9.8	9.9
1.44	4.3	5.5	6.3	6.9	7.4	7.8	8.1	8.4	8.7	8.9	9.2	9.3	9.5	9.6	9.7	9.9	9.9	10.0	10.1	10.1
1.46	4.4	5.6	6.4	7.0	7.5	8.0	8.3	8.6	8.9	9.1	9.4	9.5	9.7	9.8	10.0	10.1	10.2	10.3	10.3	10.4
1.48	4.5	5.7	6.5	7.2	7.7	8.1	8.5	8.8	9.1	9.3	9.6	9.8	9.9	10.1	10.2	10.3	10.4	10.5	10.6	10.6
1.50	4.6	5.8	6.7	7.3	7.9	8.3	8.7	9.0	9.3	9.5	9.8	10.0	10.1	10.3	10.4	10.6	10.7	10.7	10.8	10.9
1.52	4.7	5.9	6.8	7.5	8.0	8.5	8.9	9.2	9.5	9.8	10.0	10.2	10.4	10.5	10.7	10.8	10.9	11.0	11.1	11.1
1.54	4.8	6.1	6.9	7.6	8.2	8.6	9.0	9.4	9.7	10.0	10.2	10.4	10.6	10.8	10.9	11.0	11.1	11.2	11.3	11.4
1.56	4.9	6.2	7.1	7.8	8.3	8.8	9.2	9.6	9.9	10.2	10.4	10.6	10.8	11.0	11.1	11.3	11.4	11.5	11.6	11.6
1.58	5.0	6.3	7.2	7.9	8.5	9.0	9.4	9.8	10.1	10.4	10.6	10.8	11.0	11.2	11.4	11.5	11.6	11.7	11.8	11.9
1.60	5.0	6.4	7.4	8.1	8.7	9.2	9.6	10.0	10.3	10.6	10.8	11.1	11.3	11.4	11.6	11.7	11.9	12.0	12.1	12.2
1.62	5.1	6.5	7.5	8.2	8.8	9.3	9.8	10.2	10.5	10.8	11.1	11.3	11.5	11.7	11.8	12.0	12.1	12.2	12.3	12.4
1.64	5.2	6.7	7.6	8.4	9.0	9.5	10.0	10.4	10.7	11.0	11.3	11.5	11.7	11.9	12.1	12.2	12.4	12.5	12.6	12.7
1.66	5.3	6.8	7.8	8.5	9.2	9.7	10.2	10.6	10.9	11.2	11.5	11.7	12.0	12.2	12.3	12.5	12.6	12.7	12.9	13.0
1.68	5.4	6.9	7.9	8.7	9.3	9.9	10.3	10.8	11.1	11.4	11.7	12.0	12.2	12.4	12.6	12.7	12.9	13.0	13.1	13.2
1.70	5.5	7.0	8.1	8.9	9.5	10.1	10.5	11.0	11.3	11.6	11.9	12.2	12.4	12.6	12.8	13.0	13.1	13.3	13.4	13.5
1.72	5.6	7.1	8.2	9.0	9.7	10.2	10.7	11.2	11.5	11.9	12.2	12.4	12.7	12.9	13.1	13.2	13.4	13.5	13.6	13.8
1.74	5.7	7.3	8.3	9.2	9.9	10.4	10.9	11.4	11.7	12.1	12.4	12.7	12.9	13.1	13.3	13.5	13.6	13.8	13.9	14.0
1.76	5.8	7.4	8.5	9.3	10.0	10.6	11.1	11.6	11.9	12.3	12.6	12.9	13.1	13.4	13.6	13.7	13.9	14.1	14.2	14.3
1.78	5.9	7.5	8.6	9.5	10.2	10.8	11.3	11.8	12.2	12.5	12.8	13.1	13.4	13.6	13.8	14.0	14.2	14.3	14.5	14.6
1.80	6.0	7.7	8.8	9.7	10.4	11.0	11.5	12.0	12.4	12.7	13.1	13.4	13.6	13.9	14.1	14.3	14.4	14.6	14.7	14.9
1.82	6.1	7.8	8.9	9.8	10.5	11.2	11.7	12.2	12.6	13.0	13.3	13.6	13.9	14.1	14.3	14.5	14.7	14.9	15.0	15.1
1.84	6.2	7.9	9.1	10.0	10.7	11.4	11.9	12.4	12.8	13.2	13.5	13.8	14.1	14.4	14.6	14.8	15.0	15.1	15.3	15.4
1.86	6.3	8.0	9.2	10.1	10.9	11.5	12.1	12.6	13.0	13.4	13.8	14.1	14.4	14.6	14.8	15.0	15.2	15.4	15.6	15.7
1.88	6.4	8.2	9.4	10.3	11.1	11.7	12.3	12.8	13.2	13.6	14.0	14.3	14.6	14.9	15.1	15.3	15.5	15.7	15.8	16.0
1.90	6.5	8.3	9.5	10.5	11.3	11.9	12.5	13.0	13.5	13.9	14.2	14.6	14.8	15.1	15.4	15.6	15.8	16.0	16.1	16.3
1.92	6.6	8.4	9.7	10.6	11.4	12.1	12.7	13.2	13.7	14.1	14.5	14.8	15.1	15.4	15.6	15.8	16.0	16.2	16.4	16.5
1.94	6.7	8.6	9.8	10.8	11.6	12.3	12.9	13.4	13.9	14.3	14.7	15.0	15.3	15.6	15.9	16.1	16.3	16.5	16.7	16.8
1.96	6.8	8.7	10.0	11.0	11.8	12.5	13.1	13.7	14.1	14.6	14.9	15.3	15.6	15.9	16.1	16.4	16.6	16.8	17.0	17.1
1.98	6.9	8.8	10.1	11.2	12.0	12.7	13.3	13.9	14.4	14.8	15.2	15.5	15.9	16.1	16.4	16.7	16.9	17.1	17.3	17.4
2.00	7.0	9.0	10.3	11.3	12.2	12.9	13.5	14.1	14.6	15.0	15.4	15.8	16.1	16.4	16.7	16.9	17.2	17.4	17.5	17.7

Table 7 (continued)

h_a	$h_a - h_b$														
	.42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66	.68	.70
1.04	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
1.06	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
1.08	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
1.10	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
1.12	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
1.14	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
1.16	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
1.18	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
1.20	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
1.22	7.5	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
1.24	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
1.26	8.0	8.0	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
1.28	8.2	8.2	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
1.30	8.5	8.5	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
1.32	8.7	8.7	8.7	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
1.34	8.9	9.0	9.0	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
1.36	9.2	9.2	9.2	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
1.38	9.4	9.5	9.5	9.5	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
1.40	9.7	9.7	9.7	9.7	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
1.42	9.9	10.0	10.0	10.0	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1.44	10.2	10.2	10.2	10.2	10.2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
1.46	10.4	10.5	10.5	10.5	10.5	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
1.48	10.7	10.7	10.7	10.8	10.8	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
1.50	10.9	11.0	11.0	11.0	11.0	11.0	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
1.52	11.2	11.2	11.3	11.3	11.3	11.3	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
1.54	11.4	11.5	11.5	11.6	11.6	11.6	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
1.56	11.7	11.8	11.8	11.8	11.8	11.9	11.9	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
1.58	12.0	12.0	12.1	12.1	12.1	12.1	12.1	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
1.60	12.2	12.3	12.3	12.4	12.4	12.4	12.4	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
1.62	12.5	12.6	12.6	12.6	12.7	12.7	12.7	12.7	13.0	13.0	13.0	13.0	13.0	13.0	13.0
1.64	12.8	12.8	12.9	12.9	13.0	13.0	13.0	13.0	13.3	13.3	13.3	13.3	13.3	13.3	13.3
1.66	13.0	13.1	13.2	13.2	13.2	13.3	13.3	13.3	13.3	13.6	13.6	13.6	13.6	13.6	13.6
1.68	13.3	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.6	13.9	13.9	13.9	13.9	13.9	13.9
1.70	13.6	13.7	13.7	13.8	13.8	13.8	13.9	13.9	13.9	14.2	14.2	14.2	14.2	14.2	14.2
1.72	13.9	13.9	14.0	14.1	14.1	14.1	14.2	14.2	14.2	14.2	14.5	14.5	14.5	14.5	14.5
1.74	14.1	14.2	14.3	14.3	14.4	14.4	14.5	14.5	14.5	14.5	14.8	14.8	14.8	14.8	14.8
1.76	14.4	14.5	14.6	14.6	14.7	14.7	14.8	14.8	14.8	14.8	15.1	15.1	15.1	15.1	15.1
1.78	14.7	14.8	14.9	14.9	15.0	15.0	15.1	15.1	15.1	15.1	15.1	15.4	15.4	15.4	15.4
1.80	15.0	15.1	15.1	15.2	15.3	15.3	15.4	15.4	15.4	15.4	15.4	15.8	15.8	15.8	15.8
1.82	15.2	15.3	15.4	15.5	15.6	15.6	15.7	15.7	15.7	15.7	15.8	16.1	16.1	16.1	16.1
1.84	15.5	15.6	15.7	15.8	15.9	15.9	16.0	16.0	16.0	16.1	16.1	16.1	16.4	16.4	16.4
1.86	15.8	15.9	16.0	16.1	16.2	16.2	16.3	16.3	16.4	16.4	16.4	16.4	16.7	16.7	16.7
1.88	16.1	16.2	16.3	16.4	16.5	16.5	16.6	16.6	16.7	16.7	16.7	16.7	17.1	17.1	17.1
1.90	16.4	16.5	16.6	16.7	16.8	16.9	16.9	17.0	17.0	17.0	17.0	17.0	17.0	17.4	17.4
1.92	16.7	16.8	16.9	17.0	17.1	17.2	17.2	17.3	17.3	17.3	17.4	17.4	17.4	17.8	17.8
1.94	17.0	17.1	17.2	17.3	17.4	17.5	17.5	17.6	17.6	17.7	17.7	17.7	17.7	18.1	18.1
1.96	17.3	17.4	17.5	17.6	17.7	17.8	17.9	17.9	18.0	18.0	18.0	18.0	18.1	18.1	18.4
1.98	17.6	17.7	17.8	17.9	18.0	18.1	18.2	18.2	18.3	18.3	18.4	18.4	18.4	18.4	18.8
2.00	17.9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.6	18.7	18.7	18.7	18.7	18.7	19.1

Table 8 Submerged flow calibration for 8 in × 6 ft Cutthroat flume, (Q, cfs)

h_a	h_a-h_b																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.05	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.08	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.10	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.12	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.14	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.16	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.18	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.20	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.22	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.24	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.26	.2	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.28	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.30	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.32	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.34	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.36	.4	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.38	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.40	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.42	.4	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.44	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.46	.5	.6	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.48	.5	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.50	.6	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.52	.6	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.54	.6	.7	.8	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.56	.7	.8	.9	.9	.9	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.58	.7	.8	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.60	.7	.9	.9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.62	.8	.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.64	.8	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.66	.8	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.68	.9	1.0	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.70	.9	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.72	1.0	1.1	1.2	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.74	1.0	1.2	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
.76	1.0	1.2	1.3	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.78	1.1	1.3	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.80	1.1	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.82	1.2	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.84	1.2	1.4	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
.86	1.2	1.5	1.6	1.7	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
.88	1.3	1.5	1.6	1.7	1.8	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
.90	1.3	1.6	1.7	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
.92	1.4	1.6	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
.94	1.4	1.7	1.8	1.9	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
.96	1.4	1.7	1.9	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
.98	1.5	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
1.00	1.5	1.8	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Table 8 (continued)

h_a	$h_a - h_b$																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	1.6	1.9	2.0	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6
1.04	1.6	1.9	2.1	2.2	2.3	2.4	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1.06	1.7	2.0	2.1	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1.08	1.7	2.0	2.2	2.3	2.5	2.5	2.6	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
1.10	1.7	2.1	2.3	2.4	2.5	2.6	2.7	2.7	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
1.12	1.8	2.1	2.3	2.5	2.6	2.7	2.7	2.8	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1.14	1.8	2.2	2.4	2.5	2.7	2.7	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1
1.16	1.9	2.2	2.4	2.6	2.7	2.8	2.9	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.2	3.2	3.2	3.2	3.2
1.18	1.9	2.3	2.5	2.7	2.8	2.9	3.0	3.0	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.3	3.3
1.20	2.0	2.3	2.6	2.7	2.9	3.0	3.0	3.1	3.2	3.2	3.2	3.3	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4
1.22	2.0	2.4	2.6	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.4	3.4	3.4	3.5	3.5	3.5	3.5	3.5
1.24	2.1	2.4	2.7	2.9	3.0	3.1	3.2	3.3	3.3	3.4	3.4	3.4	3.5	3.5	3.5	3.5	3.6	3.6	3.6	3.6
1.26	2.1	2.5	2.8	2.9	3.1	3.2	3.3	3.3	3.4	3.5	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
1.28	2.2	2.6	2.8	3.0	3.1	3.3	3.3	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
1.30	2.2	2.6	2.9	3.1	3.2	3.3	3.4	3.5	3.6	3.6	3.7	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8
1.32	2.3	2.7	2.9	3.1	3.3	3.4	3.5	3.6	3.7	3.7	3.8	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9
1.34	2.3	2.7	3.0	3.2	3.4	3.5	3.6	3.7	3.7	3.8	3.8	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0	4.0
1.36	2.4	2.8	3.1	3.3	3.4	3.6	3.7	3.7	3.8	3.9	3.9	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.1	4.1
1.38	2.4	2.8	3.1	3.3	3.5	3.6	3.7	3.8	3.9	4.0	4.0	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2
1.40	2.4	2.9	3.2	3.4	3.6	3.7	3.8	3.9	4.0	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3
1.42	2.5	3.0	3.3	3.5	3.7	3.8	3.9	4.0	4.1	4.1	4.2	4.2	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.4
1.44	2.5	3.0	3.3	3.5	3.7	3.9	4.0	4.1	4.2	4.2	4.3	4.3	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5
1.46	2.6	3.1	3.4	3.6	3.8	3.9	4.1	4.2	4.2	4.3	4.4	4.4	4.5	4.5	4.5	4.6	4.6	4.6	4.7	4.7
1.48	2.6	3.1	3.5	3.7	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.5	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.8
1.50	2.7	3.2	3.5	3.8	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.6	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.9
1.52	2.7	3.3	3.6	3.8	4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.7	4.8	4.8	4.8	4.9	4.9	4.9	4.9	5.0
1.54	2.8	3.3	3.7	3.9	4.1	4.3	4.4	4.5	4.6	4.7	4.7	4.8	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.0
1.56	2.8	3.4	3.7	4.0	4.2	4.3	4.5	4.6	4.7	4.8	4.8	4.9	5.0	5.0	5.0	5.1	5.1	5.1	5.1	5.1
1.58	2.9	3.4	3.8	4.1	4.3	4.4	4.6	4.7	4.8	4.9	4.9	5.0	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2
1.60	3.0	3.5	3.9	4.1	4.3	4.5	4.6	4.8	4.9	5.0	5.0	5.1	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.4
1.62	3.0	3.6	3.9	4.2	4.4	4.6	4.7	4.9	5.0	5.0	5.1	5.2	5.2	5.3	5.3	5.4	5.4	5.4	5.4	5.5
1.64	3.1	3.6	4.0	4.3	4.5	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.3	5.4	5.4	5.5	5.5	5.5	5.6	5.6
1.66	3.1	3.7	4.1	4.3	4.6	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.4	5.5	5.5	5.6	5.6	5.6	5.7	5.7
1.68	3.2	3.8	4.1	4.4	4.6	4.8	5.0	5.1	5.2	5.3	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.7	5.8	5.8
1.70	3.2	3.8	4.2	4.5	4.7	4.9	5.1	5.2	5.3	5.4	5.5	5.6	5.6	5.7	5.8	5.8	5.8	5.9	5.9	5.9
1.72	3.3	3.9	4.3	4.6	4.8	5.0	5.2	5.3	5.4	5.5	5.6	5.7	5.7	5.8	5.9	5.9	5.9	6.0	6.0	6.0
1.74	3.3	3.9	4.4	4.7	4.9	5.1	5.2	5.4	5.5	5.6	5.7	5.8	5.8	5.9	6.0	6.0	6.0	6.1	6.1	6.1
1.76	3.4	4.0	4.4	4.7	5.0	5.2	5.3	5.5	5.6	5.7	5.8	5.9	6.0	6.0	6.1	6.1	6.2	6.2	6.2	6.2
1.78	3.4	4.1	4.5	4.8	5.1	5.3	5.4	5.6	5.7	5.8	5.9	6.0	6.1	6.1	6.2	6.2	6.3	6.3	6.3	6.3
1.80	3.5	4.1	4.6	4.9	5.1	5.3	5.5	5.7	5.8	5.9	6.0	6.1	6.2	6.2	6.3	6.3	6.4	6.4	6.4	6.5
1.82	3.5	4.2	4.6	5.0	5.2	5.4	5.6	5.8	5.9	6.0	6.1	6.2	6.3	6.3	6.4	6.4	6.5	6.5	6.5	6.6
1.84	3.6	4.3	4.7	5.0	5.3	5.5	5.7	5.8	6.0	6.1	6.2	6.3	6.4	6.4	6.5	6.5	6.6	6.6	6.7	6.7
1.86	3.6	4.3	4.8	5.1	5.4	5.6	5.8	5.9	6.1	6.2	6.3	6.4	6.5	6.5	6.6	6.7	6.7	6.7	6.8	6.8
1.88	3.7	4.4	4.9	5.2	5.5	5.7	5.9	6.0	6.2	6.3	6.4	6.5	6.6	6.6	6.7	6.8	6.8	6.9	6.9	6.9
1.90	3.8	4.5	4.9	5.3	5.5	5.8	6.0	6.1	6.3	6.4	6.5	6.6	6.7	6.8	6.8	6.9	6.9	7.0	7.0	7.0
1.92	3.8	4.5	5.0	5.4	5.6	5.9	6.1	6.2	6.4	6.5	6.6	6.7	6.8	6.9	6.9	7.0	7.0	7.1	7.1	7.2
1.94	3.9	4.6	5.1	5.4	5.7	5.9	6.1	6.3	6.5	6.6	6.7	6.8	6.9	7.0	7.0	7.1	7.1	7.2	7.2	7.3
1.96	3.9	4.7	5.1	5.5	5.8	6.0	6.2	6.4	6.6	6.7	6.8	6.9	7.0	7.1	7.1	7.2	7.3	7.3	7.4	7.4
1.98	4.0	4.7	5.2	5.6	5.9	6.1	6.3	6.5	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.3	7.4	7.4	7.5	7.5
2.00	4.0	4.8	5.3	5.7	6.0	6.2	6.4	6.6	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.4	7.5	7.5	7.6	7.6

Table 8 (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
2.02	4.1	4.9	5.4	5.8	6.1	6.3	6.5	6.7	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.5	7.6	7.7	7.7	7.7
2.04	4.1	4.9	5.4	5.8	6.1	6.4	6.6	6.8	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.7	7.8	7.8	7.9
2.06	4.2	5.0	5.5	5.9	6.2	6.5	6.7	6.9	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.8	7.9	7.9	8.0
2.08	4.3	5.1	5.6	6.0	6.3	6.6	6.8	7.0	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.0	8.1	8.1
2.10	4.3	5.1	5.7	6.1	6.4	6.7	6.9	7.1	7.3	7.4	7.5	7.7	7.8	7.8	7.9	8.0	8.1	8.1	8.2	8.2
2.12	4.4	5.2	5.8	6.2	6.5	6.8	7.0	7.2	7.4	7.5	7.6	7.8	7.9	8.0	8.0	8.1	8.2	8.2	8.3	8.3
2.14	4.4	5.3	5.8	6.2	6.6	6.8	7.1	7.3	7.5	7.6	7.7	7.9	8.0	8.1	8.2	8.2	8.3	8.4	8.4	8.5
2.16	4.5	5.3	5.9	6.3	6.7	6.9	7.2	7.4	7.6	7.7	7.9	8.0	8.1	8.2	8.3	8.4	8.4	8.5	8.5	8.6
2.18	4.6	5.4	6.0	6.4	6.7	7.0	7.3	7.5	7.7	7.8	8.0	8.1	8.2	8.3	8.4	8.5	8.5	8.6	8.7	8.7
2.20	4.6	5.5	6.1	6.5	6.8	7.1	7.4	7.6	7.8	7.9	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.7	8.8	8.8
2.22	4.7	5.6	5.1	6.6	6.9	7.2	7.5	7.7	7.9	8.0	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.8	8.9	9.0
2.24	4.7	5.6	6.2	6.7	7.0	7.3	7.6	7.8	8.0	8.1	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.0	9.1
2.26	4.8	5.7	6.3	6.7	7.1	7.4	7.7	7.9	8.1	8.2	8.4	8.5	8.6	8.8	8.9	8.9	9.0	9.1	9.2	9.2
2.28	4.8	5.8	6.4	6.8	7.2	7.5	7.8	8.0	8.2	8.3	8.5	8.6	8.8	8.9	9.0	9.1	9.1	9.2	9.3	9.3
2.30	4.9	5.8	6.5	6.9	7.3	7.6	7.9	8.1	8.3	8.5	8.6	8.7	8.9	9.0	9.1	9.2	9.3	9.3	9.4	9.5
2.32	5.0	5.9	6.5	7.0	7.4	7.7	8.0	8.2	8.4	8.6	8.7	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.5	9.6
2.34	5.0	6.0	6.6	7.1	7.5	7.8	8.0	8.3	8.5	8.7	8.8	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.7
2.36	5.1	6.1	6.7	7.2	7.6	7.9	8.1	8.4	8.6	8.8	8.9	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.8
2.38	5.1	6.1	6.8	7.3	7.6	8.0	8.2	8.5	8.7	8.9	9.1	9.2	9.3	9.5	9.6	9.7	9.8	9.8	9.9	10.0
2.40	5.2	6.2	6.9	7.3	7.7	8.1	8.3	8.6	8.8	9.0	9.2	9.3	9.5	9.6	9.7	9.8	9.9	10.0	10.0	10.1
2.42	5.3	6.3	6.9	7.4	7.8	8.2	8.4	8.7	8.9	9.1	9.3	9.4	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.2
2.44	5.3	6.3	7.0	7.5	7.9	8.3	8.5	8.8	9.0	9.2	9.4	9.5	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4
2.46	5.4	6.4	7.1	7.6	8.0	8.4	8.6	8.9	9.1	9.3	9.5	9.7	9.8	9.9	10.0	10.2	10.3	10.3	10.4	10.5
2.48	5.5	6.5	7.2	7.7	8.1	8.5	8.7	9.0	9.2	9.4	9.6	9.8	9.9	10.1	10.2	10.3	10.4	10.5	10.5	10.6
2.50	5.5	6.6	7.3	7.8	8.2	8.6	8.9	9.1	9.3	9.5	9.7	9.9	10.0	10.2	10.3	10.4	10.5	10.6	10.7	10.7

Table 8 (continued)

h_a	h_a-h_b												
	.42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66
1.04	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1.06	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
1.08	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
1.10	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
1.12	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
1.14	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
1.16	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
1.18	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
1.20	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1.22	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
1.24	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
1.26	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
1.28	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
1.30	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
1.32	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
1.34	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1.36	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
1.38	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
1.40	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1.42	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
1.44	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
1.46	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
1.48	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
1.50	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
1.52	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1.54	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
1.56	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
1.58	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
1.60	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
1.62	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
1.64	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
1.66	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
1.68	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
1.70	5.9	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
1.72	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
1.74	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
1.76	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
1.78	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
1.80	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
1.82	6.6	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
1.84	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
1.86	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
1.88	6.9	7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
1.90	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
1.92	7.2	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
1.94	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
1.96	7.4	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
1.98	7.5	7.6	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
2.00	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
2.02	7.8	7.8	7.8	7.9	7.9	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.0

Table 8 (continued)

h_a	$h_a - h_b$ .42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66
2.04	7.9	7.9	8.0	8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.1	8.1	8.1
2.06	8.0	8.1	8.1	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2
2.08	8.1	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
2.10	8.3	8.3	8.3	8.4	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5
2.12	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6
2.14	8.5	8.5	8.6	8.6	8.6	8.6	8.7	8.8	8.8	8.8	8.8	8.8	8.8
2.16	8.6	8.7	8.7	8.7	8.8	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9
2.18	8.8	8.8	8.8	8.9	8.9	8.9	8.9	8.9	9.0	9.0	9.0	9.0	9.0
2.20	8.9	8.9	9.0	9.0	9.0	9.0	9.1	9.1	9.2	9.2	9.2	9.2	9.2
2.22	9.0	9.1	9.1	9.1	9.1	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3
2.24	9.1	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4
2.26	9.3	9.3	9.3	9.4	9.4	9.4	9.5	9.5	9.5	9.6	9.6	9.6	9.6
2.28	9.4	9.4	9.5	9.5	9.5	9.6	9.6	9.6	9.6	9.7	9.7	9.7	9.7
2.30	9.5	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.8	9.9	9.9	9.9	9.9
2.32	9.6	9.7	9.7	9.8	9.8	9.8	9.9	9.9	9.9	9.9	10.0	10.0	10.0
2.34	9.8	9.8	9.9	9.9	9.9	10.0	10.0	10.0	10.0	10.0	10.1	10.1	10.1
2.36	9.9	10.0	10.0	10.0	10.1	10.1	10.1	10.2	10.2	10.2	10.3	10.3	10.3
2.38	10.0	10.1	10.1	10.2	10.2	10.2	10.3	10.3	10.3	10.3	10.4	10.4	10.4
2.40	10.2	10.2	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.5	10.5	10.6	10.6
2.42	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.6	10.6	10.6	10.6	10.7	10.7
2.44	10.4	10.5	10.5	10.6	10.6	10.7	10.7	10.7	10.7	10.7	10.8	10.9	10.9
2.46	10.6	10.6	10.7	10.7	10.8	10.8	10.8	10.8	10.9	10.9	10.9	11.0	11.0
2.48	10.7	10.7	10.8	10.8	10.9	10.9	11.0	11.0	11.0	11.0	11.0	11.1	11.2
2.50	10.8	10.9	10.9	11.0	11.0	11.1	11.1	11.1	11.2	11.2	11.2	11.2	11.3

Table 9 Submerged flow calibration for 16 in × 6 ft Cutthroat flume, (Q, cfs)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.06	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.08	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.10	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.12	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.14	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.16	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.18	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.20	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.22	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.24	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.26	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.28	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.30	.6	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.32	.6	.7	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.34	.7	.8	.8	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.36	.7	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.38	.8	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.40	.8	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.42	.9	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.44	1.0	1.1	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.46	1.0	1.2	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.48	1.1	1.3	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
.50	1.2	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.52	1.2	1.4	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.54	1.3	1.5	1.6	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.56	1.4	1.6	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
.58	1.4	1.7	1.8	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
.60	1.5	1.8	1.9	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
.62	1.6	1.9	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
.64	1.7	1.9	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
.66	1.7	2.0	2.2	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
.68	1.8	2.1	2.3	2.4	2.5	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
.70	1.9	2.2	2.4	2.5	2.6	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
.72	2.0	2.3	2.5	2.6	2.7	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
.74	2.0	2.4	2.6	2.8	2.9	2.9	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
.76	2.1	2.5	2.7	2.9	3.0	3.1	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
.78	2.2	2.6	2.8	3.0	3.1	3.2	3.2	3.3	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
.80	2.3	2.7	2.9	3.1	3.2	3.3	3.4	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
.82	2.4	2.8	3.0	3.2	3.3	3.4	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
.84	2.4	2.9	3.1	3.3	3.4	3.5	3.6	3.7	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
.86	2.5	3.0	3.2	3.4	3.6	3.7	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
.88	2.6	3.1	3.3	3.5	3.7	3.8	3.9	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
.90	2.7	3.2	3.5	3.7	3.8	3.9	4.0	4.1	4.1	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
.92	2.8	3.3	3.6	3.8	3.9	4.1	4.2	4.2	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
.94	2.8	3.4	3.7	3.9	4.1	4.2	4.3	4.4	4.4	4.5	4.5	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
.96	2.9	3.5	3.8	4.0	4.2	4.3	4.4	4.5	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
.98	3.0	3.6	3.9	4.1	4.3	4.5	4.6	4.7	4.7	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
1.00	3.1	3.7	4.0	4.3	4.5	4.6	4.7	4.8	4.9	4.9	5.0	5.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1

Table 9 (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	3.2	3.8	4.1	4.4	4.6	4.7	4.9	5.0	5.0	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
1.04	3.3	3.9	4.3	4.5	4.7	4.9	5.0	5.1	5.2	5.2	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4
1.06	3.4	4.0	4.4	4.6	4.9	5.0	5.2	5.3	5.3	5.4	5.5	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6
1.08	3.5	4.1	4.5	4.8	5.0	5.2	5.3	5.4	5.5	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
1.10	3.6	4.2	4.6	4.9	5.1	5.3	5.4	5.6	5.6	5.7	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
1.12	3.6	4.3	4.7	5.0	5.3	5.4	5.6	5.7	5.8	5.9	5.9	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
1.14	3.7	4.4	4.9	5.2	5.4	5.6	5.7	5.9	6.0	6.0	6.1	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3
1.16	3.8	4.5	5.0	5.3	5.5	5.7	5.9	6.0	6.1	6.2	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5
1.18	3.9	4.6	5.1	5.4	5.7	5.9	6.0	6.2	6.3	6.4	6.4	6.5	6.5	6.6	6.6	6.7	6.7	6.7	6.7	6.7
1.20	4.0	4.8	5.2	5.6	5.8	6.0	6.2	6.3	6.4	6.5	6.6	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8
1.22	4.1	4.9	5.3	5.7	6.0	6.2	6.4	6.5	6.6	6.7	6.8	6.8	6.9	6.9	7.0	7.0	7.0	7.0	7.0	7.0
1.24	4.2	5.0	5.5	5.8	6.1	6.3	6.5	6.7	6.8	6.9	7.0	7.0	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2
1.26	4.3	5.1	5.6	6.0	6.2	6.5	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4
1.28	4.4	5.2	5.7	6.1	6.4	6.6	6.8	7.0	7.1	7.2	7.3	7.4	7.4	7.5	7.5	7.5	7.6	7.6	7.6	7.6
1.30	4.5	5.3	5.9	6.2	6.5	6.8	7.0	7.1	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.7	7.8	7.8	7.8	7.8
1.32	4.6	5.4	6.0	6.4	6.7	6.9	7.1	7.3	7.4	7.6	7.7	7.7	7.8	7.8	7.9	7.9	7.9	8.0	8.0	8.0
1.34	4.7	5.6	6.1	6.5	6.8	7.1	7.3	7.5	7.6	7.7	7.8	7.9	8.0	8.0	8.1	8.1	8.1	8.2	8.2	8.2
1.36	4.8	5.7	6.2	6.7	7.0	7.2	7.5	7.6	7.8	7.9	8.0	8.1	8.2	8.2	8.3	8.3	8.3	8.4	8.4	8.4
1.38	4.9	5.8	6.4	6.8	7.1	7.4	7.6	7.8	8.0	8.1	8.2	8.3	8.4	8.4	8.5	8.5	8.5	8.6	8.6	8.6
1.40	5.0	5.9	6.5	6.9	7.3	7.6	7.8	8.0	8.1	8.3	8.4	8.5	8.5	8.6	8.7	8.7	8.7	8.7	8.8	8.8
1.42	5.1	6.0	6.6	7.1	7.4	7.7	7.9	8.1	8.3	8.4	8.6	8.7	8.7	8.8	8.9	8.9	8.9	9.0	9.0	9.0
1.44	5.2	6.2	6.8	7.2	7.6	7.9	8.1	8.3	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.1	9.1	9.2	9.3	9.3
1.46	5.3	6.3	6.9	7.4	7.7	8.0	8.3	8.5	8.7	8.8	8.9	9.0	9.1	9.2	9.2	9.3	9.3	9.4	9.5	9.5
1.48	5.4	6.4	7.0	7.5	7.9	8.2	8.4	8.6	8.8	9.0	9.1	9.2	9.3	9.4	9.4	9.5	9.5	9.6	9.6	9.7
1.50	5.5	6.5	7.2	7.7	8.0	8.4	8.6	8.8	9.0	9.2	9.3	9.4	9.5	9.6	9.6	9.7	9.7	9.8	9.8	9.9
1.52	5.6	6.6	7.3	7.8	8.2	8.5	8.8	9.0	9.2	9.3	9.5	9.6	9.7	9.8	9.8	9.9	10.0	10.0	10.0	10.1
1.54	5.7	6.8	7.4	8.0	8.4	8.7	8.9	9.2	9.4	9.5	9.7	9.8	9.9	10.0	10.1	10.1	10.2	10.2	10.2	10.2
1.56	5.8	6.9	7.6	8.1	8.5	8.8	9.1	9.3	9.5	9.7	9.9	10.0	10.1	10.2	10.3	10.3	10.4	10.4	10.4	10.5
1.58	5.9	7.0	7.7	8.3	8.7	9.0	9.3	9.5	9.7	9.9	10.0	10.2	10.3	10.4	10.5	10.5	10.6	10.6	10.7	10.7
1.60	6.0	7.1	7.9	8.4	8.8	9.2	9.5	9.7	9.9	10.1	10.2	10.4	10.5	10.6	10.7	10.7	10.8	10.8	10.9	10.9
1.62	6.1	7.3	8.0	8.6	9.0	9.3	9.6	9.9	10.1	10.3	10.4	10.6	10.7	10.8	10.9	10.9	11.0	11.1	11.1	11.1
1.64	6.2	7.4	8.1	8.7	9.1	9.5	9.8	10.1	10.3	10.5	10.6	10.8	10.9	11.0	11.1	11.2	11.2	11.3	11.3	11.3
1.66	6.3	7.5	8.3	8.9	9.3	9.7	10.0	10.2	10.5	10.7	10.8	11.0	11.1	11.2	11.3	11.4	11.4	11.5	11.5	11.6
1.68	6.4	7.6	8.4	9.0	9.5	9.8	10.2	10.4	10.6	10.8	11.0	11.2	11.3	11.4	11.5	11.6	11.6	11.7	11.8	11.8
1.70	6.5	7.8	8.6	9.2	9.6	10.0	10.3	10.6	10.8	11.0	11.2	11.4	11.5	11.6	11.7	11.8	11.9	11.9	12.0	12.0
1.72	6.7	7.9	8.7	9.3	9.8	10.2	10.5	10.8	11.0	11.2	11.4	11.6	11.7	11.8	11.9	12.0	12.1	12.1	12.2	12.2
1.74	6.8	8.0	8.9	9.5	10.0	10.4	10.7	11.0	11.2	11.4	11.6	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.4	12.5
1.76	6.9	8.2	9.0	9.6	10.1	10.5	10.9	11.2	11.4	11.6	11.8	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.6	12.7
1.78	7.0	8.3	9.1	9.8	10.3	10.7	11.0	11.3	11.6	11.8	12.0	12.2	12.3	12.5	12.6	12.7	12.7	12.8	12.9	12.9
1.80	7.1	8.4	9.3	9.9	10.4	10.9	11.2	11.5	11.8	12.0	12.2	12.4	12.5	12.7	12.8	12.9	13.0	13.0	13.1	13.2
1.82	7.2	8.6	9.4	10.1	10.6	11.0	11.4	11.7	12.0	12.2	12.4	12.6	12.7	12.9	13.0	13.1	13.2	13.3	13.3	13.4
1.84	7.3	8.7	9.6	10.3	10.8	11.2	11.6	11.9	12.2	12.4	12.6	12.8	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.6
1.86	7.4	8.8	9.7	10.4	11.0	11.4	11.8	12.1	12.4	12.6	12.8	13.0	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9
1.88	7.5	9.0	9.9	10.6	11.1	11.6	12.0	12.3	12.6	12.8	13.0	13.2	13.4	13.5	13.7	13.8	13.9	14.0	14.0	14.1
1.90	7.6	9.1	10.0	10.7	11.3	11.7	12.1	12.5	12.8	13.0	13.2	13.4	13.6	13.7	13.9	14.0	14.1	14.2	14.3	14.3
1.92	7.8	9.2	10.2	10.9	11.5	11.9	12.3	12.7	13.0	13.2	13.4	13.6	13.8	14.0	14.1	14.2	14.3	14.4	14.5	14.6
1.94	7.9	9.4	10.3	11.1	11.6	12.1	12.5	12.9	13.2	13.4	13.6	13.8	14.0	14.2	14.3	14.4	14.6	14.6	14.7	14.8
1.96	8.0	9.5	10.5	11.2	11.8	12.3	12.7	13.0	13.4	13.6	13.9	14.1	14.2	14.4	14.5	14.7	14.8	14.9	15.0	15.0
1.98	8.1	9.6	10.6	11.4	12.0	12.5	12.9	13.2	13.6	13.8	14.1	14.3	14.5	14.6	14.8	14.9	15.0	15.1	15.2	15.3
2.00	8.2	9.8	10.8	11.5	12.1	12.6	13.1	13.4	13.8	14.0	14.3	14.5	14.7	14.8	15.0	15.1	15.2	15.4	15.4	15.5

Table 9 (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
2.02	8.3	9.9	10.9	11.7	12.3	12.8	13.3	13.6	14.0	14.2	14.5	14.7	14.9	15.1	15.2	15.4	15.5	15.6	15.7	15.8
2.04	8.4	10.0	11.1	11.9	12.5	13.0	13.5	13.8	14.2	14.4	14.7	14.9	15.1	15.3	15.5	15.6	15.7	15.8	15.9	16.0
2.06	8.6	10.2	11.2	12.0	12.7	13.2	13.6	14.0	14.4	14.6	14.9	15.1	15.3	15.5	15.7	15.8	16.0	16.1	16.2	16.3
2.08	8.7	10.3	11.4	12.2	12.8	13.4	13.8	14.2	14.6	14.9	15.1	15.4	15.6	15.7	15.9	16.1	16.2	16.3	16.4	16.5
2.10	8.8	10.5	11.6	12.4	13.0	13.6	14.0	14.4	14.8	15.1	15.3	15.6	15.8	16.0	16.1	16.3	16.4	16.5	16.7	16.7
2.12	8.9	10.6	11.7	12.5	13.2	13.8	14.2	14.6	15.0	15.3	15.6	15.8	16.0	16.2	16.4	16.5	16.7	16.8	16.9	17.0
2.14	9.0	10.7	11.9	12.7	13.4	13.9	14.4	14.8	15.2	15.5	15.8	16.0	16.2	16.4	16.6	16.8	16.9	17.0	17.1	17.2
2.16	9.1	10.9	12.0	12.9	13.6	14.1	14.6	15.0	15.4	15.7	16.0	16.2	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.5
2.18	9.3	11.0	12.2	13.0	13.7	14.3	14.8	15.2	15.6	15.9	16.2	16.5	16.7	16.9	17.1	17.2	17.4	17.5	17.6	17.7
2.20	9.4	11.2	12.3	13.2	13.9	14.5	15.0	15.4	15.8	16.1	16.4	16.7	16.9	17.1	17.3	17.5	17.6	17.8	17.9	18.0
2.22	9.5	11.3	12.5	13.4	14.1	14.7	15.2	15.6	16.0	16.3	16.6	16.9	17.1	17.4	17.5	17.7	17.9	18.0	18.1	18.2
2.24	9.6	11.5	12.7	13.6	14.3	14.9	15.4	15.8	16.2	16.6	16.9	17.1	17.4	17.6	17.8	18.0	18.1	18.3	18.4	18.5
2.26	9.7	11.6	12.8	13.7	14.5	15.1	15.6	16.0	16.4	16.8	17.1	17.4	17.6	17.8	18.0	18.2	18.4	18.5	18.6	18.8
2.28	9.9	11.7	13.0	13.9	14.6	15.3	15.8	16.2	16.6	17.0	17.3	17.6	17.8	18.1	18.3	18.4	18.6	18.8	18.9	19.0
2.30	10.0	11.9	13.1	14.1	14.8	15.5	16.0	16.4	16.9	17.2	17.5	17.8	18.1	18.3	18.5	18.7	18.9	19.0	19.1	19.3
2.32	10.1	12.0	13.3	14.3	15.0	15.6	16.2	16.7	17.1	17.4	17.8	18.0	18.3	18.5	18.7	18.9	19.1	19.3	19.4	19.5
2.34	10.2	12.2	13.5	14.4	15.2	15.8	16.4	16.9	17.3	17.6	18.0	18.3	18.5	18.8	19.0	19.2	19.4	19.5	19.7	19.8
2.36	10.4	12.3	13.6	14.6	15.4	16.0	16.6	17.1	17.5	17.9	18.2	18.5	18.8	19.0	19.2	19.4	19.6	19.8	19.9	20.0
2.38	10.5	12.5	13.8	14.8	15.6	16.2	16.8	17.3	17.7	18.1	18.4	18.7	19.0	19.2	19.5	19.7	19.9	20.0	20.2	20.3
2.40	10.6	12.6	14.0	15.0	15.8	16.4	17.0	17.5	17.9	18.3	18.7	19.0	19.2	19.5	19.7	19.9	20.1	20.3	20.4	20.6
2.42	10.7	12.8	14.1	15.1	15.9	16.6	17.2	17.7	18.1	18.5	18.9	19.2	19.5	19.7	20.0	20.2	20.4	20.5	20.7	20.8
2.44	10.8	12.9	14.3	15.3	16.1	16.8	17.4	17.9	18.4	18.8	19.1	19.4	19.7	20.0	20.2	20.4	20.6	20.8	20.9	21.1
2.46	11.0	13.1	14.4	15.5	16.3	17.0	17.6	18.1	18.6	19.0	19.3	19.7	20.0	20.2	20.5	20.7	20.9	21.0	21.2	21.4
2.48	11.1	13.2	14.6	15.7	16.5	17.2	17.8	18.3	18.8	19.2	19.6	19.9	20.2	20.5	20.7	20.9	21.1	21.3	21.5	21.6
2.50	11.2	13.4	14.8	15.8	16.7	17.4	18.0	18.5	19.0	19.4	19.8	20.1	20.4	20.7	21.0	21.2	21.4	21.6	21.7	21.9

Table 9 (continued)

h_a	$h_a - h_b$												
	.42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66
1.04	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
1.06	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
1.08	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
1.10	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
1.12	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
1.14	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
1.16	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
1.18	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
1.20	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
1.22	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
1.24	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
1.26	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
1.28	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
1.30	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
1.32	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1.34	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
1.36	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
1.38	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
1.40	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
1.42	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
1.44	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
1.46	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
1.48	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
1.50	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
1.52	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
1.54	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
1.56	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
1.58	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.6	10.8
1.60	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
1.62	11.1	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
1.64	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
1.66	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
1.68	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
1.70	12.0	12.1	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
1.72	12.3	12.3	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
1.74	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
1.76	12.7	12.8	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
1.78	13.0	13.0	13.0	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1
1.80	13.2	13.2	13.3	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
1.82	13.4	13.5	13.5	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
1.84	13.7	13.7	13.7	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9
1.86	13.9	13.9	14.0	14.0	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
1.88	14.1	14.2	14.2	14.2	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
1.90	14.4	14.4	14.5	14.5	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6
1.92	14.6	14.7	14.7	14.7	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
1.94	14.9	14.9	14.9	15.0	15.0	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
1.96	15.1	15.2	15.2	15.2	15.3	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
1.98	15.3	15.4	15.4	15.5	15.5	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
2.00	15.6	15.6	15.7	15.7	15.8	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9
2.02	15.8	15.9	15.9	16.0	16.0	16.0	16.2	16.2	16.2	16.2	16.2	16.2	16.2

Table 9 (continued)

h_a	h_a-h_b .42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66
2.04	16.1	16.1	16.2	16.2	16.3	16.3	16.5	16.5	16.5	16.5	16.5	16.5	16.5
2.06	16.3	16.4	16.4	16.5	16.5	16.6	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2.08	16.6	16.6	16.7	16.7	16.8	16.8	16.8	17.0	17.0	17.0	17.0	17.0	17.0
2.10	16.8	16.9	17.0	17.0	17.0	17.1	17.1	17.3	17.3	17.3	17.3	17.3	17.3
2.12	17.1	17.1	17.2	17.3	17.3	17.3	17.4	17.5	17.5	17.5	17.5	17.5	17.5
2.14	17.3	17.4	17.5	17.5	17.6	17.6	17.6	17.8	17.8	17.8	17.8	17.8	17.8
2.16	17.6	17.7	17.7	17.8	17.8	17.9	17.9	17.9	18.1	18.1	18.1	18.1	18.1
2.18	17.8	17.9	18.0	18.0	18.1	18.1	18.2	18.2	18.4	18.4	18.4	18.4	18.4
2.20	18.1	18.2	18.2	18.3	18.4	18.4	18.4	18.5	18.6	18.6	18.6	18.6	18.6
2.22	18.3	18.4	18.5	18.6	18.6	18.7	18.7	18.7	18.9	18.9	18.9	18.9	18.9
2.24	18.6	18.7	18.8	18.8	18.9	18.9	19.0	19.0	19.0	19.2	19.2	19.2	19.2
2.26	18.9	18.9	19.0	19.1	19.2	19.2	19.2	19.3	19.3	19.5	19.5	19.5	19.5
2.28	19.1	19.2	19.3	19.4	19.4	19.5	19.5	19.6	19.6	19.8	19.8	19.8	19.8
2.30	19.4	19.5	19.6	19.6	19.7	19.7	19.8	19.8	19.9	20.1	20.1	20.1	20.1
2.32	19.6	19.7	19.8	19.9	20.0	20.0	20.1	20.1	20.1	20.2	20.3	20.3	20.3
2.34	19.9	20.0	20.1	20.2	20.2	20.3	20.3	20.4	20.4	20.4	20.6	20.6	20.6
2.36	20.2	20.3	20.4	20.4	20.5	20.6	20.6	20.7	20.7	20.7	20.9	20.9	20.9
2.38	20.4	20.5	20.6	20.7	20.8	20.8	20.9	20.9	21.0	21.0	21.2	21.2	21.2
2.40	20.7	20.8	20.9	21.0	21.1	21.1	21.2	21.2	21.3	21.3	21.3	21.5	21.5
2.42	21.0	21.1	21.2	21.3	21.3	21.4	21.5	21.5	21.6	21.6	21.6	21.8	21.8
2.44	21.2	21.3	21.4	21.5	21.6	21.7	21.7	21.8	21.8	21.9	21.9	22.1	22.1
2.46	21.5	21.6	21.7	21.8	21.9	22.0	22.0	22.1	22.1	22.2	22.2	22.4	22.4
2.48	21.8	21.9	22.0	22.1	22.2	22.2	22.3	22.4	22.4	22.5	22.5	22.5	22.7
2.50	22.0	22.1	22.3	22.4	22.4	22.5	22.6	22.7	22.7	22.7	22.8	22.8	23.0

Table 10 Submerged flow calibration for 24 in × 6 ft Cutthroat flume, (Q, cfs)

h_a	$h_a - h_b$																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.06	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.08	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.10	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.12	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.14	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.16	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.18	.4	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.20	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.22	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.24	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.26	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.28	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.30	.9	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.32	.9	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.34	1.0	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.36	1.1	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.38	1.2	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.40	1.3	1.5	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.42	1.4	1.6	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.44	1.5	1.7	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
.46	1.6	1.8	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
.48	1.7	1.9	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
.50	1.8	2.1	2.2	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
.52	1.9	2.2	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
.54	2.0	2.3	2.5	2.6	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
.56	2.1	2.4	2.6	2.8	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
.58	2.2	2.6	2.8	2.9	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
.60	2.3	2.7	2.9	3.1	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
.62	2.4	2.8	3.1	3.2	3.3	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
.64	2.5	3.0	3.2	3.4	3.5	3.6	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
.66	2.6	3.1	3.4	3.5	3.7	3.7	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
.68	2.7	3.2	3.5	3.7	3.8	3.9	4.0	4.0	4.1	4.1	4.I	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
.70	2.9	3.4	3.7	3.9	4.0	4.1	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
.72	3.0	3.5	3.8	4.0	4.2	4.3	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
.74	3.1	3.6	4.0	4.2	4.3	4.5	4.5	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
.76	3.2	3.8	4.1	4.4	4.5	4.6	4.7	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
.78	3.3	3.9	4.3	4.5	4.7	4.8	4.9	5.0	5.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
.80	3.5	4.1	4.4	4.7	4.9	5.0	5.1	5.2	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
.82	3.6	4.2	4.6	4.9	5.1	5.2	5.3	5.4	5.5	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
.84	3.7	4.4	4.8	5.0	5.3	5.4	5.5	5.6	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
.86	3.8	4.5	4.9	5.2	5.4	5.6	5.7	5.8	5.9	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
.88	4.0	4.7	5.1	5.4	5.6	5.8	5.9	6.0	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
.90	4.1	4.8	5.3	5.6	5.8	6.0	6.1	6.2	6.3	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
.92	4.2	5.0	5.4	5.8	6.0	6.2	6.3	6.5	6.5	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
.94	4.3	5.1	5.6	5.9	6.2	6.4	6.5	6.7	6.8	6.8	6.9	6.9	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
.96	4.5	5.3	5.8	6.1	6.4	6.6	6.8	6.9	7.0	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
.98	4.6	5.4	5.9	6.3	6.6	6.8	7.0	7.1	7.2	7.3	7.3	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
1.00	4.7	5.6	6.1	6.5	6.8	7.0	7.2	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7

Table 10 (continued)

h_a	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
	$h_a - h_b$																			
1.02	4.9	5.7	6.3	6.7	7.0	7.2	7.4	7.6	7.7	7.8	7.8	7.9	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1.04	5.0	5.9	6.5	6.9	7.2	7.4	7.6	7.8	7.9	8.0	8.1	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2
1.06	5.1	6.1	6.7	7.1	7.4	7.6	7.8	8.0	8.1	8.2	8.3	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5
1.08	5.3	6.2	6.8	7.3	7.6	7.9	8.1	8.2	8.4	8.5	8.5	8.6	8.7	8.7	8.8	8.8	8.8	8.8	8.8	8.8
1.10	5.4	6.4	7.0	7.5	7.8	8.1	8.3	8.5	8.6	8.7	8.8	8.9	8.9	8.9	9.0	9.0	9.0	9.0	9.0	9.0
1.12	5.5	6.6	7.2	7.7	8.0	8.3	8.5	8.7	8.8	9.0	9.0	9.1	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3
1.14	5.7	6.7	7.4	7.9	8.2	8.5	8.7	8.9	9.1	9.2	9.3	9.4	9.4	9.5	9.6	9.6	9.6	9.6	9.6	9.6
1.16	5.8	6.9	7.6	8.1	8.4	8.7	9.0	9.2	9.3	9.5	9.6	9.6	9.7	9.7	9.8	9.9	9.9	9.9	9.9	9.9
1.18	6.0	7.1	7.8	8.3	8.7	9.0	9.2	9.4	9.6	9.7	9.8	9.9	10.0	10.0	10.0	10.1	10.1	10.1	10.1	10.1
1.20	6.1	7.2	8.0	8.5	8.9	9.2	9.4	9.6	9.8	10.0	10.1	10.2	10.2	10.3	10.3	10.4	10.4	10.4	10.4	10.4
1.22	6.3	7.4	8.1	8.7	9.1	9.4	9.7	9.9	10.1	10.2	10.3	10.4	10.5	10.6	10.6	10.7	10.7	10.7	10.7	10.7
1.24	6.4	7.6	8.3	8.9	9.3	9.6	9.9	10.1	10.3	10.5	10.6	10.7	10.8	10.8	10.9	10.9	11.0	11.0	11.0	11.0
1.26	6.5	7.8	8.5	9.1	9.5	9.9	10.1	10.4	10.6	10.7	10.9	11.0	11.0	11.1	11.2	11.2	11.3	11.3	11.3	11.3
1.28	6.7	7.9	8.7	9.3	9.7	10.1	10.4	10.6	10.8	11.0	11.1	11.2	11.3	11.4	11.4	11.5	11.6	11.6	11.6	11.6
1.30	6.8	8.1	8.9	9.5	10.0	10.3	10.6	10.9	11.1	11.2	11.4	11.5	11.6	11.7	11.7	11.8	11.9	11.9	11.9	11.9
1.32	7.0	8.3	9.1	9.7	10.2	10.6	10.9	11.1	11.3	11.5	11.7	11.8	11.9	12.0	12.0	12.1	12.1	12.2	12.2	12.2
1.34	7.1	8.5	9.3	9.9	10.4	10.8	11.1	11.4	11.6	11.8	11.9	12.1	12.2	12.2	12.3	12.4	12.4	12.5	12.5	12.5
1.36	7.3	8.6	9.5	10.1	10.6	11.0	11.4	11.6	11.8	12.0	12.2	12.3	12.4	12.5	12.6	12.6	12.7	12.8	12.8	12.8
1.38	7.4	8.8	9.7	10.4	10.9	11.3	11.6	11.9	12.1	12.3	12.5	12.6	12.7	12.8	12.9	12.9	13.0	13.1	13.1	13.1
1.40	7.6	9.0	9.9	10.6	11.1	11.5	11.8	12.1	12.4	12.6	12.7	12.9	13.0	13.1	13.2	13.2	13.3	13.3	13.4	13.4
1.42	7.7	9.2	10.1	10.8	11.3	11.7	12.1	12.4	12.6	12.8	13.0	13.2	13.3	13.4	13.5	13.5	13.6	13.6	13.8	13.8
1.44	7.9	9.4	10.3	11.0	11.5	12.0	12.3	12.6	12.9	13.1	13.3	13.5	13.6	13.7	13.8	13.9	13.9	13.9	14.1	14.1
1.46	8.0	9.6	10.5	11.2	11.8	12.2	12.6	12.9	13.2	13.4	13.6	13.7	13.9	14.0	14.1	14.2	14.2	14.3	14.4	14.4
1.48	8.2	9.7	10.7	11.4	12.0	12.5	12.9	13.2	13.4	13.7	13.9	14.0	14.2	14.3	14.4	14.5	14.5	14.6	14.6	14.7
1.50	8.4	9.9	10.9	11.7	12.2	12.7	13.1	13.4	13.7	13.9	14.1	14.3	14.5	14.6	14.7	14.8	14.8	14.9	14.9	15.1
1.52	8.5	10.1	11.1	11.9	12.5	13.0	13.4	13.7	14.0	14.2	14.4	14.6	14.8	14.9	15.0	15.1	15.2	15.2	15.2	15.4
1.54	8.7	10.3	11.3	12.1	12.7	13.2	13.6	14.0	14.3	14.5	14.7	14.9	15.1	15.2	15.3	15.4	15.5	15.5	15.6	15.6
1.56	8.8	10.5	11.6	12.3	13.0	13.5	13.9	14.2	14.5	14.8	15.0	15.2	15.4	15.5	15.6	15.7	15.8	15.8	15.9	15.9
1.58	9.0	10.7	11.8	12.6	13.2	13.7	14.1	14.5	14.8	15.1	15.3	15.5	15.7	15.8	15.9	16.0	16.1	16.2	16.2	16.3
1.60	9.2	10.9	12.0	12.8	13.4	14.0	14.4	14.8	15.1	15.4	15.6	15.8	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.6
1.62	9.3	11.1	12.2	13.0	13.7	14.2	14.7	15.0	15.4	15.6	15.9	16.1	16.3	16.4	16.6	16.7	16.8	16.8	16.9	16.9
1.64	9.5	11.3	12.4	13.3	13.9	14.5	14.9	15.3	15.6	15.9	16.2	16.4	16.6	16.7	16.9	17.0	17.1	17.2	17.2	17.3
1.66	9.6	11.4	12.6	13.5	14.2	14.7	15.2	15.6	15.9	16.2	16.5	16.7	16.9	17.0	17.2	17.3	17.4	17.5	17.6	17.6
1.68	9.8	11.6	12.8	13.7	14.4	15.0	15.5	15.9	16.2	16.5	16.8	17.0	17.2	17.4	17.5	17.6	17.7	17.8	17.9	17.9
1.70	10.0	11.8	13.0	13.9	14.7	15.2	15.7	16.1	16.5	16.8	17.1	17.3	17.5	17.7	17.8	18.0	18.1	18.2	18.2	18.3
1.72	10.1	12.0	13.3	14.2	14.9	15.5	16.0	16.4	16.8	17.1	17.4	17.6	17.8	18.0	18.2	18.3	18.4	18.5	18.6	18.6
1.74	10.3	12.2	13.5	14.4	15.2	15.8	16.3	16.7	17.1	17.4	17.7	17.9	18.1	18.3	18.5	18.6	18.7	18.8	18.9	19.0
1.76	10.5	12.4	13.7	14.7	15.4	16.0	16.5	17.0	17.4	17.7	18.0	18.2	18.4	18.6	18.8	18.9	19.1	19.2	19.3	19.3
1.78	10.6	12.6	13.9	14.9	15.7	16.3	16.8	17.3	17.7	18.0	18.3	18.5	18.8	19.0	19.1	19.3	19.4	19.5	19.6	19.7
1.80	10.8	12.8	14.2	15.1	15.9	16.6	17.1	17.5	17.9	18.3	18.6	18.9	19.1	19.3	19.5	19.6	19.7	19.9	20.0	20.0
1.82	11.0	13.0	14.4	15.4	16.2	16.8	17.4	17.8	18.2	18.6	18.9	19.2	19.4	19.6	19.8	19.9	20.1	20.2	20.3	20.4
1.84	11.1	13.2	14.6	15.6	16.4	17.1	17.6	18.1	18.5	18.9	19.2	19.5	19.7	19.9	20.1	20.3	20.4	20.5	20.7	20.7
1.86	11.3	13.4	14.8	15.9	16.7	17.4	17.9	18.4	18.8	19.2	19.5	19.8	20.0	20.3	20.5	20.6	20.8	20.9	21.0	21.1
1.88	11.5	13.6	15.0	16.1	16.9	17.6	18.2	18.7	19.1	19.5	19.8	20.1	20.4	20.6	20.8	21.0	21.1	21.2	21.4	21.5
1.90	11.6	13.8	15.3	16.3	17.2	17.9	18.5	19.0	19.4	19.8	20.1	20.4	20.7	20.9	21.1	21.3	21.5	21.6	21.7	21.8
1.92	11.8	14.1	15.5	16.6	17.5	18.2	18.8	19.3	19.7	20.1	20.5	20.8	21.0	21.3	21.5	21.7	21.8	21.9	22.1	22.2
1.94	12.0	14.3	15.7	16.8	17.7	18.4	19.0	19.6	20.0	20.4	20.8	21.1	21.4	21.6	21.8	22.0	22.2	22.3	22.4	22.5
1.96	12.2	14.5	16.0	17.1	18.0	18.7	19.3	19.9	20.3	20.7	21.1	21.4	21.7	21.9	22.2	22.3	22.5	22.7	22.8	22.9
1.98	12.3	14.7	16.2	17.3	18.2	19.0	19.6	20.2	20.6	21.0	21.4	21.7	22.0	22.3	22.5	22.7	22.9	23.0	23.2	23.3
2.00	12.5	14.9	16.4	17.6	18.5	19.3	19.9	20.5	20.9	21.4	21.7	22.1	22.4	22.6	22.8	23.0	23.2	23.4	23.5	23.6

Table 10 (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
2.02	12.7	15.1	16.7	17.8	18.8	19.5	20.2	20.8	21.2	21.7	22.1	22.4	22.7	22.9	23.2	23.4	23.6	23.7	23.9	24.0
2.04	12.9	15.3	16.9	18.1	19.0	19.8	20.5	21.1	21.6	22.0	22.4	22.7	23.0	23.3	23.5	23.7	23.9	24.1	24.2	24.4
2.06	13.0	15.5	17.1	18.3	19.3	20.1	20.8	21.4	21.9	22.3	22.7	23.0	23.4	23.6	23.9	24.1	24.3	24.5	24.6	24.7
2.08	13.2	15.7	17.4	18.6	19.6	20.4	21.1	21.7	22.2	22.6	23.0	23.4	23.7	24.0	24.2	24.5	24.7	24.8	25.0	25.1
2.10	13.4	15.9	17.6	18.8	19.8	20.7	21.4	22.0	22.5	22.9	23.4	23.7	24.0	24.3	24.6	24.8	25.0	25.2	25.4	25.5
2.12	13.6	16.2	17.8	19.1	20.1	20.9	21.6	22.3	22.8	23.3	23.7	24.0	24.4	24.7	24.9	25.2	25.4	25.6	25.7	25.9
2.14	13.7	16.4	18.1	19.4	20.4	21.2	21.9	22.6	23.1	23.6	24.0	24.4	24.7	25.0	25.3	25.5	25.7	25.9	26.1	26.3
2.16	13.9	16.6	18.3	19.6	20.6	21.5	22.2	22.9	23.4	23.9	24.3	24.7	25.1	25.4	25.6	25.9	26.1	26.3	26.5	26.6
2.18	14.1	16.8	18.6	19.9	20.9	21.8	22.5	23.2	23.7	24.2	24.7	25.1	25.4	25.7	26.0	26.3	26.5	26.7	26.9	27.0
2.20	14.3	17.0	18.8	20.1	21.2	22.1	22.8	23.5	24.1	24.6	25.0	25.4	25.8	26.1	26.4	26.6	26.8	27.1	27.2	27.4
2.22	14.5	17.2	19.0	20.4	21.5	22.4	23.1	23.8	24.4	24.9	25.3	25.7	26.1	26.4	26.7	27.0	27.2	27.4	27.6	27.8
2.24	14.7	17.4	19.3	20.6	21.7	22.7	23.4	24.1	24.7	25.2	25.7	26.1	26.5	26.8	27.1	27.3	27.6	27.8	28.0	28.2
2.26	14.8	17.7	19.5	20.9	22.0	22.9	23.7	24.4	25.0	25.5	26.0	26.4	26.8	27.1	27.4	27.7	28.0	28.2	28.4	28.6
2.28	15.0	17.9	19.8	21.2	22.3	23.2	24.0	24.7	25.3	25.9	26.3	26.8	27.2	27.5	27.8	28.1	28.3	28.6	28.8	28.9
2.30	15.2	18.1	20.0	21.4	22.6	23.5	24.3	25.0	25.7	26.2	26.7	27.1	27.5	27.9	28.2	28.5	28.7	28.9	29.1	29.3
2.32	15.4	18.3	20.3	21.7	22.9	23.8	24.6	25.4	26.0	26.5	27.0	27.5	27.9	28.2	28.5	28.8	29.1	29.3	29.5	29.7
2.34	15.6	18.6	20.5	22.0	23.1	24.1	25.0	25.7	26.3	26.9	27.4	27.8	28.2	28.6	28.9	29.2	29.5	29.7	29.9	30.1
2.36	15.8	18.8	20.7	22.2	23.4	24.4	25.3	26.0	26.6	27.2	27.7	28.2	28.6	28.9	29.3	29.6	29.9	30.1	30.3	30.5
2.38	16.0	19.0	21.0	22.5	23.7	24.7	25.6	26.3	27.0	27.5	28.1	28.5	28.9	29.3	29.6	30.0	30.2	30.5	30.7	30.9
2.40	16.1	19.2	21.2	22.8	24.0	25.0	25.9	26.6	27.3	27.9	28.4	28.9	29.3	29.7	30.0	30.3	30.6	30.9	31.1	31.3
2.42	16.3	19.5	21.5	23.0	24.3	25.3	26.2	26.9	27.6	28.2	28.7	29.2	29.7	30.0	30.4	30.7	31.0	31.3	31.5	31.7
2.44	16.5	19.7	21.7	23.3	24.6	25.6	26.5	27.3	28.0	28.6	29.1	29.6	30.0	30.4	30.8	31.1	31.4	31.7	31.9	32.1
2.46	16.7	19.9	22.0	23.6	24.8	25.9	26.8	27.6	28.3	28.9	29.4	29.9	30.4	30.8	31.1	31.5	31.8	32.0	32.3	32.5
2.48	16.9	20.1	22.3	23.8	25.1	26.2	27.1	27.9	28.6	29.2	29.8	30.3	30.7	31.2	31.5	31.9	32.2	32.4	32.7	32.9
2.50	17.1	20.4	22.5	24.1	25.4	26.5	27.4	28.2	29.0	29.5	30.1	30.7	31.1	31.5	31.9	32.2	32.5	32.8	33.1	33.3

Table 10 (continued)

h_a	$h_a - h_b$												
	.42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66
1.04	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
1.06	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
1.08	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
1.10	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
1.12	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
1.14	9.6	9.6	9.6	9.6	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
1.16	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
1.18	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
1.20	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
1.22	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
1.24	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
1.26	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
1.28	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
1.30	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
1.32	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
1.34	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
1.36	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
1.38	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1
1.40	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
1.42	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
1.44	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
1.46	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
1.48	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
1.50	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
1.52	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
1.54	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
1.56	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
1.58	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4
1.60	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
1.62	17.0	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
1.64	17.3	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
1.66	17.6	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
1.68	18.0	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2
1.70	18.3	18.4	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
1.72	18.7	18.7	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9
1.74	19.0	19.1	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
1.76	19.4	19.4	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
1.78	19.7	19.8	19.8	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
1.80	20.1	20.1	20.2	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
1.82	20.4	20.5	20.5	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7
1.84	20.8	20.9	20.9	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1
1.86	21.2	21.2	21.3	21.3	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
1.88	21.5	21.6	21.6	21.7	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9
1.90	21.9	22.0	22.0	22.1	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
1.92	22.3	22.3	22.4	22.4	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
1.94	22.6	22.7	22.8	22.8	22.8	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1
1.96	23.0	23.1	23.1	23.2	23.2	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
1.98	23.4	23.4	23.5	23.6	23.6	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
2.00	23.7	23.8	23.9	24.0	24.0	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2
2.02	24.1	24.2	24.3	24.3	24.4	24.4	24.6	24.6	24.6	24.6	24.6	24.6	24.6

Table 10 (continued)

h_a	h_a-h_b												
	.42	.44	.46	.48	.50	.52	.54	.56	.58	.60	.62	.64	.66
2.04	24.5	24.6	24.7	24.7	24.8	24.8	25.1	25.1	25.1	25.1	25.1	25.1	25.1
2.06	24.9	25.0	25.0	25.1	25.2	25.2	25.5	25.5	25.5	25.5	25.5	25.5	25.5
2.08	25.2	25.3	25.4	25.5	25.6	25.6	25.6	25.9	25.9	25.9	25.9	25.9	25.9
2.10	25.6	25.7	25.8	25.9	26.0	26.0	26.0	26.3	26.3	26.3	26.3	26.3	26.3
2.12	26.0	26.1	26.2	26.3	26.3	26.4	26.4	26.7	26.7	26.7	26.7	26.7	26.7
2.14	26.4	26.5	26.6	26.7	26.7	26.8	26.8	27.1	27.1	27.1	27.1	27.1	27.1
2.16	26.8	26.9	27.0	27.1	27.1	27.2	27.3	27.3	27.5	27.5	27.5	27.5	27.5
2.18	27.2	27.3	27.4	27.5	27.5	27.6	27.7	27.7	28.0	28.0	28.0	28.0	28.0
2.20	27.5	27.7	27.8	27.9	27.9	28.0	28.1	28.1	28.4	28.4	28.4	28.4	28.4
2.22	27.9	28.1	28.2	28.3	28.4	28.4	28.5	28.5	28.8	28.8	28.8	28.8	28.8
2.24	28.3	28.5	28.6	28.7	28.8	28.8	28.9	28.9	29.0	29.2	29.2	29.2	29.2
2.26	28.7	28.8	29.0	29.1	29.2	29.2	29.3	29.4	29.4	29.7	29.7	29.7	29.7
2.28	29.1	29.2	29.4	29.5	29.6	29.7	29.7	29.8	29.8	30.1	30.1	30.1	30.1
2.30	29.5	29.6	29.8	29.9	30.0	30.1	30.1	30.2	30.2	30.5	30.5	30.5	30.5
2.32	29.9	30.0	30.2	30.3	30.4	30.5	30.6	30.6	30.7	30.7	31.0	31.0	31.0
2.34	30.3	30.4	30.6	30.7	30.8	30.9	31.0	31.0	31.1	31.1	31.4	31.4	31.4
2.36	30.7	30.9	31.0	31.1	31.2	31.3	31.4	31.5	31.5	31.6	31.9	31.9	31.9
2.38	31.1	31.3	31.4	31.5	31.6	31.7	31.8	31.9	32.0	32.0	32.3	32.3	32.3
2.40	31.5	31.7	31.8	31.9	32.1	32.2	32.3	32.3	32.4	32.4	32.5	32.8	32.8
2.42	31.9	32.1	32.2	32.4	32.5	32.6	32.7	32.8	32.8	32.9	32.9	33.2	33.2
2.44	32.3	32.5	32.6	32.8	32.9	33.0	33.1	33.2	33.3	33.3	33.4	33.7	33.7
2.46	32.7	32.9	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.8	34.1	34.1
2.48	33.1	33.3	33.5	33.6	33.7	33.9	34.0	34.1	34.1	34.2	34.2	34.3	34.6
2.50	33.5	33.7	33.9	34.0	34.2	34.3	34.4	34.5	34.6	34.6	34.7	34.7	35.1

Table 11 Submerged flow calibration for 12 in × 9 ft Cutthroat flume, (Q, cfs)

h_a \ $h_a - h_b$	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.06	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.08	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.10	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.12	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.14	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.16	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.18	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.20	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.22	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.24	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.26	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.28	.4	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.30	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.32	.5	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.34	.6	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.36	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.38	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.40	.7	.6	.8	.8	.6	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.6	.8	.8	.8	.8
.42	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.44	.9	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.46	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.48	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.50	1.0	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.52	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.54	1.1	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.56	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.58	1.3	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
.60	1.3	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.62	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.64	1.5	1.6	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.66	1.5	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.68	1.6	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
.70	1.7	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
.72	1.7	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
.74	1.8	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
.76	1.9	2.0	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
.78	1.9	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
.80	2.0	2.2	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
.82	2.1	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
.84	2.1	2.4	2.5	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
.86	2.2	2.4	2.6	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
.88	2.3	2.5	2.7	2.7	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
.90	2.4	2.6	2.7	2.8	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
.92	2.4	2.7	2.8	2.9	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
.94	2.5	2.8	2.9	3.0	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
.96	2.6	2.9	3.0	3.1	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
.98	2.7	2.9	3.1	3.2	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
1.00	2.7	3.0	3.2	3.3	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

Table II (continued)

h_a	$h_a - h_b$																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	2.8	3.1	3.3	3.4	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
1.04	2.9	3.2	3.4	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
1.06	3.0	3.3	3.5	3.6	3.7	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
1.08	3.0	3.4	3.6	3.7	3.8	3.9	3.9	3.9	3.9	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
1.10	3.1	3.5	3.7	3.8	3.9	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
1.12	3.2	3.6	3.8	3.9	4.0	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
1.14	3.3	3.6	3.9	4.0	4.1	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1.16	3.4	3.7	4.0	4.1	4.2	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
1.18	3.4	3.8	4.0	4.2	4.3	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
1.20	3.5	3.9	4.1	4.3	4.4	4.5	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
1.22	3.6	4.0	4.2	4.4	4.5	4.6	4.7	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
1.24	3.7	4.1	4.3	4.5	4.6	4.7	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
1.26	3.8	4.2	4.4	4.6	4.7	4.8	4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1.28	3.9	4.3	4.5	4.7	4.8	4.9	5.0	5.1	5.1	5.1	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
1.30	3.9	4.4	4.6	4.8	5.0	5.1	5.1	5.2	5.2	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
1.32	4.0	4.5	4.8	4.9	5.1	5.2	5.2	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
1.34	4.1	4.6	4.9	5.0	5.2	5.3	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
1.36	4.2	4.7	5.0	5.1	5.3	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
1.38	4.3	4.8	5.1	5.3	5.4	5.5	5.6	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
1.40	4.4	4.9	5.2	5.4	5.5	5.6	5.7	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
1.42	4.5	5.0	5.3	5.5	5.6	5.7	5.8	5.9	6.0	6.0	6.0	6.1	6.1	6.1	6.0	6.0	6.0	6.0	6.0	6.0
1.44	4.5	5.1	5.4	5.6	5.7	5.9	6.0	6.0	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
1.46	4.6	5.2	5.5	5.7	5.9	6.0	6.1	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
1.48	4.7	5.3	5.6	5.8	6.0	6.1	6.2	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
1.50	4.8	5.4	5.7	5.9	6.1	6.2	6.3	6.4	6.5	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
1.52	4.9	5.5	5.8	6.0	6.2	6.3	6.4	6.5	6.6	6.6	6.7	6.7	6.7	6.7	6.8	6.7	6.7	6.7	6.7	6.7
1.54	5.0	5.6	5.9	6.2	6.3	6.5	6.6	6.7	6.7	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
1.56	5.1	5.7	6.0	6.3	6.4	6.6	6.7	6.8	6.9	6.9	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
1.58	5.2	5.8	6.1	6.4	6.6	6.7	6.8	6.9	7.0	7.0	7.1	7.1	7.1	7.2	7.2	7.1	7.1	7.1	7.1	7.1
1.60	5.3	5.9	6.2	6.5	6.7	6.8	7.0	7.0	7.1	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
1.62	5.4	6.0	6.4	6.6	6.8	7.0	7.1	7.2	7.2	7.3	7.4	7.4	7.4	7.4	7.5	7.5	7.4	7.4	7.4	7.4
1.64	5.5	6.1	6.5	6.7	6.9	7.1	7.2	7.3	7.4	7.4	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
1.66	5.6	6.2	6.6	6.8	7.0	7.2	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
1.68	5.6	6.3	6.7	7.0	7.2	7.3	7.5	7.6	7.6	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.9
1.70	5.7	6.4	6.8	7.1	7.3	7.5	7.6	7.7	7.8	7.9	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1.72	5.8	6.5	6.9	7.2	7.4	7.6	7.7	7.8	7.9	8.0	8.0	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2
1.74	5.9	6.6	7.0	7.3	7.5	7.7	7.9	8.0	8.1	8.1	8.2	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
1.76	6.0	6.7	7.1	7.4	7.7	7.8	8.0	8.1	8.2	8.3	8.3	8.4	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5
1.78	6.1	6.8	7.3	7.6	7.8	8.0	8.1	8.2	8.3	8.4	8.5	8.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
1.80	6.2	6.9	7.4	7.7	7.9	8.1	8.2	8.4	8.5	8.5	8.6	8.7	8.7	8.7	8.8	8.8	8.8	8.8	8.8	8.8
1.82	6.3	7.0	7.5	7.8	8.0	8.2	8.4	8.5	8.6	8.7	8.8	8.8	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
1.84	6.4	7.2	7.6	7.9	8.2	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.0	9.0	9.1	9.1	9.1	9.1	9.1	9.1
1.86	6.5	7.3	7.7	8.0	8.3	8.5	8.6	8.8	8.9	9.0	9.0	9.1	9.1	9.2	9.2	9.2	9.2	9.3	9.2	9.2
1.88	6.6	7.4	7.8	8.2	8.4	8.6	8.8	8.9	9.0	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4
1.90	6.7	7.5	8.0	8.3	8.6	8.8	8.9	9.1	9.2	9.3	9.3	9.4	9.4	9.5	9.5	9.5	9.6	9.6	9.5	9.5
1.92	6.8	7.6	8.1	8.4	8.7	8.9	9.1	9.2	9.3	9.4	9.5	9.5	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7
1.94	6.9	7.7	8.2	8.5	8.8	9.0	9.2	9.3	9.4	9.5	9.6	9.7	9.7	9.8	9.8	9.8	9.9	9.9	9.9	9.8
1.96	7.0	7.8	8.3	8.7	8.9	9.2	9.3	9.5	9.6	9.7	9.8	9.8	9.9	9.9	10.0	10.0	10.0	10.0	10.0	10.0
1.98	7.1	7.9	8.4	8.8	9.1	9.3	9.5	9.6	9.7	9.8	9.9	10.0	10.0	10.1	10.1	10.2	10.2	10.2	10.2	10.2
2.00	7.2	8.0	8.6	8.9	9.2	9.4	9.6	9.7	9.9	10.0	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.4	10.4	10.3

Table II (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
2.02	7.3	8.2	8.7	9.1	9.3	9.6	9.7	9.9	10.0	10.1	10.2	10.3	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.5
2.04	7.4	8.3	8.8	9.2	9.5	9.7	9.9	10.0	10.2	10.3	10.4	10.4	10.5	10.5	10.6	10.6	10.7	10.7	10.7	10.7
2.06	7.5	8.4	8.9	9.3	9.6	9.8	10.0	10.2	10.3	10.4	10.5	10.6	10.7	10.7	10.7	10.8	10.8	10.8	10.8	10.9
2.08	7.6	8.5	9.0	9.4	9.7	10.0	10.2	10.3	10.5	10.6	10.7	10.7	10.8	10.9	10.9	10.9	11.0	11.0	11.0	11.0
2.10	7.7	8.6	9.2	9.6	9.9	10.1	10.3	10.5	10.6	10.7	10.8	10.9	11.0	11.0	11.1	11.1	11.1	11.2	11.2	11.2
2.12	7.8	8.7	9.3	9.7	10.0	10.2	10.4	10.6	10.7	10.9	11.0	11.0	11.1	11.2	11.2	11.3	11.3	11.3	11.3	11.3
2.14	7.9	8.8	9.4	9.8	10.1	10.4	10.6	10.8	10.9	11.0	11.1	11.2	11.3	11.3	11.4	11.4	11.5	11.5	11.5	11.5
2.16	8.0	9.0	9.5	10.0	10.3	10.5	10.7	10.9	11.0	11.2	11.3	11.4	11.4	11.5	11.5	11.6	11.6	11.6	11.7	11.7
2.18	8.1	9.1	9.7	10.1	10.4	10.7	10.9	11.0	11.2	11.3	11.4	11.5	11.6	11.6	11.7	11.7	11.8	11.8	11.8	11.8
2.20	8.2	9.2	9.8	10.2	10.5	10.8	11.0	11.2	11.3	11.5	11.6	11.7	11.7	11.8	11.9	11.9	11.9	12.0	12.0	12.0
2.22	8.3	9.3	9.9	10.3	10.7	10.9	11.2	11.3	11.5	11.6	11.7	11.8	11.9	12.0	12.0	12.1	12.1	12.1	12.2	12.2
2.24	8.4	9.4	10.0	10.5	10.8	11.1	11.3	11.5	11.6	11.8	11.9	12.0	12.1	12.1	12.2	12.2	12.3	12.3	12.3	12.3
2.26	8.5	9.6	10.2	10.6	11.0	11.2	11.4	11.6	11.8	11.9	12.0	12.1	12.2	12.3	12.4	12.4	12.4	12.5	12.5	12.5
2.28	8.6	9.7	10.3	10.7	11.1	11.4	11.6	11.8	11.9	12.1	12.2	12.3	12.4	12.5	12.5	12.6	12.6	12.6	12.7	12.7
2.30	8.8	9.8	10.4	10.9	11.2	11.5	11.7	11.9	12.1	12.2	12.4	12.5	12.5	12.6	12.7	12.7	12.8	12.8	12.8	12.9
2.32	8.9	9.9	10.6	11.0	11.4	11.7	11.9	12.1	12.2	12.4	12.5	12.6	12.7	12.8	12.8	12.9	12.9	13.0	13.0	13.0
2.34	9.0	10.0	10.7	11.1	11.5	11.8	12.0	12.2	12.4	12.5	12.7	12.8	12.9	12.9	13.0	13.1	13.1	13.1	13.2	13.2
2.36	9.1	10.1	10.8	11.3	11.6	11.9	12.2	12.4	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.2	13.3	13.3	13.4	13.4
2.38	9.2	10.3	10.9	11.4	11.8	12.1	12.3	12.5	12.7	12.9	13.0	13.1	13.2	13.3	13.3	13.4	13.4	13.5	13.5	13.6
2.40	9.3	10.4	11.1	11.6	11.9	12.2	12.5	12.7	12.9	13.0	13.1	13.3	13.4	13.4	13.5	13.6	13.6	13.7	13.7	13.7
2.42	9.4	10.5	11.2	11.7	12.1	12.4	12.6	12.8	13.0	13.2	13.3	13.4	13.5	13.6	13.7	13.7	13.8	13.8	13.9	13.9
2.44	9.5	10.6	11.3	11.8	12.2	12.5	12.8	13.0	13.2	13.3	13.5	13.6	13.7	13.8	13.8	13.9	14.0	14.0	14.0	14.1
2.46	9.6	10.8	11.5	12.0	12.4	12.7	12.9	13.1	13.3	13.5	13.6	13.7	13.8	13.9	14.0	14.1	14.1	14.2	14.2	14.3
2.48	9.7	10.9	11.6	12.1	12.5	12.8	13.1	13.3	13.5	13.6	13.8	13.9	14.0	14.1	14.2	14.2	14.3	14.4	14.4	14.4
2.50	9.8	11.0	11.7	12.2	12.6	13.0	13.2	13.5	13.6	13.8	14.0	14.1	14.2	14.3	14.4	14.4	14.5	14.5	14.6	14.6
2.52	9.9	11.1	11.9	12.4	12.8	13.1	13.4	13.6	13.8	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.7	14.7	14.8
2.54	10.1	11.2	12.0	12.5	12.9	13.3	13.5	13.8	14.0	14.1	14.3	14.4	14.5	14.6	14.7	14.8	14.8	14.9	14.9	15.0
2.56	10.2	11.4	12.1	12.7	13.1	13.4	13.7	13.9	14.1	14.3	14.4	14.6	14.7	14.8	14.9	14.9	15.0	15.1	15.1	15.1
2.58	10.3	11.5	12.3	12.8	13.2	13.6	13.8	14.1	14.3	14.5	14.6	14.7	14.9	15.0	15.0	15.1	15.2	15.2	15.3	15.3
2.60	10.4	11.6	12.4	12.9	13.4	13.7	14.0	14.2	14.4	14.6	14.8	14.9	15.0	15.1	15.2	15.3	15.4	15.4	15.5	15.5
2.62	10.5	11.7	12.5	13.1	13.5	13.9	14.1	14.4	14.6	14.8	14.9	15.1	15.2	15.3	15.4	15.5	15.5	15.6	15.6	15.7
2.64	10.6	11.9	12.7	13.2	13.7	14.0	14.3	14.5	14.8	14.9	15.1	15.2	15.4	15.5	15.6	15.6	15.7	15.8	15.8	15.9
2.66	10.7	12.0	12.8	13.4	13.8	14.2	14.5	14.7	14.9	15.1	15.3	15.4	15.5	15.6	15.7	15.8	15.9	15.9	16.0	16.0
2.68	10.8	12.1	12.9	13.5	13.9	14.3	14.6	14.9	15.1	15.3	15.4	15.6	15.7	15.8	15.9	16.0	16.1	16.1	16.2	16.2
2.70	10.9	12.3	13.1	13.6	14.1	14.5	14.8	15.0	15.2	15.4	15.6	15.7	15.9	16.0	16.1	16.2	16.2	16.3	16.4	16.4
2.72	11.1	12.4	13.2	13.8	14.2	14.6	14.9	15.2	15.4	15.6	15.8	15.9	16.0	16.2	16.3	16.3	16.4	16.5	16.5	16.6
2.74	11.2	12.5	13.3	13.9	14.4	14.8	15.1	15.3	15.6	15.8	15.9	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.7	16.8
2.76	11.3	12.6	13.5	14.1	14.5	14.9	15.2	15.5	15.7	15.9	16.1	16.3	16.4	16.5	16.6	16.7	16.8	16.8	16.9	17.0
2.78	11.4	12.8	13.6	14.2	14.7	15.1	15.4	15.7	15.9	16.1	16.3	16.4	16.6	16.7	16.8	16.9	17.0	17.0	17.1	17.1
2.80	11.5	12.9	13.7	14.4	14.8	15.2	15.6	15.8	16.1	16.3	16.4	16.6	16.7	16.9	17.0	17.1	17.1	17.2	17.3	17.3
2.82	11.6	13.0	13.9	14.5	15.0	15.4	15.7	16.0	16.2	16.4	16.6	16.8	16.9	17.0	17.1	17.2	17.3	17.4	17.5	17.5
2.84	11.7	13.2	14.0	14.7	15.1	15.5	15.9	16.2	16.4	16.6	16.8	16.9	17.1	17.2	17.3	17.4	17.5	17.6	17.6	17.7
2.86	11.9	13.3	14.2	14.8	15.3	15.7	16.0	16.3	16.6	16.8	17.0	17.1	17.3	17.4	17.5	17.6	17.7	17.8	17.8	17.9
2.88	12.0	13.4	14.3	14.9	15.4	15.9	16.2	16.5	16.7	16.9	17.1	17.3	17.4	17.6	17.7	17.8	17.9	18.0	18.0	18.1
2.90	12.1	13.5	14.4	15.1	15.6	16.0	16.4	16.6	16.9	17.1	17.3	17.5	17.6	17.8	17.9	18.0	18.1	18.1	18.2	18.3
2.92	12.2	13.7	14.6	15.2	15.7	16.2	16.5	16.8	17.1	17.3	17.5	17.6	17.8	17.9	18.0	18.2	18.2	18.3	18.4	18.5
2.94	12.3	13.8	14.7	15.4	15.9	16.3	16.7	17.0	17.2	17.5	17.6	17.8	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.6
2.96	12.4	13.9	14.9	15.5	16.1	16.5	16.8	17.1	17.4	17.6	17.8	18.0	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.8
2.98	12.6	14.1	15.0	15.7	16.2	16.6	17.0	17.3	17.6	17.8	18.0	18.2	18.3	18.5	18.6	18.7	18.8	18.9	19.0	19.0
3.00	12.7	14.2	15.1	15.8	16.4	16.8	17.2	17.5	17.7	18.0	18.2	18.4	18.5	18.7	18.8	18.9	19.0	19.1	19.2	19.2

Table II (continued)

h_a	$h_a - h_b$									
	.42	.44	.46	.48	.50	.52	.54	.56	.58	.60
2.04	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
2.06	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
2.08	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
2.10	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
2.12	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
2.14	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
2.16	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
2.18	11.9	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
2.20	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
2.22	12.2	12.2	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
2.24	12.4	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
2.26	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
2.28	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
2.30	12.9	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
2.32	13.0	13.1	13.1	13.0	13.0	13.0	13.0	13.0	13.0	13.0
2.34	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
2.36	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
2.38	13.6	13.6	13.6	13.5	13.5	13.5	13.5	13.5	13.5	13.5
2.40	13.7	13.8	13.8	13.7	13.7	13.7	13.7	13.7	13.7	13.7
2.42	13.9	13.9	13.9	14.0	13.9	13.9	13.9	13.9	13.9	13.9
2.44	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
2.46	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
2.48	14.5	14.5	14.5	14.5	14.4	14.4	14.4	14.4	14.4	14.4
2.50	14.6	14.7	14.7	14.7	14.6	14.6	14.6	14.6	14.6	14.6
2.52	14.8	14.8	14.8	14.9	14.9	14.8	14.8	14.8	14.8	14.8
2.54	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
2.56	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
2.58	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
2.60	15.5	15.6	15.6	15.6	15.6	15.5	15.5	15.5	15.5	15.5
2.62	15.7	15.7	15.8	15.8	15.8	15.8	15.7	15.7	15.7	15.7
2.64	15.9	15.9	15.9	16.0	16.0	16.0	15.9	15.9	15.9	15.9
2.66	16.1	16.1	16.1	16.2	16.2	16.2	16.1	16.1	16.1	16.1
2.68	16.3	16.3	16.3	16.3	16.4	16.4	16.3	16.3	16.3	16.3
2.70	16.4	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
2.72	16.6	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
2.74	16.8	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
2.76	17.0	17.0	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
2.78	17.2	17.2	17.3	17.3	17.3	17.3	17.3	17.2	17.2	17.2
2.80	17.4	17.4	17.4	17.5	17.5	17.5	17.5	17.4	17.4	17.4
2.82	17.6	17.6	17.6	17.7	17.7	17.7	17.7	17.7	17.6	17.6
2.84	17.8	17.8	17.8	17.9	17.9	17.9	17.9	17.9	17.8	17.8
2.86	17.9	18.0	18.0	18.0	18.1	18.1	18.1	18.1	18.0	18.0
2.88	18.1	18.2	18.2	18.2	18.3	18.3	18.3	18.3	18.2	18.2
2.90	18.3	18.4	18.4	18.4	18.5	18.5	18.5	18.5	18.4	18.4
2.92	18.5	18.6	18.6	18.6	18.7	18.7	18.7	18.7	18.7	18.6
2.94	18.7	18.7	18.8	18.8	18.8	18.9	18.9	18.9	18.9	18.8
2.96	18.9	18.9	19.0	19.0	19.0	19.1	19.1	19.1	19.1	19.0
2.98	19.1	19.1	19.2	19.2	19.2	19.3	19.3	19.3	19.3	19.2
3.00	19.3	19.3	19.4	19.4	19.4	19.5	19.5	19.5	19.5	19.4

Table 12 Submerged flow calibration for 24 in × 9 ft Cutthroat flume, (Q, cfs)

h_a \ $h_a - h_b$	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.06	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.08	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.10	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.12	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.14	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.16	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.18	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.20	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.22	.6	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.24	.7	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8	.8
.26	.8	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.28	.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.30	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
.32	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.34	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.36	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.38	1.4	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.40	1.5	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
.42	1.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.44	1.7	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
.46	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
.48	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
.50	2.1	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
.52	2.2	2.4	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
.54	2.3	2.5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
.56	2.4	2.7	2.8	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
.58	2.6	2.8	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
.60	2.7	3.0	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
.62	2.8	3.1	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
.64	3.0	3.3	3.4	3.5	3.5	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
.66	3.1	3.4	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
.68	3.2	3.5	3.7	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
.70	3.4	3.7	3.9	4.0	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
.72	3.5	3.9	4.0	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
.74	3.6	4.0	4.2	4.3	4.4	4.4	4.5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
.76	3.8	4.2	4.4	4.5	4.6	4.6	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
.78	3.9	4.3	4.5	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
.80	4.1	4.5	4.7	4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
.82	4.2	4.6	4.9	5.0	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
.84	4.3	4.8	5.1	5.2	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
.86	4.5	5.0	5.2	5.4	5.5	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
.88	4.6	5.1	5.4	5.6	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
.90	4.8	5.3	5.6	5.8	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
.92	4.9	5.5	5.8	6.0	6.1	6.2	6.2	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
.94	5.1	5.6	5.9	6.1	6.3	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
.96	5.2	5.8	6.1	6.3	6.5	6.6	6.6	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
.98	5.4	6.0	6.3	6.5	6.7	6.8	6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
1.00	5.5	6.1	6.5	6.7	6.9	7.0	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1

Table 12 (continued)

h_a	$h_a - h_b$ .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	5.7	6.3	6.7	6.9	7.1	7.2	7.3	7.3	7.4	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
1.04	5.9	6.5	6.9	7.1	7.3	7.4	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
1.06	6.0	6.7	7.1	7.3	7.5	7.6	7.7	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
1.08	6.2	6.9	7.3	7.5	7.7	7.8	7.9	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
1.10	6.3	7.0	7.4	7.7	7.9	8.0	8.1	8.2	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
1.12	6.5	7.2	7.6	7.9	8.1	8.3	8.4	8.4	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
1.14	6.7	7.4	7.8	8.1	8.3	8.5	8.6	8.7	8.7	8.7	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
1.16	6.9	7.6	8.0	8.3	8.5	8.7	8.8	8.9	8.9	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
1.18	7.0	7.8	8.2	8.5	8.8	8.9	9.0	9.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
1.20	7.2	8.0	8.4	8.7	9.0	9.1	9.3	9.4	9.4	9.5	9.5	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
1.22	7.3	8.1	8.6	9.0	9.2	9.4	9.5	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
1.24	7.5	8.3	8.8	9.2	9.4	9.6	9.7	9.8	9.9	9.9	10.0	10.0	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
1.26	7.7	8.5	9.0	9.4	9.6	9.8	10.0	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
1.28	7.8	8.7	9.2	9.6	9.8	10.0	10.2	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
1.30	8.0	8.9	9.4	9.8	10.1	10.3	10.4	10.5	10.6	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
1.32	8.2	9.1	9.7	10.0	10.3	10.5	10.7	10.8	10.9	10.9	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
1.34	8.4	9.3	9.9	10.2	10.5	10.7	10.9	11.0	11.1	11.2	11.2	11.3	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2
1.36	8.5	9.5	10.1	10.5	10.8	11.0	11.1	11.3	11.4	11.4	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
1.38	8.7	9.7	10.3	10.7	11.0	11.2	11.4	11.5	11.6	11.7	11.7	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
1.40	8.9	9.9	10.5	10.9	11.2	11.4	11.6	11.8	11.9	11.9	12.0	12.0	12.1	12.0	12.0	12.0	12.0	12.0	12.0	12.0
1.42	9.1	10.1	10.7	11.1	11.4	11.7	11.9	12.0	12.1	12.2	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
1.44	9.2	10.3	10.9	11.4	11.7	11.9	12.1	12.3	12.4	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
1.46	9.4	10.5	11.1	11.6	11.9	12.2	12.4	12.5	12.6	12.7	12.8	12.8	12.9	12.9	12.8	12.8	12.8	12.8	12.8	12.8
1.48	9.6	10.7	11.4	11.8	12.1	12.4	12.6	12.8	12.9	13.0	13.1	13.1	13.1	13.2	13.1	13.1	13.1	13.1	13.1	13.1
1.50	9.8	10.9	11.6	12.0	12.4	12.6	12.9	13.0	13.1	13.2	13.3	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
1.52	10.0	11.1	11.8	12.3	12.6	12.9	13.1	13.3	13.4	13.5	13.6	13.6	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7
1.54	10.2	11.3	12.0	12.5	12.9	13.1	13.4	13.5	13.7	13.8	13.9	13.9	14.0	14.0	14.0	13.9	13.9	13.9	13.9	13.9
1.56	10.3	11.5	12.2	12.7	13.1	13.4	13.6	13.8	13.9	14.0	14.1	14.2	14.2	14.3	14.3	14.2	14.2	14.2	14.2	14.2
1.58	10.5	11.7	12.5	13.0	13.3	13.6	13.9	14.0	14.2	14.3	14.4	14.5	14.5	14.6	14.6	14.5	14.5	14.5	14.5	14.5
1.60	10.7	11.9	12.7	13.2	13.6	13.9	14.1	14.3	14.5	14.6	14.7	14.7	14.8	14.8	14.9	14.8	14.8	14.8	14.8	14.8
1.62	10.9	12.2	12.9	13.4	13.8	14.1	14.4	14.6	14.7	14.9	15.0	15.0	15.1	15.1	15.1	15.2	15.1	15.1	15.1	15.1
1.64	11.1	12.4	13.1	13.7	14.1	14.4	14.6	14.8	15.0	15.1	15.2	15.3	15.4	15.4	15.4	15.5	15.4	15.4	15.4	15.4
1.66	11.3	12.6	13.4	13.9	14.3	14.6	14.9	15.1	15.3	15.4	15.5	15.6	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
1.68	11.5	12.8	13.6	14.2	14.6	14.9	15.2	15.4	15.5	15.7	15.8	15.9	15.9	16.0	16.0	16.0	16.0	16.0	16.0	16.0
1.70	11.7	13.0	13.8	14.4	14.8	15.2	15.4	15.6	15.8	16.0	16.1	16.2	16.2	16.3	16.3	16.3	16.3	16.3	16.3	16.3
1.72	11.9	13.2	14.1	14.6	15.1	15.4	15.7	15.9	16.1	16.2	16.4	16.4	16.5	16.6	16.6	16.6	16.6	16.6	16.6	16.6
1.74	12.0	13.4	14.3	14.9	15.3	15.7	16.0	16.2	16.4	16.5	16.6	16.7	16.8	16.9	16.9	16.9	16.9	16.9	16.9	16.9
1.76	12.2	13.7	14.5	15.1	15.6	15.9	16.2	16.5	16.6	16.8	16.9	17.0	17.1	17.2	17.2	17.2	17.2	17.2	17.2	17.2
1.78	12.4	13.9	14.8	15.4	15.8	16.2	16.5	16.7	16.9	17.1	17.2	17.3	17.4	17.5	17.5	17.5	17.6	17.5	17.5	17.5
1.80	12.6	14.1	15.0	15.6	16.1	16.5	16.8	17.0	17.2	17.4	17.5	17.6	17.7	17.8	17.8	17.8	17.9	17.8	17.8	17.8
1.82	12.8	14.3	15.2	15.9	16.3	16.7	17.0	17.3	17.5	17.6	17.8	17.9	18.0	18.1	18.1	18.1	18.2	18.2	18.1	18.1
1.84	13.0	14.5	15.5	16.1	16.6	17.0	17.3	17.6	17.8	17.9	18.1	18.2	18.3	18.4	18.4	18.5	18.5	18.5	18.4	18.4
1.86	13.2	14.8	15.7	16.4	16.9	17.3	17.6	17.8	18.0	18.2	18.4	18.5	18.6	18.7	18.7	18.8	18.8	18.8	18.7	18.7
1.88	13.4	15.0	15.9	16.6	17.1	17.5	17.8	18.1	18.3	18.5	18.7	18.8	18.9	19.0	19.0	19.1	19.1	19.1	19.0	19.0
1.90	13.6	15.2	16.2	16.9	17.4	17.8	18.1	18.4	18.6	18.8	19.0	19.1	19.2	19.3	19.3	19.4	19.4	19.4	19.4	19.4
1.92	13.8	15.4	16.4	17.1	17.6	18.1	18.4	18.7	18.9	19.1	19.2	19.4	19.5	19.6	19.6	19.7	19.7	19.7	19.8	19.7
1.94	14.0	15.7	16.7	17.4	17.9	18.3	18.7	19.0	19.2	19.4	19.5	19.7	19.8	19.9	19.9	20.0	20.0	20.1	20.1	20.0
1.96	14.2	15.9	16.9	17.6	18.2	18.6	19.0	19.2	19.5	19.7	19.8	20.0	20.1	20.2	20.3	20.3	20.4	20.4	20.4	20.3
1.98	14.4	16.1	17.1	17.9	18.4	18.9	19.2	19.5	19.8	20.0	20.1	20.3	20.4	20.5	20.6	20.6	20.7	20.7	20.7	20.6
2.00	14.6	16.3	17.4	18.1	18.7	19.1	19.5	19.8	20.1	20.3	20.4	20.6	20.7	20.8	20.9	21.0	21.0	21.0	21.1	21.0

Table 12 (continued)

h_a	h_a-h_b .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
2.02	14.8	16.6	17.6	18.4	19.0	19.4	19.8	20.1	20.4	20.6	20.7	20.9	21.0	21.1	21.2	21.3	21.3	21.4	21.4	21.4
2.04	15.0	16.8	17.9	18.6	19.2	19.7	20.1	20.4	20.6	20.9	21.1	21.2	21.3	21.4	21.5	21.6	21.6	21.7	21.7	21.7
2.06	15.3	17.0	18.1	18.9	19.5	20.0	20.4	20.7	20.9	21.2	21.4	21.5	21.6	21.8	21.8	21.9	22.0	22.0	22.0	22.1
2.08	15.5	17.3	18.4	19.2	19.8	20.3	20.6	21.0	21.2	21.5	21.7	21.8	22.0	22.1	22.2	22.2	22.3	22.3	22.4	22.4
2.10	15.7	17.5	18.6	19.4	20.0	20.5	20.9	21.3	21.5	21.8	22.0	22.1	22.3	22.4	22.5	22.6	22.6	22.7	22.7	22.7
2.12	15.9	17.7	18.9	19.7	20.3	20.8	21.2	21.6	21.8	22.1	22.3	22.4	22.6	22.7	22.8	22.9	22.9	23.0	23.0	23.1
2.14	16.1	18.0	19.1	20.0	20.6	21.1	21.5	21.8	22.1	22.4	22.6	22.8	22.9	23.0	23.1	23.2	23.3	23.3	23.4	23.4
2.16	16.3	18.2	19.4	20.2	20.9	21.4	21.8	22.1	22.4	22.7	22.9	23.1	23.2	23.3	23.5	23.5	23.6	23.7	23.7	23.7
2.18	16.5	18.5	19.6	20.5	21.1	21.7	22.1	22.4	22.7	23.0	23.2	23.4	23.5	23.7	23.8	23.9	23.9	24.0	24.0	24.1
2.20	16.7	18.7	19.9	20.8	21.4	21.9	22.4	22.7	23.0	23.3	23.5	23.7	23.9	24.0	24.1	24.2	24.3	24.3	24.4	24.4
2.22	16.9	18.9	20.1	21.0	21.7	22.2	22.7	23.0	23.3	23.6	23.8	24.0	24.2	24.3	24.4	24.5	24.6	24.7	24.7	24.8
2.24	17.1	19.2	20.4	21.3	22.0	22.5	23.0	23.3	23.7	23.9	24.1	24.3	24.5	24.6	24.8	24.9	24.9	25.0	25.1	25.1
2.26	17.4	19.4	20.7	21.6	22.3	22.8	23.3	23.6	24.0	24.2	24.5	24.7	24.8	25.0	25.1	25.2	25.3	25.3	25.4	25.4
2.28	17.6	19.6	20.9	21.8	22.5	23.1	23.6	23.9	24.3	24.5	24.8	25.0	25.2	25.3	25.4	25.5	25.6	25.7	25.7	25.8
2.30	17.8	19.9	21.2	22.1	22.8	23.4	23.9	24.2	24.6	24.9	25.1	25.3	25.5	25.6	25.8	25.9	26.0	26.0	26.1	26.1
2.32	18.0	20.1	21.4	22.4	23.1	23.7	24.2	24.6	24.9	25.2	25.4	25.6	25.8	26.0	26.1	26.2	26.3	26.4	26.4	26.5
2.34	18.2	20.4	21.7	22.6	23.4	24.0	24.5	24.9	25.2	25.5	25.7	26.0	26.1	26.3	26.4	26.5	26.6	26.7	26.8	26.8
2.36	18.4	20.6	22.0	22.9	23.7	24.3	24.8	25.2	25.5	25.8	26.1	26.3	26.5	26.6	26.8	26.9	27.0	27.1	27.1	27.2
2.38	18.7	20.9	22.2	23.2	24.0	24.6	25.1	25.5	25.8	26.1	26.4	26.6	26.8	27.0	27.1	27.2	27.3	27.4	27.5	27.5
2.40	18.9	21.1	22.5	23.5	24.2	24.8	25.4	25.8	26.1	26.4	26.7	26.9	27.1	27.3	27.4	27.6	27.7	27.8	27.8	27.9
2.42	19.1	21.4	22.8	23.8	24.5	25.1	25.7	26.1	26.5	26.8	27.0	27.3	27.5	27.6	27.8	27.9	28.0	28.1	28.2	28.2
2.44	19.3	21.6	23.0	24.0	24.8	25.4	26.0	26.4	26.8	27.1	27.4	27.6	27.8	28.0	28.1	28.3	28.4	28.5	28.5	28.6
2.46	19.5	21.9	23.3	24.3	25.1	25.7	26.3	26.7	27.1	27.4	27.7	27.9	28.1	28.3	28.5	28.6	28.7	28.8	28.9	29.0
2.48	19.8	22.1	23.5	24.6	25.4	26.0	26.6	27.0	27.4	27.7	28.0	28.3	28.5	28.7	28.8	29.0	29.1	29.2	29.2	29.3
2.50	20.0	22.4	23.8	24.9	25.7	26.3	26.9	27.3	27.7	28.1	28.3	28.6	28.8	29.0	29.2	29.3	29.4	29.5	29.6	29.7
2.52	20.2	22.6	24.1	25.1	26.0	26.6	27.2	27.7	28.0	28.4	28.7	28.9	29.2	29.3	29.5	29.7	29.8	29.9	30.0	30.0
2.54	20.4	22.9	24.4	25.4	26.3	26.9	27.5	28.0	28.4	28.7	29.0	29.3	29.5	29.7	29.9	30.0	30.1	30.2	30.3	30.4
2.56	20.7	23.1	24.6	25.7	26.6	27.2	27.8	28.3	28.7	29.0	29.3	29.6	29.8	30.0	30.2	30.4	30.5	30.6	30.7	30.8
2.58	20.9	23.4	24.9	26.0	26.9	27.5	28.1	28.6	29.0	29.4	29.7	29.9	30.2	30.4	30.6	30.7	30.8	31.0	31.0	31.1
2.60	21.1	23.6	25.2	26.3	27.2	27.9	28.4	28.9	29.3	29.7	30.0	30.3	30.5	30.7	30.9	31.1	31.2	31.3	31.4	31.5
2.62	21.3	23.9	25.4	26.6	27.4	28.2	28.7	29.2	29.7	30.0	30.3	30.6	30.9	31.1	31.3	31.4	31.6	31.7	31.8	31.9
2.64	21.6	24.1	25.7	26.9	27.7	28.5	29.1	29.6	30.0	30.4	30.7	31.0	31.2	31.4	31.6	31.8	31.9	32.0	32.1	32.2
2.66	21.8	24.4	26.0	27.1	28.0	28.8	29.4	29.9	30.3	30.7	31.0	31.3	31.6	31.8	32.0	32.1	32.3	32.4	32.5	32.6
2.68	22.0	24.6	26.3	27.4	28.3	29.1	29.7	30.2	30.6	31.0	31.4	31.7	31.9	32.1	32.3	32.5	32.6	32.8	32.9	33.0
2.70	22.2	24.9	26.5	27.7	28.6	29.4	30.0	30.5	31.0	31.4	31.7	32.0	32.3	32.5	32.7	32.9	33.0	33.1	33.2	33.3
2.72	22.5	25.2	26.8	28.0	28.9	29.7	30.3	30.9	31.3	31.7	32.0	32.3	32.6	32.8	33.0	33.2	33.4	33.5	33.6	33.7
2.74	22.7	25.4	27.1	28.3	29.2	30.0	30.6	31.2	31.6	32.0	32.4	32.7	33.0	33.2	33.4	33.6	33.7	33.9	34.0	34.1
2.76	22.9	25.7	27.4	28.6	29.5	30.3	31.0	31.5	32.0	32.4	32.7	33.0	33.3	33.5	33.8	33.9	34.1	34.2	34.4	34.5
2.78	23.2	25.9	27.7	28.9	29.9	30.6	31.3	31.8	32.3	32.7	33.1	33.4	33.7	33.9	34.1	34.3	34.5	34.6	34.7	34.8
2.80	23.4	26.2	27.9	29.2	30.2	30.9	31.6	32.2	32.6	33.1	33.4	33.7	34.0	34.3	34.5	34.7	34.8	35.0	35.1	35.2
2.82	23.6	26.5	28.2	29.5	30.5	31.3	31.9	32.5	33.0	33.4	33.8	34.1	34.4	34.6	34.8	35.0	35.2	35.4	35.5	35.6
2.84	23.9	26.7	28.5	29.8	30.8	31.6	32.3	32.8	33.3	33.7	34.1	34.4	34.7	35.0	35.2	35.4	35.6	35.7	35.9	36.0
2.86	24.1	27.0	28.8	30.1	31.1	31.9	32.6	33.2	33.7	34.1	34.5	34.8	35.1	35.3	35.6	35.8	35.9	36.1	36.2	36.4
2.88	24.3	27.3	29.1	30.4	31.4	32.2	32.9	33.5	34.0	34.4	34.8	35.1	35.4	35.7	35.9	36.1	36.3	36.5	36.6	36.7
2.90	24.6	27.5	29.3	30.7	31.7	32.5	33.2	33.8	34.3	34.8	35.2	35.5	35.8	36.1	36.3	36.5	36.7	36.9	37.0	37.1
2.92	24.8	27.8	29.6	31.0	32.0	32.8	33.6	34.2	34.7	35.1	35.5	35.9	36.2	36.4	36.7	36.9	37.1	37.2	37.4	37.5
2.94	25.1	28.1	29.9	31.3	32.3	33.2	33.9	34.5	35.0	35.5	35.9	36.2	36.5	36.8	37.0	37.3	37.4	37.6	37.8	37.9
2.96	25.3	28.3	30.2	31.6	32.6	33.5	34.2	34.8	35.4	35.8	36.2	36.6	36.9	37.2	37.4	37.6	37.8	38.0	38.1	38.3
2.98	25.5	28.6	30.5	31.9	32.9	33.8	34.5	35.2	35.7	36.2	36.6	36.9	37.3	37.5	37.8	38.0	38.2	38.4	38.5	38.7
3.00	25.8	28.9	30.8	32.2	33.2	34.1	34.9	35.5	36.0	36.5	36.9	37.3	37.6	37.9	38.2	38.4	38.6	38.8	38.9	39.1

Table 12 (continued)

h_a	$h_a - h_b$ .42	.44	.46	.48	.50	.52	.54	.56	.58	.60
2.04	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
2.06	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
2.08	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
2.10	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6
2.12	23.1	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
2.14	23.4	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3
2.16	23.7	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
2.18	24.1	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
2.20	24.4	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3
2.22	24.8	24.8	24.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7
2.24	25.1	25.1	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
2.26	25.5	25.5	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
2.28	25.8	25.8	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7
2.30	26.2	26.2	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1
2.32	26.5	26.5	26.5	26.4	26.4	26.4	26.4	26.4	26.4	26.4
2.34	26.9	26.9	26.9	26.8	26.8	26.8	26.8	26.8	26.8	26.8
2.36	27.2	27.2	27.3	27.1	27.1	27.1	27.1	27.1	27.1	27.1
2.38	27.6	27.6	27.6	27.5	27.5	27.5	27.5	27.5	27.5	27.5
2.40	27.9	28.0	28.0	27.9	27.9	27.9	27.9	27.9	27.9	27.9
2.42	28.3	28.3	28.3	28.4	28.2	28.2	28.2	28.2	28.2	28.2
2.44	28.6	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6
2.46	29.0	29.0	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0
2.48	29.4	29.4	29.4	29.5	29.3	29.3	29.3	29.3	29.3	29.3
2.50	29.7	29.8	29.8	29.8	29.7	29.7	29.7	29.7	29.7	29.7
2.52	30.1	30.1	30.2	30.2	30.2	30.1	30.1	30.1	30.1	30.1
2.54	30.5	30.5	30.5	30.6	30.6	30.4	30.4	30.4	30.4	30.4
2.56	30.8	30.9	30.9	30.9	30.9	30.8	30.8	30.8	30.8	30.8
2.58	31.2	31.2	31.3	31.3	31.3	31.2	31.2	31.2	31.2	31.2
2.60	31.6	31.6	31.7	31.7	31.7	31.6	31.6	31.6	31.6	31.6
2.62	31.9	32.0	32.0	32.1	32.1	32.1	31.9	31.9	31.9	31.9
2.64	32.3	32.4	32.4	32.4	32.5	32.5	32.3	32.3	32.3	32.3
2.66	32.7	32.7	32.8	32.8	32.8	32.9	32.7	32.7	32.7	32.7
2.68	33.0	33.1	33.2	33.2	33.2	33.2	33.1	33.1	33.1	33.1
2.70	33.4	33.5	33.5	33.6	33.6	33.6	33.5	33.5	33.5	33.5
2.72	33.8	33.9	33.9	34.0	34.0	34.0	34.0	33.9	33.9	33.9
2.74	34.2	34.2	34.3	34.3	34.4	34.4	34.4	34.3	34.3	34.3
2.76	34.6	34.6	34.7	34.7	34.8	34.8	34.8	34.6	34.6	34.6
2.78	34.9	35.0	35.1	35.1	35.2	35.2	35.2	35.0	35.0	35.0
2.80	35.3	35.4	35.5	35.5	35.5	35.6	35.6	35.4	35.4	35.4
2.82	35.7	35.8	35.8	35.9	35.9	36.0	36.0	36.0	35.8	35.8
2.84	36.1	36.2	36.2	36.3	36.3	36.4	36.4	36.4	36.2	36.2
2.86	36.5	36.5	36.6	36.7	36.7	36.8	36.8	36.8	36.6	36.6
2.88	36.8	36.9	37.0	37.1	37.1	37.1	37.2	37.2	37.0	37.0
2.90	37.2	37.3	37.4	37.5	37.5	37.5	37.6	37.6	37.4	37.4
2.92	37.6	37.7	37.8	37.9	37.9	37.9	38.0	38.0	38.0	37.8
2.94	38.0	38.1	38.2	38.2	38.3	38.3	38.4	38.4	38.4	38.2
2.96	38.4	38.5	38.6	38.6	38.7	38.7	38.8	38.8	38.8	38.6
2.98	38.8	38.9	39.0	39.0	39.1	39.1	39.2	39.2	39.2	39.1
3.00	39.2	39.3	39.4	39.4	39.5	39.6	39.6	39.6	39.6	39.5

Table 13 Submerged flow calibration for 36 in × 9 ft Cutthroat flume, (Q, cfs)

h_a	$h_a - h_b$: .02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
.02	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.04	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.06	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.08	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.10	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
.12	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
.14	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
.16	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
.18	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7	.7
.20	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9	.9
.22	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
.24	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
.26	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.28	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
.30	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
.32	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
.34	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
.36	2.0	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
.38	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
.40	2.3	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
.42	2.5	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
.44	2.7	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
.46	2.8	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
.48	3.0	3.3	3.4	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
.50	3.2	3.5	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
.52	3.4	3.7	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
.54	3.6	3.9	4.1	4.1	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
.56	3.7	4.1	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
.58	3.9	4.3	4.5	4.6	4.7	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
.60	4.1	4.5	4.7	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
.62	4.3	4.7	5.0	5.1	5.2	5.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
.64	4.5	5.0	5.2	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
.66	4.7	5.2	5.4	5.6	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
.68	4.9	5.4	5.7	5.8	5.9	6.0	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
.70	5.1	5.7	5.9	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.7	6.2	6.2	6.2	6.2	6.2	6.2
.72	5.3	5.9	6.2	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
.74	5.5	6.1	6.4	6.6	6.7	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
.76	5.8	6.4	6.7	6.9	7.0	7.1	7.1	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
.78	6.0	6.6	6.9	7.1	7.3	7.4	7.4	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
.80	6.2	6.8	7.2	7.4	7.6	7.6	7.7	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
.82	6.4	7.1	7.5	7.7	7.8	7.9	8.0	8.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
.84	6.6	7.3	7.7	8.0	8.1	8.2	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
.86	6.9	7.6	8.0	8.2	8.4	8.5	8.6	8.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
.88	7.1	7.8	8.3	8.5	8.7	8.8	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
.90	7.3	8.1	8.5	8.8	9.0	9.1	9.2	9.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
.92	7.5	8.3	8.8	9.1	9.3	9.4	9.5	9.6	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
.94	7.8	8.6	9.1	9.4	9.6	9.7	9.8	9.9	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
.96	8.0	8.9	9.4	9.7	9.9	10.0	10.1	10.2	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
.98	8.2	9.1	9.6	10.0	10.2	10.4	10.5	10.5	10.6	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
1.00	8.5	9.4	9.9	10.3	10.5	10.7	10.8	10.9	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8

Table 13 (continued)

h_a	$h_a - h_b$																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
1.02	8.7	9.7	10.2	10.6	10.8	11.0	11.1	11.2	11.2	11.3	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
1.04	8.9	9.9	10.5	10.9	11.1	11.3	11.4	11.5	11.6	11.6	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
1.06	9.2	10.2	10.8	11.2	11.4	11.6	11.8	11.9	11.9	11.9	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
1.08	9.4	10.5	11.1	11.5	11.8	12.0	12.1	12.2	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
1.10	9.7	10.8	11.4	11.8	12.1	12.3	12.4	12.5	12.6	12.6	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
1.12	9.9	11.0	11.7	12.1	12.4	12.6	12.8	12.9	13.0	13.0	13.0	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
1.14	10.2	11.3	12.0	12.4	12.7	12.9	13.1	13.2	13.3	13.4	13.4	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
1.16	10.4	11.6	12.3	12.7	13.0	13.3	13.5	13.6	13.7	13.7	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
1.18	10.7	11.9	12.6	13.0	13.4	13.6	13.8	13.9	14.0	14.1	14.1	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
1.20	10.9	12.2	12.9	13.4	13.7	14.0	14.1	14.3	14.4	14.4	14.5	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
1.22	11.2	12.4	13.2	13.7	14.0	14.3	14.5	14.6	14.7	14.8	14.9	14.9	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
1.24	11.5	12.7	13.5	14.0	14.4	14.6	14.8	15.0	15.1	15.2	15.2	15.3	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
1.26	11.7	13.0	13.8	14.3	14.7	15.0	15.2	15.4	15.5	15.6	15.6	15.6	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
1.28	12.0	13.3	14.1	14.7	15.0	15.3	15.6	15.7	15.9	15.9	16.0	16.0	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
1.30	12.2	13.6	14.4	15.0	15.4	15.7	15.9	16.1	16.2	16.3	16.4	16.4	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2
1.32	12.5	13.9	14.7	15.3	15.7	16.0	16.3	16.5	16.6	16.7	16.8	16.8	16.8	16.6	16.6	16.6	16.6	16.6	16.6	16.6
1.34	12.8	14.2	15.1	15.7	16.1	16.4	16.6	16.8	17.0	17.1	17.2	17.2	17.2	17.0	17.0	17.0	17.0	17.0	17.0	17.0
1.36	13.0	14.5	15.4	16.0	16.4	16.8	17.0	17.2	17.4	17.5	17.5	17.6	17.6	17.4	17.4	17.4	17.4	17.4	17.4	17.4
1.38	13.3	14.8	15.7	16.3	16.6	17.1	17.4	17.6	17.7	17.9	17.9	18.0	18.0	17.8	17.8	17.8	17.8	17.8	17.8	17.8
1.40	13.6	15.1	16.0	16.7	17.1	17.5	17.8	18.0	18.1	18.2	18.3	18.4	18.4	18.2	18.2	18.2	18.2	18.2	18.2	18.2
1.42	13.8	15.4	16.4	17.0	17.5	17.8	18.1	18.3	18.5	18.6	18.7	18.8	18.8	18.9	18.6	18.6	18.6	18.6	18.6	18.6
1.44	14.1	15.7	16.7	17.3	17.8	18.2	18.5	18.7	18.9	19.0	19.1	19.2	19.2	19.3	19.0	19.0	19.0	19.0	19.0	19.0
1.46	14.4	16.0	17.0	17.7	18.2	18.6	18.9	19.1	19.3	19.4	19.5	19.6	19.7	19.7	19.5	19.5	19.5	19.5	19.5	19.5
1.48	14.7	16.4	17.4	18.0	18.6	18.9	19.3	19.5	19.7	19.8	19.9	20.0	20.1	20.1	19.9	19.9	19.9	19.9	19.9	19.9
1.50	15.0	16.7	17.7	18.4	18.9	19.3	19.6	19.9	20.1	20.2	20.3	20.4	20.5	20.5	20.3	20.3	20.3	20.3	20.3	20.3
1.52	15.2	17.0	18.0	18.7	19.3	19.7	20.0	20.3	20.5	20.6	20.8	20.8	20.9	20.9	21.0	20.7	20.7	20.7	20.7	20.7
1.54	15.5	17.3	18.4	19.1	19.6	20.1	20.4	20.7	20.9	21.0	21.2	21.3	21.3	21.4	21.4	21.1	21.1	21.1	21.1	21.1
1.56	15.8	17.6	18.7	19.5	20.0	20.5	20.8	21.1	21.3	21.5	21.6	21.7	21.8	21.8	21.8	21.6	21.6	21.6	21.6	21.6
1.58	16.1	17.9	19.0	19.8	20.4	20.8	21.2	21.5	21.7	21.9	22.0	22.1	22.2	22.2	22.3	22.0	22.0	22.0	22.0	22.0
1.60	16.4	18.2	19.4	20.2	20.6	21.2	21.6	21.9	22.1	22.3	22.4	22.5	22.6	22.7	22.7	22.4	22.4	22.4	22.4	22.4
1.62	16.7	18.6	19.7	20.5	21.1	21.6	22.0	22.3	22.5	22.7	22.8	23.0	23.0	23.1	23.1	23.2	22.9	22.9	22.9	22.9
1.64	16.9	18.9	20.1	20.9	21.5	22.0	22.4	22.7	22.9	23.1	23.3	23.4	23.5	23.5	23.6	23.6	23.3	23.3	23.3	23.3
1.66	17.2	19.2	20.4	21.3	21.9	22.4	22.8	23.1	23.3	23.5	23.7	23.8	23.9	24.0	24.0	24.1	23.8	23.8	23.8	23.8
1.68	17.5	19.5	20.8	21.6	22.3	22.8	23.2	23.5	23.7	24.0	24.1	24.2	24.3	24.4	24.5	24.5	24.2	24.2	24.2	24.2
1.70	17.8	19.9	21.1	22.0	22.6	23.2	23.6	23.9	24.2	24.4	24.5	24.7	24.8	24.9	24.9	25.0	24.7	24.7	24.7	24.7
1.72	18.1	20.2	21.5	22.4	23.0	23.5	24.0	24.3	24.6	24.8	25.0	25.1	25.2	25.3	25.4	25.4	25.4	25.1	25.1	25.1
1.74	18.4	20.5	21.8	22.7	23.4	23.9	24.4	24.7	25.0	25.2	25.4	25.6	25.7	25.8	25.8	25.9	25.9	25.6	25.6	25.6
1.76	18.7	20.9	22.2	23.1	23.8	24.3	24.8	25.1	25.4	25.7	25.8	26.0	26.1	26.2	26.3	26.3	26.4	26.0	26.0	26.0
1.78	19.0	21.2	22.5	23.5	24.2	24.7	25.2	25.5	25.8	26.1	26.3	26.4	26.6	26.7	26.7	25.8	26.8	26.5	26.5	26.5
1.80	19.3	21.5	22.9	23.9	24.6	25.1	25.6	26.0	26.3	26.5	26.7	26.9	27.0	27.1	27.2	27.3	27.3	27.0	27.0	27.0
1.82	19.6	21.9	23.3	24.2	25.0	25.5	26.0	26.4	26.7	27.0	27.2	27.3	27.5	27.6	27.7	27.7	27.8	27.8	27.4	27.4
1.84	19.9	22.2	23.6	24.6	25.4	25.9	26.4	26.8	27.1	27.4	27.6	27.8	27.9	28.0	28.1	28.2	28.2	28.2	27.9	27.9
1.86	20.2	22.6	24.0	25.0	25.8	26.4	26.8	27.2	27.5	27.8	28.1	28.2	28.4	28.5	28.6	28.7	28.7	28.7	28.4	28.4
1.88	20.5	22.9	24.3	25.4	26.1	26.8	27.3	27.7	28.0	28.3	28.5	28.7	28.8	29.0	29.1	29.1	29.2	29.2	28.9	28.9
1.90	20.8	23.2	24.7	25.8	26.5	27.2	27.7	28.1	28.4	28.7	29.0	29.1	29.3	29.4	29.5	29.6	29.7	29.7	29.3	29.3
1.92	21.1	23.6	25.1	26.1	26.9	27.6	28.1	28.5	28.9	29.2	29.4	29.6	29.8	29.9	30.0	30.1	30.1	30.2	30.2	29.8
1.94	21.4	23.9	25.4	26.5	27.3	28.0	28.5	29.0	29.3	29.6	29.9	30.1	30.2	30.4	30.5	30.6	30.6	30.7	30.7	30.3
1.96	21.7	24.3	25.8	26.9	27.8	28.4	29.0	29.4	29.8	30.1	30.3	30.5	30.7	30.8	31.0	31.0	31.1	31.1	31.2	30.8
1.98	22.0	24.6	26.2	27.3	28.2	28.8	29.4	29.8	30.2	30.5	30.8	31.0	31.2	31.3	31.4	31.5	31.6	31.6	31.7	31.3
2.00	22.4	25.0	26.6	27.7	28.6	29.2	29.8	30.3	30.6	31.0	31.2	31.5	31.6	31.8	31.9	32.0	32.1	32.1	32.2	31.8

Table 13 (continued)

h_a	h_a-h_b																			
	.02	.04	.06	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36	.38	.40
2.02	22.7	25.3	26.9	28.1	29.0	29.7	30.2	30.7	31.1	31.4	31.7	31.9	32.1	32.3	32.4	32.5	32.6	32.6	32.7	32.7
2.04	23.0	25.7	27.3	28.5	29.4	30.1	30.7	31.1	31.5	31.9	32.2	32.4	32.6	32.7	32.9	33.0	33.1	33.1	33.2	33.2
2.06	23.3	26.0	27.7	28.9	29.8	30.5	31.1	31.6	32.0	32.3	32.6	32.9	33.1	33.2	33.4	33.5	33.6	33.6	33.7	33.7
2.08	23.6	26.4	28.1	29.3	30.2	30.9	31.5	32.0	32.4	32.8	33.1	33.3	33.5	33.7	33.9	34.0	34.1	34.1	34.2	34.2
2.10	23.9	26.7	28.5	29.7	30.6	31.4	32.0	32.5	32.9	33.3	33.6	33.8	34.0	34.2	34.3	34.5	34.6	34.6	34.7	34.7
2.12	24.3	27.1	28.8	30.1	31.0	31.8	32.4	32.9	33.4	33.7	34.0	34.3	34.5	34.7	34.8	35.0	35.1	35.1	35.2	35.2
2.14	24.6	27.5	29.2	30.5	31.5	32.2	32.9	33.4	33.8	34.2	34.5	34.8	35.0	35.2	35.3	35.5	35.6	35.6	35.7	35.7
2.16	24.9	27.8	29.6	30.9	31.9	32.7	33.3	33.8	34.3	34.7	35.0	35.2	35.5	35.7	35.8	36.0	36.1	36.1	36.2	36.2
2.18	25.2	28.2	30.0	31.3	32.3	33.1	33.7	34.3	34.7	35.1	35.5	35.7	36.0	36.2	36.3	36.5	36.6	36.7	36.7	36.8
2.20	25.5	28.5	30.4	31.7	32.7	33.5	34.2	34.7	35.2	35.6	35.9	36.2	36.5	36.7	36.8	37.0	37.1	37.2	37.2	37.3
2.22	25.9	28.9	30.8	32.1	33.1	34.0	34.6	35.2	35.7	36.1	36.4	36.7	36.9	37.2	37.3	37.5	37.6	37.7	37.8	37.8
2.24	26.2	29.3	31.2	32.5	33.6	34.4	35.1	35.7	36.1	36.5	36.9	37.2	37.4	37.7	37.8	38.0	38.1	38.2	38.3	38.3
2.26	26.5	29.6	31.6	32.9	34.0	34.8	35.5	36.1	36.6	37.0	37.4	37.7	37.9	38.2	38.3	38.5	38.6	38.7	38.8	38.9
2.28	26.8	30.0	32.0	33.4	34.4	35.3	36.0	36.6	37.1	37.5	37.9	38.2	38.4	38.7	38.8	39.0	39.1	39.2	39.3	39.4
2.30	27.2	30.4	32.4	33.8	34.9	35.7	36.4	37.0	37.5	38.0	38.3	38.7	38.9	39.2	39.4	39.5	39.7	39.8	39.9	39.9
2.32	27.5	30.8	32.8	34.2	35.3	36.2	36.9	37.5	38.0	38.5	38.8	39.2	39.4	39.7	39.9	40.0	40.2	40.3	40.4	40.5
2.34	27.8	31.1	33.1	34.6	35.7	36.6	37.4	38.0	38.5	38.9	39.3	39.7	39.9	40.2	40.4	40.6	40.7	40.8	40.9	41.0
2.36	28.2	31.5	33.5	35.0	36.2	37.1	37.8	38.4	39.0	39.4	39.8	40.2	40.4	40.7	40.9	41.1	41.2	41.3	41.4	41.5
2.38	28.5	31.9	34.0	35.4	36.6	37.5	38.3	38.9	39.5	39.9	40.3	40.7	40.9	41.2	41.4	41.6	41.8	41.9	42.0	42.1
2.40	28.8	32.3	34.4	35.9	37.0	38.0	38.7	39.4	39.9	40.4	40.8	41.2	41.5	41.7	41.9	42.1	42.3	42.4	42.5	42.6
2.42	29.2	32.6	34.8	36.3	37.5	38.4	39.2	39.9	40.4	40.9	41.3	41.7	42.0	42.2	42.5	42.6	42.8	42.9	43.1	43.1
2.44	29.5	33.0	35.2	36.7	37.9	38.9	39.7	40.3	40.9	41.4	41.8	42.2	42.5	42.7	43.0	43.2	43.3	43.5	43.6	43.7
2.46	29.8	33.4	35.6	37.1	38.3	39.3	40.1	40.8	41.4	41.9	42.3	42.7	43.0	43.3	43.5	43.7	43.9	44.0	44.1	44.2
2.48	30.2	33.8	36.0	37.6	38.8	39.8	40.6	41.3	41.9	42.4	42.8	43.2	43.5	43.8	44.0	44.2	44.4	44.6	44.7	44.8
2.50	30.5	34.2	36.4	38.0	39.2	40.2	41.1	41.8	42.4	42.9	43.3	43.7	44.0	44.3	44.6	44.8	44.9	45.1	45.2	45.3
2.52	30.9	34.5	36.8	38.4	39.7	40.7	41.5	42.2	42.8	43.4	43.8	44.2	44.5	44.8	45.1	45.3	45.5	45.6	45.8	45.9
2.54	31.2	34.9	37.2	38.9	40.1	41.2	42.0	42.7	43.3	43.9	44.3	44.7	45.1	45.4	45.6	45.8	46.0	46.2	46.3	46.4
2.56	31.6	35.3	37.6	39.3	40.6	41.6	42.5	43.2	43.8	44.4	44.8	45.2	45.6	45.9	46.1	46.4	46.6	46.7	46.9	47.0
2.58	31.9	35.7	38.0	39.7	41.0	42.1	43.0	43.7	44.3	44.9	45.3	45.7	46.1	46.4	46.7	46.9	47.1	47.3	47.4	47.6
2.60	32.2	36.1	38.4	40.2	41.5	42.5	43.4	44.2	44.8	45.4	45.9	46.3	46.6	46.9	47.2	47.5	47.7	47.8	48.0	48.1
2.62	32.6	36.5	38.9	40.6	41.9	43.0	43.9	44.7	45.3	45.9	46.4	46.8	47.2	47.5	47.8	48.0	48.2	48.4	48.5	48.7
2.64	32.9	36.9	39.3	41.0	42.4	43.5	44.4	45.2	45.8	46.4	46.9	47.3	47.7	48.0	48.3	48.5	48.8	48.9	49.1	49.2
2.66	33.3	37.2	39.7	41.5	42.8	44.0	44.9	45.7	46.3	46.9	47.4	47.8	48.2	48.5	48.8	49.1	49.3	49.5	49.7	49.8
2.68	33.6	37.6	40.1	41.9	43.3	44.4	45.4	46.1	46.8	47.4	47.9	48.4	48.7	49.1	49.4	49.6	49.9	50.1	50.2	50.4
2.70	34.0	38.0	40.5	42.4	43.8	44.9	45.8	46.6	47.3	47.9	48.4	48.9	49.3	49.6	49.9	50.2	50.4	50.6	50.8	50.9
2.72	34.3	38.4	41.0	42.8	44.2	45.4	46.3	47.1	47.8	48.4	49.0	49.4	49.8	50.2	50.5	50.7	51.0	51.2	51.4	51.5
2.74	34.7	38.8	41.4	43.2	44.7	45.8	46.8	47.6	48.3	48.9	49.5	49.9	50.3	50.7	51.0	51.3	51.5	51.7	51.9	52.1
2.76	35.0	39.2	41.8	43.7	45.1	46.3	47.3	48.1	48.8	49.5	50.0	50.5	50.9	51.2	51.6	51.8	52.1	52.3	52.5	52.6
2.78	35.4	39.6	42.2	44.1	45.6	46.8	47.8	48.6	49.4	50.0	50.5	51.0	51.4	51.8	52.1	52.4	52.7	52.9	53.1	53.2
2.80	35.8	40.0	42.7	44.6	46.1	47.3	48.3	49.1	49.9	50.5	51.1	51.5	52.0	52.3	52.7	53.0	53.2	53.4	53.6	53.8
2.82	36.1	40.4	43.1	45.0	46.5	47.8	48.8	49.6	50.4	51.0	51.6	52.1	52.5	52.9	53.2	53.5	53.8	54.0	54.2	54.4
2.84	36.5	40.8	43.5	45.5	47.0	48.2	49.3	50.1	50.9	51.5	52.1	52.6	53.1	53.4	53.8	54.1	54.3	54.6	54.8	55.0
2.86	36.8	41.2	44.0	45.9	47.5	48.7	49.8	50.6	51.4	52.1	52.6	53.2	53.6	54.0	54.3	54.6	54.9	55.2	55.4	55.5
2.88	37.2	41.6	44.4	46.4	47.9	49.2	50.3	51.2	51.9	52.6	53.2	53.7	54.1	54.5	54.9	55.2	55.5	55.7	55.9	56.1
2.90	37.6	42.0	44.8	46.8	48.4	49.7	50.8	51.7	52.4	53.1	53.7	54.2	54.7	55.1	55.5	55.8	56.1	56.3	56.5	56.7
2.92	37.9	42.5	45.3	47.3	48.9	50.2	51.3	52.2	53.0	53.7	54.3	54.8	55.2	55.7	56.0	56.3	56.6	56.9	57.1	57.3
2.94	38.3	42.9	45.7	47.8	49.4	50.7	51.8	52.7	53.5	54.2	54.8	55.3	55.8	56.2	56.6	56.9	57.2	57.5	57.7	57.9
2.96	38.6	43.3	46.1	48.2	49.8	51.2	52.3	53.2	54.0	54.7	55.3	55.9	56.4	56.8	57.2	57.5	57.8	58.0	58.3	58.5
2.98	39.0	43.7	46.6	48.7	50.3	51.6	52.8	53.7	54.5	55.2	55.9	56.4	56.9	57.3	57.7	58.1	58.4	58.6	58.9	59.1
3.00	39.4	44.1	47.0	49.1	50.8	52.1	53.3	54.2	55.1	55.8	56.4	57.0	57.5	57.9	58.3	58.6	58.9	59.2	59.5	59.7

Table 13 (continued)

h_a	$h_a - h_b$ .42	.44	.46	.48	.50	.52	.54	.56	.58	.60
2.04	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8	32.8
2.06	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
2.08	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8	33.8
2.10	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3	34.3
2.12	35.2	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
2.14	35.8	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3	35.3
2.16	36.3	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8
2.18	36.8	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4
2.20	37.3	36.9	36.[illegible]	36.9	36.9	36.9	36.9	36.9	36.9	36.9
2.22	37.8	37.9	37.4	37.4	37.4	37.4	37.4	37.4	37.4	37.4
2.24	38.4	38.4	37.9	37.9	37.9	37.9	37.9	37.9	37.9	37.9
2.26	38.9	38.9	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
2.28	39.4	39.5	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
2.30	40.0	40.0	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
2.32	40.5	40.5	40.6	40.1	40.1	40.1	40.1	40.1	40.1	40.1
2.34	41.0	41.1	41.1	40.6	40.6	40.6	40.6	40.6	40.6	40.6
2.36	41.6	41.6	41.6	41.1	41.1	41.1	41.1	41.1	41.1	41.1
2.38	42.1	42.2	42.2	41.7	41.7	41.7	41.7	41.7	41.7	41.7
2.40	42.7	42.7	42.7	42.2	42.2	42.2	42.2	42.2	42.2	42.2
2.42	43.2	43.3	43.3	43.3	42.8	42.8	42.8	42.8	42.8	42.8
2.44	43.8	43.8	43.9	43.9	43.3	43.3	43.3	43.3	43.3	43.3
2.46	44.3	44.4	44.4	44.4	43.9	43.9	43.9	43.9	43.9	43.9
2.48	44.9	44.9	45.0	45.0	44.5	44.5	44.5	44.5	44.5	44.5
2.50	45.4	45.5	45.5	45.6	45.0	45.0	45.0	45.0	45.0	45.0
2.52	46.0	46.0	46.1	46.1	46.1	45.6	45.6	45.6	45.6	45.6
2.54	46.5	46.6	46.7	46.7	46.7	46.1	46.1	46.1	46.1	46.1
2.56	47.1	47.2	47.2	47.3	47.3	46.7	46.7	46.7	46.7	46.7
2.58	47.7	47.7	47.8	47.8	47.9	47.3	47.3	47.3	47.3	47.3
2.60	48.2	48.3	48.4	48.4	48.4	47.9	47.9	47.9	47.9	47.9
2.62	48.8	48.9	48.9	49.0	49.0	49.0	48.4	48.4	48.4	48.4
2.64	49.3	49.4	49.5	49.6	49.6	49.6	49.0	49.0	49.0	49.0
2.66	49.9	50.0	50.1	50.1	50.2	50.2	49.6	49.6	49.6	49.6
2.68	50.5	50.6	50.7	50.7	50.8	50.8	50.2	50.2	50.2	50.2
2.70	51.1	51.2	51.2	51.3	51.3	51.4	50.8	50.8	50.8	50.8
2.72	51.6	51.7	51.8	51.9	51.9	52.0	52.0	51.4	51.4	51.4
2.74	52.2	52.3	52.4	52.5	52.5	52.6	52.6	51.9	51.9	51.9
2.76	52.8	52.9	53.0	53.1	53.1	53.1	53.2	52.5	52.5	52.5
2.78	53.4	53.5	53.6	53.6	53.7	53.7	53.8	53.1	53.1	53.1
2.80	53.9	54.1	54.2	54.2	54.3	54.3	54.4	53.7	53.7	53.7
2.82	54.5	54.6	54.7	54.8	54.9	54.9	55.0	55.0	54.3	54.3
2.84	55.1	55.2	55.3	55.4	55.5	55.5	55.6	55.6	54.9	54.9
2.86	55.7	55.8	55.9	56.0	56.1	56.1	56.2	56.2	55.5	55.5
2.88	56.3	56.4	56.5	56.6	56.7	56.8	56.8	56.8	56.1	56.1
2.90	56.9	57.0	57.1	57.2	57.3	57.4	57.4	57.4	56.7	56.7
2.92	57.5	57.6	57.7	57.8	57.9	58.0	58.0	58.0	58.1	57.4
2.94	58.1	58.2	58.3	58.4	58.5	58.6	58.6	58.7	58.7	58.0
2.96	58.6	58.6	58.9	59.0	59.1	59.2	59.2	59.3	59.3	58.6
2.98	59.2	59.4	59.5	59.6	59.7	59.8	59.9	59.9	59.9	59.2
3.00	59.8	60.0	60.1	60.3	60.3	60.4	60.5	60.5	60.5	59.8

APPENDIX B

DISCHARGE RATINGS IN METRIC UNITS

Table 14 Free flow calibrations for selected Cutthroat flumes, metric units (Q^*, cms)

h_a^*	10X90CM	20X90CM	30X90CM	20X180CM	40X180CM	60X180CM	30X270CM	60X270CM	100X270C
.005	.000	.000	.000	.000	.000	.000	.000	.000	.001
.010	.000	.000	.000	.000	.000	.001	.000	.001	.002
.015	.000	.000	.000	.000	.001	.001	.001	.002	.003
.020	.000	.001	.001	.001	.002	.002	.001	.003	.005
.025	.000	.001	.001	.001	.002	.003	.002	.004	.007
.030	.001	.001	.002	.001	.003	.005	.003	.005	.009
.035	.001	.002	.002	.002	.004	.006	.003	.007	.011
.040	.001	.002	.003	.002	.005	.007	.004	.008	.014
.045	.001	.003	.004	.003	.006	.009	.005	.010	.017
.050	.001	.003	.004	.003	.007	.011	.006	.012	.020
.055	.002	.004	.005	.004	.008	.012	.007	.014	.023
.060	.002	.004	.006	.005	.009	.014	.008	.016	.026
.065	.002	.005	.007	.005	.011	.016	.009	.018	.030
.070	.003	.006	.008	.006	.012	.018	.010	.020	.034
.075	.003	.006	.009	.007	.014	.021	.011	.022	.038
.080	.003	.007	.011	.007	.015	.023	.012	.025	.042
.085	.004	.008	.012	.008	.017	.025	.013	.027	.046
.090	.004	.009	.013	.009	.018	.028	.015	.030	.050
.095	.005	.010	.014	.010	.020	.030	.016	.032	.054
.100	.005	.011	.016	.011	.022	.033	.017	.035	.059
.105	.006	.012	.017	.012	.024	.036	.018	.038	.063
.110	.006	.013	.019	.013	.026	.039	.020	.040	.068
.115	.007	.014	.021	.013	.027	.042	.021	.043	.073
.120	.007	.015	.022	.014	.029	.045	.023	.046	.078
.125	.008	.016	.024	.015	.032	.048	.024	.049	.083
.130	.008	.018	.026	.016	.034	.051	.026	.052	.089
.135	.009	.019	.028	.018	.036	.054	.027	.056	.094
.140	.010	.020	.030	.019	.038	.057	.029	.059	.099
.145	.010	.022	.031	.020	.040	.061	.031	.062	.105
.150	.011	.023	.034	.021	.043	.064	.032	.066	.111
.155	.012	.024	.036	.022	.045	.068	.034	.069	.117
.160	.012	.026	.038	.023	.047	.072	.036	.073	.122
.165	.013	.027	.040	.024	.050	.075	.037	.076	.129
.170	.014	.029	.042	.026	.052	.079	.039	.080	.135
.175	.014	.031	.045	.027	.055	.083	.041	.083	.141
.180	.015	.032	.047	.028	.058	.087	.043	.087	.147
.185	.016	.034	.049	.030	.060	.091	.045	.091	.154
.190	.017	.036	.052	.031	.063	.095	.047	.095	.160
.195	.018	.037	.054	.032	.066	.099	.049	.099	.167
.200	.018	.039	.057	.034	.068	.104	.051	.103	.174
.205	.019	.041	.060	.035	.071	.108	.052	.107	.180
.210	.020	.043	.062	.036	.074	.112	.055	.111	.187
.215	.021	.045	.065	.038	.077	.117	.057	.115	.194
.220	.022	.047	.068	.039	.080	.121	.059	.119	.201
.225	.023	.049	.071	.041	.083	.126	.061	.123	.209
.230	.024	.051	.074	.042	.086	.130	.063	.128	.216
.235	.025	.053	.077	.044	.089	.135	.065	.132	.223
.240	.026	.055	.080	.045	.092	.140	.067	.137	.231
.245	.027	.057	.083	.047	.096	.145	.069	.141	.238
.250	.028	.059	.086	.049	.099	.150	.072	.146	.246

Table 14 (continued)

h_a^*	10X90CM	20X90CM	30X90CM	20X180CM	40X180CM	60X180CM	30X270CM	60X270CM	100X270C
.255	.029	.061	.089	.050	.102	.155	.074	.150	.254
.260	.030	.063	.092	.052	.106	.160	.076	.155	.261
.265	.031	.066	.096	.053	.109	.165	.078	.159	.269
.270	.032	.068	.099	.055	.112	.170	.081	.164	.277
.275	.033	.070	.102	.057	.116	.175	.083	.169	.285
.280	.034	.073	.106	.059	.119	.180	.085	.174	.293
.285	.035	.075	.109	.060	.123	.186	.088	.179	.302
.290	.037	.078	.113	.062	.126	.191	.090	.183	.310
.295	.038	.080	.116	.064	.130	.197	.093	.188	.318
.300	.039	.082	.120	.066	.134	.202	.095	.193	.327
.305	.040	.085	.124	.067	.137	.208	.098	.199	.335
.310	.041	.088	.127	.069	.141	.213	.100	.204	.344
.315	.043	.090	.131	.071	.145	.219	.103	.209	.353
.320	.044	.093	.135	.073	.149	.225	.105	.214	.361
.325	.045	.096	.139	.075	.152	.231	.108	.219	.370
.330	.046	.098	.143	.077	.156	.237	.110	.224	.379
.335	.048	.101	.147	.079	.160	.243	.113	.230	.388
.340	.049	.104	.151	.081	.164	.249	.116	.235	.397
.345	.050	.107	.155	.083	.168	.255	.118	.241	.406
.350	.052	.110	.159	.085	.172	.261	.121	.246	.416
.355	.053	.112	.164	.087	.176	.267	.124	.252	.425
.360	.054	.115	.168	.089	.180	.273	.126	.257	.434
.365	.056	.118	.172	.091	.185	.279	.129	.263	.444
.370	.057	.121	.177	.093	.189	.285	.132	.268	.453
.375	.059	.124	.181	.095	.193	.292	.135	.274	.463
.380	.060	.127	.185	.097	.197	.299	.138	.280	.473
.385	.062	.131	.190	.099	.202	.305	.140	.286	.482
.390	.063	.134	.195	.101	.206	.312	.143	.291	.492
.395	.065	.137	.199	.103	.210	.318	.146	.297	.502
.400	.066	.140	.204	.105	.215	.325	.149	.303	.512
.405	.068	.143	.209	.108	.219	.332	.152	.309	.522
.410	.069	.147	.213	.110	.224	.339	.155	.315	.532
.415	.071	.150	.218	.112	.228	.345	.158	.321	.542
.420	.072	.153	.223	.114	.233	.352	.161	.327	.552
.425	.074	.157	.228	.116	.237	.359	.164	.333	.563
.430	.076	.160	.233	.119	.242	.366	.167	.339	.573
.435	.077	.163	.238	.121	.247	.373	.170	.346	.584
.440	.079	.167	.243	.123	.251	.380	.173	.352	.594
.445	.080	.170	.248	.126	.256	.388	.176	.358	.605
.450	.082	.174	.253	.128	.261	.395	.179	.364	.615
.455	***	***	***	.130	.266	.402	.182	.371	.626
.460	***	***	***	.133	.270	.409	.185	.377	.637
.465	***	***	***	.135	.275	.417	.189	.383	.648
.470	***	***	***	.138	.280	.424	.192	.390	.659
.475	***	***	***	.140	.285	.432	.195	.396	.669
.480	***	***	***	.142	.290	.439	.198	.403	.681
.485	***	***	***	.145	.295	.447	.201	.409	.692
.490	***	***	***	.147	.300	.454	.205	.416	.703
.495	***	***	***	.150	.305	.462	.208	.423	.714
.500	***	***	***	.152	.310	.470	.211	.429	.725

Table 14 (continued)

h_a^*	10X90CM	20X90CM	30X90CM	20X180CM	40X180CM	60X180CM	30X270CM	60X270CM	100X270C
.505	...	...	...	.155	.315	.477	.214	.436	.737
.510	...	...	...	.157	.321	.485	.218	.443	.748
.515	...	...	...	.160	.326	.493	.221	.450	.760
.520	...	...	...	.162	.331	.501	.224	.457	.771
.525	...	...	...	.165	.336	.509	.228	.463	.783
.530	...	...	...	.168	.342	.517	.231	.470	.794
.535	...	...	...	.170	.347	.525	.235	.477	.806
.540	...	...	...	.173	.352	.533	.238	.484	.818
.545	...	...	...	.176	.358	.541	.242	.491	.830
.550	...	...	...	.178	.363	.550	.245	.498	.842
.555	...	...	...	.181	.369	.558	.249	.505	.854
.560	...	...	...	.184	.374	.566	.252	.513	.866
.565	...	...	...	.186	.380	.575	.256	.520	.878
.570	...	...	...	.189	.385	.583	.259	.527	.890
.575	...	...	...	.192	.391	.591	.263	.534	.902
.580	...	...	...	.195	.396	.600	.266	.541	.914
.585	...	...	...	.197	.402	.609	.270	.549	.927
.590	...	...	...	.200	.408	.617	.273	.556	.939
.595	...	...	...	.203	.414	.626	.277	.563	.952
.600	...	...	...	.206	.419	.635	.281	.571	.964
.605	...	...	...	...	...	...	.284	.578	.977
.610	...	...	...	...	...	...	.288	.586	.989
.615	...	...	...	...	...	...	.292	.593	1.002
.620	...	...	...	...	...	...	.295	.601	1.015
.625	...	...	...	...	...	...	.299	.608	1.028
.630	...	...	...	...	...	...	.303	.616	1.040
.635	...	...	...	...	...	...	.307	.624	1.053
.640	...	...	...	...	...	...	.310	.631	1.066
.645	...	...	...	...	...	...	.314	.639	1.079
.650	...	...	...	...	...	...	.318	.647	1.092
.655	...	...	...	...	...	...	.322	.655	1.106
.660	...	...	...	...	...	...	.326	.662	1.119
.665	...	...	...	...	...	...	.330	.670	1.132
.670	...	...	...	...	...	...	.333	.678	1.145
.675	...	...	...	...	...	...	.337	.686	1.159
.680	...	...	...	...	...	...	.341	.694	1.172
.685	...	...	...	...	...	...	.345	.702	1.186
.690	...	...	...	...	...	...	.349	.710	1.199
.695	...	...	...	...	...	...	.353	.718	1.213
.700	...	...	...	...	...	...	.357	.726	1.226
.705	...	...	...	...	...	...	.361	.734	1.240
.710	...	...	...	...	...	...	.365	.742	1.254
.715	...	...	...	...	...	...	.369	.750	1.268
.720	...	...	...	...	...	...	.373	.759	1.281
.725	...	...	...	...	...	...	.377	.767	1.295
.730	...	...	...	...	...	...	.381	.775	1.309
.735	...	...	...	...	...	...	.385	.784	1.323
.740	...	...	...	...	...	...	.389	.792	1.337
.745	...	...	...	...	...	...	.393	.800	1.352
.750	...	...	...	...	...	...	.398	.809	1.366

Table 15 Submerged flow calibration for 10 cm × 90 cm Cutthroat flume, (Q^*, cms)

h_a^* \ $h_a^*-h_b^*$	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.015	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.020	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.025	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.030	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.035	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.040	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.045	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.050	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.055	.001	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.060	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.065	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.070	.002	.002	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.075	.002	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.080	.002	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.085	.003	.003	.003	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.090	.003	.003	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.095	.003	.004	.004	.004	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.100	.003	.004	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.105	.004	.004	.005	.005	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.110	.004	.005	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.115	.004	.005	.006	.006	.006	.006	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.120	.004	.005	.006	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.125	.005	.006	.006	.007	.007	.007	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.130	.005	.006	.007	.007	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.135	.005	.007	.007	.008	.008	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.140	.006	.007	.008	.008	.009	.009	.009	.009	.009	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
.145	.006	.007	.008	.009	.009	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
.150	.006	.008	.009	.009	.010	.010	.010	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.155	.006	.008	.009	.010	.010	.011	.011	.011	.011	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.160	.007	.008	.010	.010	.011	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.165	.007	.009	.010	.011	.011	012	.012	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
.170	.007	.009	.010	.011	.012	.013	.013	.013	.013	.013	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.175	.008	.010	.011	.012	.013	.013	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.180	.008	.010	.011	.012	.013	.014	.014	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015
.185	.008	.011	.012	.013	.014	.014	.015	.015	.015	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016
.190	.009	.011	.012	.014	.014	.015	.015	.016	.016	.016	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017
.195	.009	.011	.013	.014	.015	.016	.016	.017	.017	.017	.017	.017	.017	.018	.018	.018	.018	.018	.018	.018
.200	.009	.012	.013	.015	.016	.016	.017	.017	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018
.205	.010	.012	.014	.015	.016	.017	.018	.018	.018	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019
.210	.010	.013	.015	.016	.017	.018	.018	.019	.019	.019	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020
.215	.011	.013	.015	.016	.017	.018	.019	.019	.020	.020	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021
.220	.011	.014	.016	.017	.018	.019	.020	.020	.021	.021	.021	.022	.022	.022	.022	.022	.022	.022	.022	.022
.225	.011	.014	.016	.018	.019	.020	.020	.021	.021	.022	.022	.022	.023	.023	.023	.023	.023	.023	.023	.023
.230	.012	.015	.017	.018	.019	.020	.021	.022	.022	.023	.023	.023	.023	.024	.024	.024	.024	.024	.024	.024
.235	.012	.015	.017	.019	.020	.021	.022	.023	.023	.024	.024	.024	.024	.024	.025	.025	.025	.025	.025	.025
.240	.012	.016	.018	.019	.021	.022	.023	.023	.024	.024	.025	.025	.025	.025	.026	.026	.026	.026	.026	.026
.245	.013	.016	.018	.020	.021	.022	.023	.024	.025	.025	.026	.026	.026	.026	.026	.027	.027	.027	.027	.027
.250	.013	.017	.019	.021	.022	.023	.024	.025	.026	.026	.026	.027	.027	.027	.027	.028	.028	.028	.029	.029

Table 15 (continued)

h_a^*	$h_a^* - h_b^*$																			
	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.014	.017	.020	.021	.023	.024	.025	.026	.026	.027	.027	.028	.028	.028	.028	.029	.029	.029	.029	.029
.260	.014	.018	.020	.022	.024	.025	.026	.027	.027	.028	.028	.029	.029	.029	.029	.030	.030	.030	.030	.030
.265	.014	.018	.021	.023	.024	.025	.026	.027	.028	.029	.029	.030	.030	.030	.030	.031	.031	.031	.031	.031
.270	.015	.019	.021	.023	.025	.026	.027	.02[illegible]	.029	.030	.030	.031	.031	.031	.031	.032	.032	.032	.032	.032
.275	.015	.019	.022	.024	.026	.027	.028	.029	.030	.031	.031	.032	.032	.032	.032	.033	.033	.033	.033	.033
.280	.016	.020	.023	.025	.026	.028	.029	.030	.031	.031	.032	.033	.033	.033	.034	.034	.034	.034	.034	.034
.285	.016	.020	.023	.025	.027	.029	.030	.031	.032	.032	.033	.033	.034	.034	.035	.035	.035	.035	.035	.035
.290	.016	.021	.024	.026	.028	.029	.031	.032	.033	.033	.034	.034	.035	.035	.036	.036	.036	.036	.036	.036
.295	.017	.021	.024	.027	.029	.030	.031	.032	.033	.034	.035	.035	.036	.036	.037	.037	.037	.037	.037	.037
.300	.017	.022	.025	.027	.029	.031	.032	.033	.034	.035	.036	.036	.037	.037	.038	.038	.038	.038	.039	.039
.305	.018	.022	.026	.028	.030	.032	.033	.034	.035	.036	.037	.037	.038	.038	.039	.039	.039	.040	.040	.040
.310	.018	.023	.026	.029	.031	.033	.034	.035	.036	.037	.038	.038	.039	.040	.040	.040	.041	.041	.041	.041
.315	.019	.024	.027	.030	.032	.033	.035	.036	.037	.038	.039	.040	.040	.041	.041	.041	.042	.042	.042	.042
.320	.019	.024	.028	.030	.032	.034	.036	.037	.038	.039	.040	.041	.041	.042	.042	.043	.043	.043	.043	.043
.325	.020	.025	.028	.031	.033	.035	.037	.038	.039	.040	.041	.042	.042	.043	.043	.044	.044	.044	.044	.045
.330	.020	.025	.029	.032	.034	.036	.037	.039	.040	.041	.042	.043	.043	.044	.044	.045	.045	.045	.046	.046
.335	.020	.026	.030	.032	.035	.037	.038	.040	.041	.042	.043	.044	.044	.045	.046	.046	.046	.047	.047	.047
.340	.021	.026	.030	.033	.036	.038	.039	.041	.042	.043	.044	.045	.046	.046	.047	.047	.048	.048	.048	.048
.345	.021	.027	.031	.034	.036	.038	.040	.042	.043	.044	.045	.046	.047	.047	.048	.048	.049	.049	.049	.050
.350	.022	.028	.032	.035	.037	.039	.041	.043	.044	.045	.046	.047	.048	.048	.049	.050	.050	.050	.051	.051
.355	.022	.028	.032	.035	.038	.040	.042	.044	.045	.046	.047	.048	.049	.050	.050	.051	.051	.052	.052	.052
.360	.023	.029	.033	.036	.039	.041	.043	.045	.046	.047	.048	.049	.050	.051	.052	.052	.052	.053	.053	.053
.365	.023	.029	.034	.037	.040	.042	.044	.045	.047	.048	.049	.050	.051	.052	.053	.053	.054	.054	.054	.055
.370	.024	.030	.034	.038	.041	.043	.045	.046	.048	.049	.050	.051	.052	.053	.054	.054	.055	.055	.056	.056
.375	.024	.031	.035	.039	.041	.044	.046	.047	.049	.050	.051	.053	.053	.054	.055	.056	.056	.057	.057	.057
.380	.025	.031	.036	.039	.042	.045	.047	.048	.050	.051	.053	.054	.055	.055	.056	.057	.057	.058	.058	.059
.385	.025	.032	.037	.040	.043	.046	.048	.049	.051	.052	.054	.055	.056	.057	.057	.058	.059	.059	.060	.060
.390	.026	.033	.037	.041	.044	.046	.049	.050	.052	.054	.055	.056	.057	.058	.059	.059	.060	.060	.061	.061
.395	.026	.033	.038	.042	.045	.047	.050	.051	.053	.055	.056	.057	.058	.059	.060	.061	.061	.062	.062	.063
.400	.027	.034	.039	.043	.046	.048	.051	.052	.054	.056	.057	.058	.059	.060	.061	.062	.063	.063	.064	.064
.405	.027	.034	.039	.043	.047	.049	.052	.054	.055	.057	.058	.059	.061	.062	.062	.063	.064	.064	.065	.065
.410	.028	.035	.040	.044	.047	.050	.053	.055	.056	.058	.059	.061	.062	.063	.064	.064	.065	.066	.066	.067
.415	.028	.036	.041	.045	.048	.051	.054	.056	.057	.059	.061	.062	.063	.064	.065	.066	.067	.067	.068	.068
.420	.029	.036	.042	.046	.049	.052	.055	.057	.059	.060	.062	.063	.064	.065	.066	.067	.068	.069	.069	.070
.425	.029	.037	.042	.047	.050	.053	.056	.058	.060	.061	.063	.064	.065	.067	.068	.068	.069	.070	.071	.071
.430	.030	.038	.043	.047	.051	.054	.057	.059	.061	.062	.064	.065	.067	.068	.069	.070	.071	.071	.072	.072
.435	.030	.038	.044	.048	.052	.055	.058	.060	.062	.064	.065	.067	.068	.069	.070	.071	.072	.073	.073	.074
.440	.031	.039	.045	.049	.053	.056	.059	.061	.063	.065	.066	.068	.069	.070	.071	.072	.073	.074	.075	.075
.445	.031	.040	.045	.050	.054	.057	.060	.062	.064	.066	.068	.069	.070	.072	.073	.074	.075	.075	.076	.077
.450	.032	.040	.046	.051	.055	.058	.061	.063	.065	.067	.069	.070	.072	.073	.074	.075	.076	.077	.078	.078

Table 15 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150	.155
.255	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029
.260	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030
.265	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031
.270	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032
.275	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033
.280	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
.285	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035
.290	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037
.295	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038
.300	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039
.305	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040
.310	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041
.315	.042	.042	.043	.043	.043	.043	.043	.043	.043	.043	.043
.320	.043	.043	.044	.044	.044	.044	.044	.044	.044	.044	.044
.325	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045
.330	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046
.335	.047	.047	.047	.048	.048	.048	.048	.048	.048	.048	.048
.340	.048	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049
.345	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050
.350	.051	.051	.051	.051	.052	.052	.052	.052	.052	.052	.052
.355	.052	.052	.053	.053	.053	.053	.053	.053	.053	.053	.053
.360	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054
.365	.055	.055	.055	.055	.055	.056	.056	.056	.056	.056	.056
.370	.056	.056	.057	.057	.057	.057	.057	.057	.057	.057	.057
.375	.058	.058	.058	.058	.058	.058	.059	.059	.059	.059	.059
.380	.059	.059	.059	.059	.060	.060	.060	.060	.060	.060	.060
.385	.060	.061	.061	.061	.061	.061	.062	.062	.062	.062	.062
.390	.062	.062	.062	.062	.062	.062	.063	.063	.063	.063	.063
.395	.063	.063	.064	.064	.064	.064	.064	.065	.065	.065	.065
.400	.064	.065	.065	.065	.065	.065	.065	.066	.066	.066	.066
.405	.066	.066	.066	.067	.067	.067	.067	.067	.068	.068	.068
.410	.067	.068	.068	.068	.068	.068	.068	.069	.069	.069	.069
.415	.069	.069	.069	.070	.070	.070	.070	.070	.070	.071	.071
.420	.070	.070	.071	.071	.071	.071	.072	.072	.072	.072	.072
.425	.072	.072	.072	.073	.073	.073	.073	.073	.073	.074	.074
.430	.073	.073	.074	.074	.074	.075	.075	.075	.075	.075	.076
.435	.074	.075	.075	.076	.076	.076	.076	.076	.076	.076	.077
.440	.076	.076	.077	.077	.077	.078	.078	.078	.078	.078	.079
.445	.077	.078	.078	.079	.079	.079	.079	.080	.080	.080	.080
.450	.079	.079	.080	.080	.081	.081	.081	.081	.081	.081	.081

Table 16 Submerged flow calibration for 20cm × 90cm Cutthroat flume, (Q^*, cms)

h_a^* \ $h_a^* - h_b^*$	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.015	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.020	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.025	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.030	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.035	.001	.001	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.040	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.045	.002	.002	.002	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.050	.002	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.055	.003	.003	.003	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.060	.003	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.065	.003	.004	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.070	.004	.005	.005	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.075	.004	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.080	.005	.006	.006	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.085	.005	.006	.007	.007	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.090	.006	.007	.008	.008	.008	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.095	.006	.008	.009	.009	.009	.009	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
.100	.007	.008	.009	.010	.010	.010	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.105	.007	.009	.010	.011	.011	.011	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.110	.008	.010	.011	.011	.012	.012	.012	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
.115	.008	.010	.012	.012	.013	.013	.013	.013	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.120	.009	.011	.012	.013	.014	.014	.014	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015
.125	.009	.012	.013	.014	.015	.015	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016
.130	.010	.013	.014	.015	.016	.016	.017	.017	.017	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018
.135	.011	.013	.015	.016	.017	.017	.018	.018	.018	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019
.140	.011	.014	.016	.017	.018	.018	.019	.019	.019	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020
.145	.012	.015	.017	.018	.019	.020	.020	.020	.021	.021	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022
.150	.012	.016	.018	.019	.020	.021	.021	.022	.022	.022	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023
.155	.013	.016	.018	.020	.021	.022	.022	.023	.023	.023	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024
.160	.014	.017	.019	.021	.022	.023	.024	.024	.024	.025	.025	.026	.026	.026	.026	.026	.026	.026	.026	.026
.165	.014	.018	.020	.022	.023	.024	.025	.025	.026	.026	.026	.027	.027	.027	.027	.027	.027	.027	.027	.027
.170	.015	.019	.021	.023	.024	.025	.026	.027	.027	.027	.028	.029	.029	.029	.029	.029	.029	.029	.029	.029
.175	.016	.020	.022	.024	.026	.027	.027	.028	.029	.029	.029	.029	.031	.031	.031	.031	.031	.031	.031	.031
.180	.016	.021	.023	.025	.027	.028	.029	.029	.030	.030	.031	.031	.032	.032	.032	.032	.032	.032	.032	.032
.185	.017	.021	.024	.026	.028	.029	.030	.031	.031	.032	.032	.032	.034	.034	.034	.034	.034	.034	.034	.034
.190	.018	.022	.025	.028	.029	.030	.031	.032	.033	.033	.034	.034	.034	.036	.036	.036	.036	.036	.036	.036
.195	.018	.023	.026	.029	.030	.032	.033	.034	.034	.035	.035	.035	.035	.037	.037	.037	.037	.037	.037	.037
.200	.019	.024	.027	.030	.032	.033	.034	.035	.036	.036	.037	.037	.037	.037	.039	.039	.039	.039	.039	.039
.205	.020	.025	.028	.031	.033	.034	.036	.037	.037	.038	.038	.039	.039	.039	.041	.041	.041	.041	.041	.041
.210	.021	.026	.030	.032	.034	.036	.037	.038	.039	.040	.040	.040	.041	.041	.043	.043	.043	.043	.043	.043
.215	.021	.027	.031	.033	.035	.037	.039	.040	.040	.041	.042	.042	.042	.042	.042	.045	.045	.045	.045	.045
.220	.022	.028	.032	.035	.037	.039	.040	.041	.042	.043	.043	.044	.044	.044	.044	.047	.047	.047	.047	.047
.225	.023	.029	.033	.036	.038	.040	.041	.043	.044	.044	.045	.046	.046	.046	.046	.049	.049	.049	.049	.049
.230	.024	.030	.034	.037	.039	.041	.043	.044	.045	.046	.047	.047	.048	.048	.048	.048	.051	.051	.051	.051
.235	.024	.031	.035	.038	.041	.043	.044	.046	.047	.048	.049	.049	.050	.050	.050	.050	.053	.053	.053	.053
.240	.025	.032	.036	.040	.042	.044	.046	.047	.049	.050	.050	.051	.051	.052	.052	.052	.055	.055	.055	.055
.245	.026	.033	.037	.041	.044	.046	.048	.049	.050	.051	.052	.053	.053	.054	.054	.054	.054	.057	.057	.057
.250	.027	.034	.039	.042	.045	.047	.049	.051	.052	.053	.054	.055	.055	.056	.056	.056	.056	.059	.059	.059

Table 16 (continued)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.028	.035	.040	.043	.046	.049	.051	.052	.054	.055	.056	.056	.057	.057	.058	.058	.058	.061	.061	.061
.260	.028	.036	.041	.045	.048	.050	.052	.054	.055	.057	.058	.058	.059	.059	.060	.060	.060	.060	.063	.063
.265	.029	.037	.042	.046	.049	.052	.054	.056	.057	.058	.059	.060	.061	.061	.062	.062	.062	.062	.066	.066
.270	.030	.038	.043	.047	.051	.053	.056	.057	.059	.060	.061	.062	.063	.063	.064	.064	.064	.065	.068	.068
.275	.031	.039	.045	.049	.052	.055	.057	.059	.061	.062	.063	.064	.065	.066	.066	.066	.067	.067	.067	.070
.280	.032	.040	.046	.050	.054	.056	.059	.061	.062	.064	.065	.066	.067	.068	.068	.069	.069	.069	.069	.073
.285	.033	.041	.047	.052	.055	.058	.060	.063	.064	.066	.067	.068	.069	.070	.070	.071	.071	.071	.071	.075
.290	.033	.042	.048	.053	.057	.060	.062	.064	.066	.068	.069	.070	.071	.072	.072	.073	.073	.073	.074	.074
.295	.034	.043	.050	.054	.058	.061	.064	.066	.068	.070	.071	.072	.073	.074	.075	.075	.075	.076	.076	.076
.300	.035	.045	.051	.056	.060	.063	.066	.068	.070	.071	.073	.074	.075	.076	.077	.077	.078	.078	.078	.078
.305	.036	.046	.052	.057	.061	.065	.067	.070	.072	.073	.075	.076	.077	.078	.079	.080	.080	.080	.081	.081
.310	.037	.047	.054	.059	.063	.066	.069	.071	.074	.075	.077	.078	.079	.080	.081	.082	.082	.083	.083	.083
.315	.038	.048	.055	.060	.064	.068	.071	.073	.075	.077	.079	.080	.082	.083	.083	.084	.085	.085	.085	.086
.320	.039	.049	.056	.062	.066	.070	.073	.075	.077	.079	.081	.082	.084	.085	.086	.086	.087	.088	.088	.088
.325	.040	.050	.058	.063	.068	.071	.074	.077	.079	.081	.083	.085	.086	.087	.088	.089	.089	.090	.090	.091
.330	.041	.051	.059	.065	.069	.073	.076	.079	.081	.083	.085	.087	.088	.089	.090	.091	.092	.092	.093	.093
.335	.041	.053	.060	.066	.071	.075	.078	.081	.083	.085	.087	.089	.090	.092	.093	.093	.094	.095	.095	.096
.340	.042	.054	.062	.068	.072	.076	.080	.083	.085	.087	.089	.091	.093	.094	.095	.096	.097	.097	.098	.098
.345	.043	.055	.063	.069	.074	.078	.082	.085	.087	.090	.092	.093	.095	.096	.097	.098	.099	.100	.100	.101
.350	.044	.056	.064	.071	.076	.080	.083	.087	.089	.092	.094	.095	.097	.098	.100	.101	.102	.102	.103	.103
.355	.045	.057	.066	.072	.077	.082	.085	.089	.091	.094	.096	.098	.099	.101	.102	.103	.104	.105	.105	.106
.360	.046	.059	.067	.074	.079	.083	.087	.091	.093	.096	.098	.100	.102	.103	.104	.106	.107	.107	.108	.109
.365	.047	.060	.069	.075	.081	.085	.089	.092	.095	.098	.100	.102	.104	.105	.107	.108	.109	.110	.111	.111
.370	.048	.061	.070	.077	.082	.087	.091	.094	.097	.100	.102	.105	.106	.108	.109	.111	.112	.112	.113	.114
.375	.049	.062	.071	.078	.084	.089	.093	.096	.100	.102	.105	.107	.109	.110	.112	.113	.114	.115	.116	.117
.380	.050	.064	.073	.080	.086	.091	.095	.099	.102	.104	.107	.109	.111	.113	.114	.116	.117	.118	.119	.119
.385	.051	.065	.074	.082	.088	.093	.097	.101	.104	.107	.109	.111	.113	.115	.117	.118	.119	.120	.121	.122
.390	.052	.066	.076	.083	.089	.094	.099	.103	.106	.109	.111	.114	.116	.116	.119	.121	.122	.123	.124	.125
.395	.053	.067	.077	.085	.091	.096	.101	.105	.108	.111	.114	.116	.118	.120	.122	.123	.125	.126	.127	.128
.400	.054	.069	.079	.087	.093	.098	.103	.107	.110	.113	.116	.119	.121	.123	.124	.126	.127	.128	.129	.130
.405	.055	.070	.080	.088	.095	.100	.105	.109	.112	.116	.118	.121	.123	.125	.127	.128	.130	.131	.132	.133
.410	.056	.071	.082	.090	.096	.102	.107	.111	.115	.118	.121	.123	.126	.128	.129	.131	.133	.134	.135	.136
.415	.057	.073	.083	.091	.098	.104	.109	.113	.117	.120	.123	.126	.128	.130	.132	.134	.135	.137	.138	.139
.420	.058	.074	.085	.093	.100	.106	.111	.115	.119	.122	.125	.128	.131	.133	.135	.136	.138	.139	.141	.142
.425	.059	.075	.086	.095	.102	.108	.113	.117	.121	.125	.128	.131	.133	.135	.137	.139	.141	.142	.143	.144
.430	.060	.077	.088	.097	.104	.110	.115	.119	.123	.127	.130	.133	.136	.138	.140	.142	.143	.145	.146	.147
.435	.061	.078	.089	.098	.106	.112	.117	.122	.126	.129	.133	.136	.138	.141	.143	.145	.146	.148	.149	.150
.440	.062	.079	.091	.100	.107	.114	.119	.124	.128	.132	.135	.138	.141	.143	.145	.147	.149	.151	.152	.153
.445	.063	.081	.092	.102	.109	.116	.121	.126	.130	.134	.137	.141	.143	.146	.148	.150	.152	.153	.155	.156
.450	.064	.082	.094	.103	.111	.118	.123	.128	.133	.136	.140	.143	.146	.148	.151	.153	.155	.156	.158	.159

Table 16 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150	.155
.255	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061
.260	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063
.265	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066
.270	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068
.275	.070	.070	.070	.070	.070	.070	.070	.070	.070	.070	.070
.280	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073
.285	.075	.075	.075	.075	.075	.075	.075	.075	.075	.075	.075
.290	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078
.295	.080	.080	.080	.080	.080	.080	.080	.080	.080	.080	.080
.300	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082	.082
.305	.081	.085	.085	.085	.085	.085	.085	.085	.085	.085	.085
.310	.083	.088	.088	.088	.088	.088	.088	.088	.088	.088	.088
.315	.086	.086	.090	.090	.090	.090	.090	.090	.090	.090	.090
.320	.088	.088	.093	.093	.093	.093	.093	.093	.093	.093	.093
.325	.091	.091	.096	.096	.096	.096	.096	.096	.096	.096	.096
.330	.093	.093	.093	.098	.098	.098	.098	.098	.098	.098	.098
.335	.096	.096	.096	.101	.101	.101	.101	.101	.101	.101	.101
.340	.098	.099	.099	.104	.104	.104	.104	.104	.104	.104	.104
.345	.101	.101	.101	.101	.107	.107	.107	.107	.107	.107	.107
.350	.104	.104	.104	.104	.110	.110	.110	.110	.110	.110	.110
.355	.106	.107	.107	.107	.112	.112	.112	.112	.112	.112	.112
.360	.109	.109	.110	.110	.110	.115	.115	.115	.115	.115	.115
.365	.112	.112	.112	.112	.113	.118	.118	.118	.118	.118	.118
.370	.114	.115	.115	.115	.115	.121	.121	.121	.121	.121	.121
.375	.117	.118	.118	.118	.118	.118	.124	.124	.124	.124	.124
.380	.120	.120	.121	.121	.121	.121	.127	.127	.127	.127	.127
.385	.123	.123	.124	.124	.124	.124	.131	.131	.131	.131	.131
.390	.125	.126	.126	.127	.127	.127	.127	.134	.134	.134	.134
.395	.128	.129	.129	.130	.130	.130	.130	.137	.137	.137	.137
.400	.131	.132	.132	.133	.133	.133	.133	.140	.140	.140	.140
.405	.134	.135	.135	.136	.136	.136	.136	.136	.143	.143	.143
.410	.137	.137	.138	.139	.139	.139	.139	.139	.147	.147	.147
.415	.140	.140	.141	.142	.142	.142	.142	.142	.142	.150	.150
.420	.143	.143	.144	.145	.145	.145	.145	.146	.146	.153	.153
.425	.145	.146	.147	.148	.148	.148	.149	.149	.149	.157	.157
.430	.148	.149	.150	.151	.151	.152	.152	.152	.152	.152	.160
.435	.151	.152	.153	.154	.154	.155	.155	.155	.155	.159	.163
.440	.154	.155	.156	.157	.157	.158	.158	.158	.159	.159	.167
.445	.157	.158	.159	.160	.161	.161	.161	.162	.162	.162	.162
.450	.160	.161	.162	.163	.164	.164	.165	.165	.165	.165	.165

Table 17 Submerged flow calibration for 30cm × 90cm Cutthroat flume, (Q^*, cms)

h_a^* \ $h_a^*-h_b^*$	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.015	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.020	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.025	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.030	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.035	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.040	.002	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.045	.003	.003	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.050	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.055	.004	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.060	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.065	.005	.006	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.070	.006	.007	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.075	.007	.008	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.080	.007	.009	.010	.010	.010	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.085	.008	.010	.011	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.090	.009	.011	.012	.012	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
.095	.009	.012	.013	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.100	.010	.013	.014	.015	.015	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016
.105	.011	.014	.015	.016	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017
.110	.012	.015	.016	.017	.018	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019
.115	.013	.016	.018	.019	.020	.020	.020	.020	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021
.120	.013	.017	.019	.020	.021	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022
.125	.014	.018	.020	.021	.022	.023	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024
.130	.015	.019	.021	.023	.024	.025	.025	.025	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026
.135	.016	.020	.023	.024	.025	.026	.027	.027	.027	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028
.140	.017	.021	.024	.026	.027	.028	.029	.029	.029	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030
.145	.018	.022	.025	.027	.029	.030	.030	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031
.150	.019	.024	.027	.029	.030	.031	.032	.033	.033	.033	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
.155	.020	.025	.028	.030	.032	.033	.034	.035	.035	.035	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036
.160	.021	.026	.029	.032	.034	.035	.036	.037	.037	.037	.037	.038	.038	.038	.038	.038	.038	.038	.038	.038
.165	.022	.027	.031	.033	.035	.037	.038	.039	.039	.039	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040
.170	.023	.029	.032	.035	.037	.039	.040	.041	.041	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
.175	.024	.030	.034	.037	.039	.040	.042	.043	.043	.044	.044	.044	.045	.045	.045	.045	.045	.045	.045	.045
.180	.025	.031	.035	.038	.041	.042	.044	.045	.045	.046	.046	.046	.047	.047	.047	.047	.047	.047	.047	.047
.185	.026	.033	.037	.040	.042	.044	.046	.047	.048	.048	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049
.190	.027	.034	.038	.042	.044	.046	.048	.049	.050	.050	.051	.051	.051	.052	.052	.052	.052	.052	.052	.052
.195	.028	.035	.040	.043	.046	.048	.050	.051	.052	.053	.053	.054	.054	.054	.054	.054	.054	.054	.054	.054
.200	.029	.037	.042	.045	.048	.050	.052	.053	.054	.055	.056	.056	.056	.056	.057	.057	.057	.057	.057	.057
.205	.030	.038	.043	.047	.050	.052	.054	.056	.057	.058	.058	.059	.059	.059	.060	.060	.060	.060	.060	.060
.210	.031	.039	.045	.049	.052	.054	.056	.058	.059	.060	.061	.061	.062	.062	.062	.062	.062	.062	.062	.062
.215	.032	.041	.046	.051	.054	.056	.058	.060	.061	.062	.063	.064	.064	.064	.064	.065	.065	.065	.065	.065
.220	.034	.042	.048	.052	.056	.058	.061	.062	.064	.065	.066	.066	.067	.067	.067	.068	.068	.068	.068	.068
.225	.035	.044	.050	.054	.058	.061	.063	.065	.066	.067	.068	.069	.070	.070	.070	.071	.071	.071	.071	.071
.230	.036	.045	.052	.056	.060	.063	.065	.067	.069	.070	.071	.072	.072	.073	.073	.073	.074	.074	.074	.074
.235	.037	.047	.053	.058	.062	.065	.067	.069	.071	.072	.074	.074	.075	.075	.076	.076	.077	.077	.077	.077
.240	.038	.048	.055	.060	.064	.067	.070	.072	.074	.075	.076	.077	.078	.078	.079	.079	.080	.080	.080	.080
.245	.039	.050	.057	.062	.066	.069	.072	.074	.076	.078	.079	.080	.081	.081	.082	.082	.082	.083	.083	.083
.250	.041	.051	.059	.064	.068	.072	.074	.077	.079	.080	.082	.083	.084	.084	.085	.085	.085	.086	.086	.086

Table 17 (continued)

h_a^*	$h_a^*-h_b^*$																			
	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.042	.053	.060	.066	.070	.074	.077	.079	.081	.083	.084	.086	.086	.087	.088	.088	.088	.089	.089	.089
.260	.043	.054	.062	.068	.072	.076	.079	.082	.084	.086	.087	.088	.089	.090	.091	.091	.091	.091	.092	.092
.265	.044	.056	.064	.070	.075	.078	.082	.084	.087	.088	.090	.091	.092	.093	.094	.094	.094	.095	.096	.096
.270	.046	.058	.066	.072	.077	.081	.084	.087	.089	.091	.093	.094	.095	.096	.097	.097	.098	.098	.099	.099
.275	.047	.059	.068	.074	.079	.083	.087	.090	.092	.094	.096	.097	.098	.099	.100	.101	.101	.101	.101	.102
.280	.048	.061	.070	.076	.081	.086	.089	.092	.095	.097	.099	.100	.101	.102	.103	.104	.104	.105	.105	.106
.285	.049	.063	.071	.078	.084	.088	.092	.095	.097	.100	.102	.103	.105	.106	.106	.107	.108	.108	.108	.109
.290	.051	.064	.073	.080	.086	.090	.094	.097	.100	.103	.105	.106	.108	.109	.110	.110	.111	.111	.112	.112
.295	.052	.066	.075	.082	.088	.093	.097	.100	.103	.105	.108	.109	.111	.112	.113	.114	.114	.115	.115	.115
.300	.053	.068	.077	.085	.090	.095	.099	.103	.106	.108	.111	.112	.114	.115	.116	.117	.118	.118	.119	.119
.305	.055	.069	.079	.087	.093	.098	.102	.106	.109	.111	.114	.115	.117	.119	.120	.121	.121	.122	.122	.122
.310	.056	.071	.081	.089	.095	.100	.105	.108	.112	.114	.117	.119	.120	.122	.123	.124	.125	.125	.126	.126
.315	.057	.073	.083	.091	.098	.103	.107	.111	.114	.117	.120	.122	.124	.125	.126	.127	.128	.129	.130	.130
.320	.059	.075	.085	.093	.100	.105	.110	.114	.117	.120	.123	.125	.127	.128	.130	.131	.132	.133	.133	.134
.325	.060	.076	.087	.096	.102	.108	.113	.117	.120	.123	.126	.128	.130	.132	.133	.135	.135	.136	.137	.137
.330	.061	.078	.089	.098	.105	.111	.115	.120	.123	.126	.129	.131	.134	.135	.137	.138	.139	.140	.141	.141
.335	.063	.080	.091	.100	.107	.113	.118	.122	.126	.129	.132	.135	.137	.139	.140	.142	.143	.144	.144	.145
.340	.064	.082	.093	.102	.110	.116	.121	.125	.129	.133	.136	.138	.140	.142	.144	.145	.146	.147	.148	.149
.345	.066	.083	.095	.105	.112	.118	.124	.128	.132	.136	.139	.141	.144	.146	.147	.149	.150	.151	.152	.153
.350	.067	.085	.098	.107	.115	.121	.127	.131	.135	.139	.142	.145	.147	.149	.151	.153	.154	.155	.156	.157
.355	.069	.087	.100	.109	.117	.124	.129	.134	.138	.142	.145	.148	.151	.153	.155	.156	.158	.159	.160	.161
.360	.070	.089	.102	.112	.120	.126	.132	.137	.142	.145	.149	.152	.154	.156	.158	.160	.161	.163	.164	.165
.365	.071	.091	.104	.114	.122	.129	.135	.140	.145	.149	.152	.155	.158	.160	.162	.164	.165	.167	.168	.169
.370	.073	.093	.106	.116	.125	.132	.138	.143	.148	.152	.155	.158	.161	.164	.166	.168	.169	.170	.172	.173
.375	.074	.095	.108	.119	.127	.135	.141	.146	.151	.155	.159	.162	.165	.167	.169	.171	.173	.174	.176	.177
.380	.076	.096	.110	.121	.130	.138	.144	.149	.154	.158	.162	.165	.168	.171	.173	.175	.177	.178	.180	.181
.385	.077	.098	.113	.124	.133	.140	.147	.152	.157	.162	.166	.169	.172	.175	.177	.179	.181	.182	.184	.185
.390	.079	.100	.115	.126	.135	.143	.150	.156	.161	.165	.169	.172	.176	.178	.181	.183	.185	.186	.188	.189
.395	.080	.102	.117	.129	.138	.146	.153	.159	.164	.168	.172	.176	.179	.182	.185	.187	.189	.191	.192	.193
.400	.082	.104	.119	.131	.141	.149	.156	.162	.167	.172	.176	.180	.183	.186	.188	.191	.193	.195	.196	.197
.405	.083	.106	.122	.134	.143	.152	.159	.165	.170	.175	.179	.183	.187	.190	.192	.195	.197	.199	.200	.202
.410	.085	.108	.124	.136	.146	.155	.162	.168	.174	.179	.183	.187	.190	.193	.196	.199	.201	.203	.205	.206
.415	.087	.110	.126	.139	.149	.157	.165	.171	.177	.182	.187	.191	.194	.197	.200	.203	.205	.207	.209	.210
.420	.088	.112	.128	.141	.152	.160	.168	.175	.180	.186	.190	.194	.198	.201	.204	.207	.209	.211	.213	.215
.425	.090	.114	.131	.144	.154	.163	.171	.178	.184	.189	.194	.198	.202	.205	.208	.211	.213	.215	.217	.219
.430	.091	.116	.133	.146	.157	.166	.174	.181	.187	.193	.197	.202	.206	.209	.212	.215	.217	.220	.222	.223
.435	.093	.118	.135	.149	.160	.169	.177	.184	.191	.196	.201	.205	.209	.213	.216	.219	.222	.224	.226	.228
.440	.094	.120	.138	.152	.163	.172	.180	.188	.194	.200	.205	.209	.213	.217	.220	.223	.226	.228	.230	.232
.445	.096	.122	.140	.154	.166	.175	.184	.191	.197	.203	.208	.213	.217	.221	.224	.227	.230	.233	.235	.237
.450	.098	.124	.143	.157	.168	.178	.187	.194	.201	.207	.212	.217	.221	.225	.228	.232	.234	.237	.239	.241

Table 17 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150	.155
.255	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089
.260	.092	.092	.092	.092	.092	.092	.092	.092	.092	.092	.092
.265	.096	.096	.096	.096	.096	.096	.096	.096	.096	.096	.096
.270	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099
.275	.102	.102	.102	.102	.102	.102	.102	.102	.102	.102	.102
.280	.106	.106	.106	.106	.106	.106	.106	.106	.106	.106	.106
.285	.109	.109	.109	.109	.109	.109	.109	.109	.109	.109	.109
.290	.113	.113	.113	.113	.113	.113	.113	.113	.113	.113	.113
.295	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116
.300	.120	.120	.120	.120	.120	.120	.120	.120	.120	.120	.120
.305	.123	.124	.124	.124	.124	.124	.124	.124	.124	.124	.124
.310	.126	.127	.127	.127	.127	.127	.127	.127	.127	.127	.127
.315	.130	.130	.131	.131	.131	.131	.131	.131	.131	.131	.131
.320	.134	.134	.135	.135	.135	.135	.135	.135	.135	.135	.135
.325	.138	.138	.139	.139	.139	.139	.139	.139	.139	.139	.139
.330	.141	.142	.142	.143	.143	.143	.143	.143	.143	.143	.143
.335	.145	.146	.146	.147	.147	.147	.147	.147	.147	.147	.147
.340	.149	.150	.150	.151	.151	.151	.151	.151	.151	.151	.151
.345	.153	.154	.154	.154	.155	.155	.155	.155	.155	.155	.155
.350	.157	.158	.158	.158	.159	.159	.159	.159	.159	.159	.159
.355	.161	.162	.162	.162	.164	.164	.164	.164	.164	.164	.164
.360	.165	.166	.166	.166	.166	.168	.166	.168	.168	.168	.168
.365	.169	.170	.170	.170	.171	.172	.172	.172	.172	.172	.172
.370	.173	.174	.174	.175	.175	.177	.177	.177	.177	.177	.177
.375	.178	.178	.179	.179	.179	.179	.181	.181	.181	.181	.181
.380	.182	.182	.183	.183	.184	.184	.185	.185	.185	.185	.185
.385	.186	.187	.187	.188	.188	.188	.190	.190	.190	.190	.190
.390	.190	.191	.192	.192	.192	.193	.193	.195	.195	.195	.195
.395	.194	.195	.196	.196	.197	.197	.197	.199	.199	.199	.199
.400	.199	.200	.200	.201	.201	.202	.202	.204	.204	.204	.204
.405	.203	.204	.205	.205	.206	.206	.206	.206	.209	.209	.209
.410	.207	.208	.209	.210	.210	.211	.211	.211	.213	.213	.213
.415	.212	.213	.214	.214	.215	.216	.216	.216	.216	.218	.218
.420	.216	.217	.218	.219	.220	.220	.221	.221	.221	.223	.223
.425	.220	.222	.223	.224	.224	.225	.225	.226	.226	.228	.228
.430	.225	.226	.227	.228	.229	.230	.230	.230	.231	.231	.233
.435	.229	.231	.232	.233	.234	.234	.235	.235	.235	.235	.238
.440	.234	.235	.237	.238	.239	.239	.240	.240	.240	.240	.243
.445	.238	.240	.241	.242	.243	.244	.245	.245	.245	.246	.246
.450	.243	.245	.246	.247	.248	.249	.250	.250	.250	.251	.251

Table 18 Submerged flow calibration for 20cm × 180cm Cutthroat flume, (Q^*, cms)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.015	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.020	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.025	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.030	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.035	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.040	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.045	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.050	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.055	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.060	.004	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.065	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.070	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.075	.006	.006	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.080	.006	.007	.008	.008	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.085	.007	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.090	.007	.008	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.095	.008	.009	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
.100	.009	.010	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.105	.009	.011	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.110	.010	.011	.012	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
.115	.010	.012	.013	.014	.014	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
.120	.011	.013	.014	.014	.015	.015	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.125	.012	.014	.015	.015	.016	.016	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015
.130	.012	.015	.016	.016	.017	.017	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016
.135	.013	.015	.017	.017	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018
.140	.014	.016	.017	.018	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019	.019
.145	.015	.017	.018	.019	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020
.150	.015	.018	.019	.020	.021	.021	.022	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021
.155	.016	.019	.020	.021	.022	.022	.023	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022
.160	.017	.020	.021	.022	.023	.024	.024	.024	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023
.165	.018	.020	.022	.023	.024	.025	.025	.025	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024
.170	.018	.021	.023	.024	.025	.026	.026	.027	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026
.175	.019	.022	.024	.026	.026	.027	.028	.028	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027
.180	.020	.023	.025	.027	.028	.028	.029	.029	.029	.029	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028
.185	.021	.024	.026	.028	.029	.029	.030	.030	.031	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030
.190	.021	.025	.027	.029	.030	.031	.031	.032	.032	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031
.195	.022	.026	.028	.030	.031	.032	.033	.033	.033	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032
.200	.023	.027	.029	.031	.032	.033	.034	.034	.035	.035	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
.205	.024	.028	.030	.032	.033	.034	.035	.036	.036	.036	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035
.210	.025	.029	.032	.033	.035	.036	.036	.037	.037	.038	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036
.215	.025	.030	.033	.035	.036	.037	.035	.038	.039	.039	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038
.220	.026	.031	.034	.036	.037	.038	.039	.040	.040	.041	.041	.039	.039	.039	.039	.039	.039	.039	.039	.039
.225	.027	.032	.035	.037	.038	.040	.040	.041	.042	.042	.042	.041	.041	.041	.041	.041	.041	.041	.041	.041
.230	.028	.033	.036	.038	.040	.041	.042	.043	.043	.043	.044	.042	.042	.042	.042	.042	.042	.042	.042	.042
.235	.029	.034	.037	.039	.041	.042	.043	.044	.045	.045	.045	.044	.044	.044	.044	.044	.044	.044	.044	.044
.240	.030	.035	.038	.041	.042	.044	.045	.045	.046	.046	.047	.047	.045	.045	.045	.045	.045	.045	.045	.045
.245	.031	.036	.039	.042	.044	.045	.046	.047	.048	.048	.048	.049	.047	.047	.047	.047	.047	.047	.047	.047
.250	.031	.037	.041	.043	.045	.046	.047	.048	.049	.050	.050	.050	.049	.049	.049	.049	.049	.049	.049	.049

Table 18 (continued)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.032	.038	.042	.044	.046	.048	.045	.050	.051	.051	.052	.052	.052	.050	.050	.050	.050	.050	.050	.050
.260	.033	.039	.043	.046	.048	.049	.050	.051	.052	.053	.053	.053	.054	.052	.052	.052	.052	.052	.052	.052
.265	.034	.040	.044	.047	.049	.051	.052	.053	.054	.054	.055	.055	.055	.053	.053	.053	.053	.053	.053	.053
.270	.035	.041	.045	.048	.050	.052	.053	.054	.055	.056	.056	.057	.057	.055	.055	.055	.055	.055	.055	.055
.275	.036	.042	.047	.049	.052	.053	.055	.056	.057	.057	.058	.058	.059	.059	.057	.057	.057	.057	.057	.057
.280	.037	.044	.048	.051	.053	.055	.056	.057	.058	.059	.060	.060	.060	.061	.059	.059	.059	.059	.059	.059
.285	.038	.045	.049	.052	.054	.056	.058	.059	.060	.061	.061	.062	.062	.062	.060	.060	.060	.060	.060	.060
.290	.039	.046	.050	.053	.056	.058	.059	.061	.062	.062	.063	.063	.064	.064	.062	.062	.062	.062	.062	.062
.295	.040	.047	.051	.055	.057	.059	.061	.062	.063	.064	.065	.065	.066	.066	.066	.064	.064	.064	.064	.064
.300	.041	.048	.053	.056	.059	.061	.062	.064	.065	.066	.066	.067	.067	.068	.068	.066	.066	.066	.066	.066
.305	.042	.049	.054	.057	.060	.062	.064	.065	.066	.067	.068	.069	.069	.070	.070	.067	.067	.067	.067	.067
.310	.043	.050	.055	.059	.061	.064	.065	.067	.068	.069	.070	.070	.071	.071	.072	.069	.069	.069	.069	.069
.315	.044	.051	.056	.060	.063	.065	.067	.068	.070	.071	.072	.072	.073	.073	.073	.074	.071	.071	.071	.071
.320	.045	.053	.058	.062	.064	.067	.069	.070	.071	.072	.073	.074	.075	.075	.075	.076	.073	.073	.073	.073
.325	.046	.054	.059	.063	.066	.068	.070	.072	.073	.074	.075	.076	.076	.077	.077	.077	.075	.075	.075	.075
.330	.047	.055	.060	.064	.067	.070	.072	.073	.075	.076	.077	.078	.078	.079	.079	.079	.077	.077	.077	.077
.335	.048	.056	.062	.066	.069	.071	.073	.075	.076	.078	.079	.079	.080	.081	.081	.081	.082	.079	.079	.079
.340	.049	.057	.063	.067	.070	.073	.075	.077	.078	.079	.080	.081	.082	.083	.083	.083	.083	.081	.081	.081
.345	.050	.059	.064	.069	.072	.074	.077	.078	.080	.081	.082	.083	.084	.084	.085	.085	.085	.083	.083	.083
.350	.051	.060	.066	.070	.073	.076	.078	.080	.082	.083	.084	.085	.086	.086	.087	.087	.087	.085	.085	.085
.355	.052	.061	.067	.071	.075	.078	.080	.082	.083	.085	.086	.087	.088	.088	.089	.089	.089	.090	.087	.087
.360	.053	.062	.068	.073	.076	.079	.082	.084	.085	.087	.088	.089	.090	.090	.091	.091	.092	.092	.089	.089
.365	.054	.063	.070	.074	.078	.081	.083	.085	.087	.088	.090	.091	.091	.092	.093	.093	.094	.094	.091	.091
.370	.055	.065	.071	.076	.079	.082	.085	.087	.089	.090	.091	.092	.093	.094	.095	.095	.096	.096	.093	.093
.375	.056	.066	.072	.077	.081	.084	.087	.089	.090	.092	.093	.094	.095	.096	.097	.097	.098	.098	.098	.095
.380	.057	.067	.074	.079	.083	.086	.088	.090	.092	.094	.095	.096	.097	.098	.099	.099	.100	.100	.100	.097
.385	.058	.068	.075	.080	.084	.087	.090	.092	.094	.096	.097	.098	.099	.100	.101	.101	.102	.102	.102	.099
.390	.059	.070	.077	.082	.086	.089	.092	.094	.096	.098	.099	.100	.101	.102	.103	.103	.104	.104	.105	.101
.395	.060	.071	.078	.083	.087	.091	.093	.096	.098	.099	.101	.102	.103	.104	.105	.106	.106	.106	.107	.107
.400	.061	.072	.079	.085	.089	.092	.095	.098	.100	.101	.103	.104	.105	.106	.107	.108	.108	.109	.109	.109
.405	.062	.073	.081	.086	.090	.094	.097	.099	.101	.103	.105	.106	.107	.108	.109	.110	.110	.111	.111	.111
.410	.063	.075	.082	.088	.092	.096	.099	.101	.103	.105	.107	.108	.109	.110	.111	.112	.112	.113	.113	.114
.415	.064	.076	.084	.089	.094	.097	.100	.103	.105	.107	.109	.110	.111	.112	.113	.114	.115	.115	.116	.116
.420	.065	.077	.085	.091	.095	.099	.102	.105	.107	.109	.111	.112	.113	.114	.115	.116	.117	.117	.118	.118
.425	.066	.079	.087	.092	.097	.101	.104	.107	.109	.111	.113	.114	.115	.116	.117	.118	.119	.119	.120	.120
.430	.067	.080	.088	.094	.099	.102	.106	.108	.111	.113	.115	.116	.117	.119	.120	.120	.121	.122	.122	.123
.435	.069	.081	.089	.095	.100	.104	.107	.110	.113	.115	.117	.118	.119	.121	.122	.123	.123	.124	.124	.125
.440	.070	.083	.091	.097	.102	.106	.109	.112	.115	.117	.119	.120	.122	.123	.124	.125	.126	.126	.127	.127
.445	.071	.084	.092	.099	.104	.108	.111	.114	.117	.119	.121	.122	.124	.125	.126	.127	.128	.128	.129	.129
.450	.072	.085	.094	.100	.105	.109	.113	.116	.118	.121	.123	.124	.126	.127	.128	.129	.130	.131	.131	.132
.455	.073	.087	.095	.102	.107	.111	.115	.118	.120	.123	.125	.126	.128	.129	.130	.131	.132	.133	.134	.134
.460	.074	.088	.097	.103	.109	.113	.117	.120	.122	.125	.127	.128	.130	.131	.133	.134	.134	.135	.136	.136
.465	.075	.089	.098	.105	.110	.115	.118	.122	.124	.127	.129	.131	.132	.134	.135	.136	.137	.138	.138	.139
.470	.076	.091	.100	.107	.112	.117	.120	.123	.126	.129	.131	.133	.134	.136	.137	.138	.139	.140	.141	.141
.475	.078	.092	.101	.108	.114	.118	.122	.125	.128	.131	.133	.135	.136	.138	.139	.140	.141	.142	.143	.144
.480	.079	.093	.103	.110	.115	.120	.124	.127	.130	.133	.135	.137	.139	.140	.141	.143	.144	.144	.145	.146
.485	.080	.095	.104	.111	.117	.122	.126	.129	.132	.135	.137	.139	.141	.142	.144	.145	.146	.147	.148	.148
.490	.081	.096	.106	.113	.119	.124	.128	.131	.134	.137	.139	.141	.143	.145	.146	.147	.148	.149	.150	.151
.495	.082	.097	.107	.115	.121	.126	.130	.133	.136	.139	.141	.143	.145	.147	.148	.149	.151	.152	.152	.153
.500	.083	.099	.109	.116	.122	.127	.132	.135	.138	.141	.143	.145	.147	.149	.150	.152	.153	.154	.155	.156

Table 18 (continued)

h_a^*	$h_a^* - h_b^*$: .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.505	.084	.100	.110	.118	.124	.129	.133	.137	.140	.143	.145	.148	.150	.151	.153	.154	.155	.156	.157	.158
.510	.086	.102	.112	.120	.126	.131	.135	.139	.142	.145	.148	.150	.152	.153	.155	.156	.158	.159	.160	.160
.515	.087	.103	.114	.121	.128	.133	.137	.141	.144	.147	.150	.152	.154	.156	.157	.159	.160	.161	.162	.163
.520	.088	.104	.115	.123	.129	.135	.139	.143	.146	.149	.152	.154	.156	.158	.160	.161	.162	.163	.164	.165
.525	.089	.106	.117	.125	.131	.137	.141	.145	.148	.151	.154	.156	.158	.160	.162	.163	.165	.166	.167	.168
.530	.090	.107	.118	.126	.133	.138	.143	.147	.150	.154	.156	.159	.161	.163	.164	.166	.167	.168	.169	.170
.535	.092	.109	.120	.128	.135	.140	.145	.149	.153	.156	.158	.161	.163	.165	.167	.168	.170	.171	.172	.173
.540	.093	.110	.121	.130	.137	.142	.147	.151	.155	.158	.161	.163	.165	.167	.169	.171	.172	.173	.174	.175
.545	.094	.112	.123	.132	.138	.144	.149	.153	.157	.160	.163	.165	.168	.170	.171	.173	.174	.176	.177	.178
.550	.095	.113	.125	.133	.140	.146	.151	.155	.159	.162	.165	.168	.170	.172	.174	.175	.177	.178	.179	.180
.555	.096	.114	.126	.135	.142	.148	.153	.157	.161	.164	.167	.170	.172	.174	.176	.178	.179	.181	.182	.183
.560	.098	.116	.128	.137	.144	.150	.155	.159	.163	.166	.169	.172	.174	.177	.178	.180	.182	.183	.184	.185
.565	.099	.117	.129	.138	.146	.152	.157	.161	.165	.169	.172	.174	.177	.179	.181	.183	.184	.186	.187	.188
.570	.100	.119	.131	.140	.148	.154	.159	.163	.167	.171	.174	.177	.179	.181	.183	.185	.187	.188	.189	.190
.575	.101	.120	.133	.142	.149	.156	.161	.165	.169	.173	.176	.179	.181	.184	.186	.187	.189	.191	.192	.193
.580	.103	.122	.134	.144	.151	.158	.163	.168	.172	.175	.178	.181	.184	.186	.188	.190	.192	.193	.194	.196
.585	.104	.123	.136	.145	.153	.159	.165	.170	.174	.177	.181	.183	.186	.188	.190	.192	.194	.196	.197	.198
.590	.105	.125	.138	.147	.155	.161	.167	.172	.176	.180	.183	.186	.188	.191	.193	.195	.197	.198	.200	.201
.595	.106	.126	.139	.149	.157	.163	.169	.174	.178	.182	.185	.188	.191	.193	.195	.197	.199	.201	.202	.203
.600	.107	.128	.141	.151	.159	.165	.171	.176	.180	.184	.187	.190	.193	.196	.198	.200	.202	.203	.205	.206

Table 18 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.255	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050
.260	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052
.265	.053	.053	.053	.053	.053	.053	.053	.053	.053	.053
.270	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055
.275	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057
.280	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059
.285	.060	.060	.060	.060	.060	.060	.060	.060	.060	.060
.290	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062
.295	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064
.300	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066
.305	.067	.067	.067	.067	.067	.067	.067	.067	.067	.067
.310	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069
.315	.071	.071	.071	.071	.071	.071	.071	.071	.071	.071
.320	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073
.325	.075	.075	.075	.075	.075	.075	.075	.075	.075	.075
.330	.077	.077	.077	.077	.077	.077	.077	.077	.077	.077
.335	.079	.079	.079	.079	.079	.079	.079	.079	.079	.079
.340	.081	.081	.081	.081	.081	.081	.081	.081	.081	.081
.345	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
.350	.085	.085	.085	.085	.085	.085	.085	.085	.085	.085
.355	.087	.087	.087	.087	.087	.087	.087	.087	.087	.087
.360	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089
.365	.091	.091	.091	.091	.091	.091	.091	.091	.091	.091
.370	.093	.093	.093	.093	.093	.093	.093	.093	.093	.093
.375	.095	.095	.095	.095	.095	.095	.095	.095	.095	.095
.380	.097	.097	.097	.097	.097	.097	.097	.097	.097	.097
.385	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099
.390	.101	.101	.101	.101	.101	.101	.101	.101	.101	.101
.395	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103
.400	.105	.105	.105	.105	.105	.105	.105	.105	.105	.105
.405	.108	.108	.108	.108	.108	.108	.108	.108	.108	.108
.410	.110	.110	.110	.110	.110	.110	.110	.110	.110	.110
.415	.116	.112	.112	.112	.112	.112	.112	.112	.112	.112
.420	.118	.114	.114	.114	.114	.114	.114	.114	.114	.114
.425	.121	.116	.116	.116	.116	.116	.116	.116	.116	.116
.430	.123	.119	.119	.119	.119	.119	.119	.119	.119	.119
.435	.125	.125	.121	.121	.121	.121	.121	.121	.121	.121
.440	.127	.128	.123	.123	.123	.123	.123	.123	.123	.123
.445	.130	.130	.126	.126	.126	.126	.126	.126	.126	.126
.450	.132	.132	.128	.128	.128	.128	.128	.128	.128	.128
.455	.135	.135	.135	.130	.130	.130	.130	.130	.130	.130
.460	.137	.137	.137	.133	.133	.133	.133	.133	.133	.133
.465	.139	.140	.140	.135	.135	.135	.135	.135	.135	.135
.470	.142	.142	.142	.138	.138	.138	.138	.138	.138	.138
.475	.144	.144	.145	.145	.140	.140	.140	.140	.140	.140
.480	.146	.147	.147	.147	.142	.142	.142	.142	.142	.142
.485	.149	.149	.150	.150	.145	.145	.145	.145	.145	.145
.490	.151	.152	.152	.152	.147	.147	.147	.147	.147	.147
.495	.154	.154	.155	.155	.155	.150	.150	.150	.150	.150
.500	.156	.157	.157	.157	.158	.152	.152	.152	.152	.152

Table 18 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.505	.159	.159	.160	.160	.160	.155	.155	.155	.155	.155
.510	.161	.162	.162	.163	.163	.163	.157	.157	.157	.157
.515	.164	.164	.165	.165	.165	.166	.160	.160	.160	.160
.520	.166	.167	.167	.168	.168	.168	.162	.142	.162	.162
.525	.169	.169	.170	.170	.171	.171	.165	.165	.165	.165
.530	.171	.172	.172	.173	.173	.174	.174	.168	.168	.168
.535	.174	.174	.175	.175	.176	.176	.176	.170	.170	.170
.540	.176	.177	.177	.178	.178	.179	.179	.173	.173	.173
.545	.179	.179	.180	.181	.181	.161	.182	.176	.176	.176
.550	.181	.182	.183	.183	.184	.184	.184	.185	.178	.178
.555	.164	.185	.185	.186	.186	.187	.187	.187	.181	.181
.560	.186	.187	.188	.189	.189	.190	.190	.190	.184	.184
.565	.189	.190	.191	.191	.192	.192	.193	.193	.186	.186
.570	.191	.192	.193	.194	.194	.195	.195	.196	.196	.189
.575	.194	.195	.196	.197	.197	.198	.198	.198	.199	.192
.580	.197	.198	.198	.199	.200	.200	.201	.201	.202	.195
.585	.199	.200	.201	.202	.203	.203	.204	.204	.204	.197
.590	.202	.203	.204	.205	.205	.206	.206	.207	.207	.207
.595	.205	.206	.207	.207	.208	.209	.209	.210	.210	.210
.600	.207	.208	.209	.210	.211	.211	.212	.212	.213	.213

Table 19 Submerged flow calibration for 40 cm × 180 cm Cutthroat flume, (Q^*, cms)

h_a^*	$h_a^* - h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.015	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.020	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.025	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.030	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.035	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.040	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.045	.005	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.050	.006	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.055	.007	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.060	.008	.009	.010	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.065	.009	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.070	.010	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.075	.012	.013	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.080	.013	.014	.015	.016	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015
.085	.014	.016	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017
.090	.015	.017	.018	.019	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018
.095	.016	.019	.020	.021	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020
.100	.017	.020	.021	.022	.023	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022
.105	.019	.022	.023	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024
.110	.020	.023	.025	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026
.115	.021	.025	.027	.028	.028	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027
.120	.023	.026	.028	.029	.030	.030	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029
.125	.024	.028	.030	.031	.032	.033	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032
.130	.025	.030	.032	.033	.034	.035	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
.135	.027	.031	.034	.035	.036	.037	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.035	.036	.036	.036
.140	.028	.033	.036	.037	.038	.039	.039	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.039	.038	.038
.145	.030	.035	.037	.039	.040	.041	.042	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040
.150	.031	.036	.039	.041	.043	.043	.044	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043
.155	.033	.038	.041	.043	.045	.046	.046	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045
.160	.034	.040	.043	.045	.047	.048	.049	.049	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047
.165	.036	.042	.045	.048	.049	.050	.051	.051	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050
.170	.037	.043	.047	.050	.051	.053	.053	.054	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052
.175	.039	.045	.049	.052	.054	.055	.056	.056	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055
.180	.040	.047	.051	.054	.056	.057	.058	.059	.059	.058	.058	.058	.058	.058	.058	.058	.058	.058	.058	.058
.185	.042	.049	.053	.056	.058	.060	.061	.062	.062	.060	.060	.060	.060	.060	.060	.060	.060	.060	.060	.060
.190	.043	.051	.056	.059	.061	.062	.064	.064	.065	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063
.195	.045	.053	.058	.061	.063	.065	.066	.067	.068	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066
.200	.047	.055	.060	.063	.066	.067	.069	.070	.070	.071	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068
.205	.048	.057	.062	.066	.068	.070	.071	.072	.073	.074	.071	.071	.071	.071	.071	.071	.071	.071	.071	.071
.210	.050	.059	.064	.068	.071	.073	.074	.075	.076	.076	.074	.074	.074	.074	.074	.074	.074	.074	.074	.074
.215	.052	.061	.066	.070	.073	.075	.077	.078	.079	.079	.077	.077	.077	.077	.077	.077	.077	.077	.077	.077
.220	.053	.063	.069	.073	.076	.078	.080	.081	.082	.082	.083	.080	.080	.080	.080	.080	.080	.080	.080	.080
.225	.055	.065	.071	.075	.078	.081	.082	.084	.085	.085	.086	.083	.083	.083	.083	.083	.083	.083	.083	.083
.230	.057	.067	.073	.078	.081	.083	.085	.087	.088	.088	.089	.086	.086	.086	.086	.086	.086	.086	.086	.086
.235	.059	.069	.075	.080	.083	.086	.088	.089	.091	.091	.092	.089	.089	.089	.089	.089	.089	.089	.089	.089
.240	.060	.071	.078	.082	.086	.089	.091	.092	.094	.095	.095	.096	.092	.092	.092	.092	.092	.092	.092	.092
.245	.062	.073	.080	.085	.089	.091	.094	.095	.097	.098	.098	.099	.096	.096	.096	.096	.096	.096	.096	.096
.250	.064	.075	.083	.088	.091	.094	.097	.098	.100	.101	.102	.102	.099	.049	.099	.099	.099	.099	.099	.099

Table 19 (continued)

h_a^*	$h_a^*-h_b^*$																			
	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.066	.078	.085	.090	.094	.097	.099	.101	.103	.104	.105	.105	.106	.102	.102	.102	.102	.102	.102	.102
.260	.068	.080	.087	.093	.097	.100	.102	.104	.106	.107	.108	.109	.109	.106	.106	.106	.106	.106	.106	.106
.265	.070	.082	.090	.095	.099	.103	.105	.107	.109	.110	.111	.112	.112	.109	.109	.109	.109	.109	.109	.109
.270	.071	.084	.092	.098	.102	.106	.108	.110	.112	.114	.115	.115	.116	.112	.112	.112	.112	.112	.112	.112
.275	.073	.086	.095	.101	.105	.109	.111	.114	.115	.117	.118	.119	.119	.120	.116	.116	.116	.116	.116	.116
.280	.075	.089	.097	.103	.108	.111	.114	.117	.119	.120	.121	.122	.123	.123	.119	.119	.119	.119	.119	.119
.285	.077	.091	.100	.106	.111	.114	.117	.120	.122	.123	.125	.126	.126	.127	.123	.123	.123	.123	.123	.123
.290	.079	.093	.102	.109	.113	.117	.121	.123	.125	.127	.128	.129	.130	.130	.126	.126	.126	.126	.126	.126
.295	.081	.095	.105	.111	.116	.120	.124	.126	.128	.130	.132	.133	.133	.134	.134	.130	.130	.130	.130	.130
.300	.083	.098	.107	.114	.119	.123	.127	.129	.132	.134	.135	.136	.137	.138	.138	.134	.134	.134	.134	.134
.305	.085	.100	.110	.117	.122	.126	.130	.133	.135	.137	.138	.140	.141	.141	.142	.137	.137	.137	.137	.137
.310	.087	.102	.112	.119	.125	.129	.133	.136	.138	.140	.142	.143	.144	.145	.146	.141	.141	.141	.141	.141
.315	.089	.105	.115	.122	.128	.133	.136	.139	.142	.144	.145	.147	.148	.149	.149	.150	.145	.145	.145	.145
.320	.091	.107	.117	.125	.131	.136	.139	.143	.145	.147	.149	.150	.152	.153	.153	.154	.149	.149	.149	.149
.325	.093	.109	.120	.128	.134	.139	.143	.146	.149	.151	.153	.154	.155	.156	.157	.157	.152	.152	.152	.152
.330	.095	.112	.123	.131	.137	.142	.146	.149	.152	.154	.156	.158	.159	.160	.161	.161	.156	.156	.156	.156
.335	.097	.114	.125	.134	.140	.145	.149	.153	.155	.158	.160	.162	.163	.164	.165	.165	.166	.160	.160	.160
.340	.099	.117	.128	.136	.143	.148	.152	.156	.159	.161	.164	.165	.167	.168	.169	.169	.170	.164	.164	.164
.345	.101	.119	.131	.139	.146	.151	.156	.159	.162	.165	.167	.169	.170	.172	.173	.173	.174	.168	.168	.168
.350	.103	.122	.134	.142	.149	.155	.159	.163	.166	.169	.171	.173	.174	.176	.177	.177	.178	.172	.172	.172
.355	.105	.124	.136	.145	.152	.158	.162	.166	.170	.172	.175	.177	.178	.179	.181	.181	.182	.182	.176	.176
.360	.107	.126	.139	.148	.155	.161	.166	.170	.173	.176	.178	.180	.182	.183	.185	.185	.186	.187	.180	.180
.365	.109	.129	.142	.151	.158	.164	.169	.173	.177	.180	.182	.184	.186	.187	.189	.190	.190	.191	.185	.185
.370	.111	.131	.144	.154	.162	.168	.173	.177	.180	.183	.186	.188	.190	.191	.193	.194	.194	.195	.189	.189
.375	.113	.134	.147	.157	.165	.171	.176	.180	.184	.187	.190	.192	.194	.195	.197	.198	.199	.199	.200	.193
.380	.115	.137	.150	.160	.168	.174	.179	.184	.188	.191	.194	.196	.198	.199	.201	.202	.203	.203	.204	.197
.385	.117	.139	.153	.163	.171	.178	.183	.187	.191	.195	.197	.200	.202	.204	.205	.206	.207	.208	.208	.202
.390	.120	.142	.156	.166	.174	.181	.186	.191	.195	.198	.201	.204	.206	.208	.209	.210	.211	.212	.213	.206
.395	.122	.144	.159	.169	.178	.184	.190	.195	.199	.202	.205	.208	.210	.212	.213	.215	.216	.216	.217	.218
.400	.124	.147	.161	.172	.181	.188	.193	.198	.202	.206	.209	.212	.214	.216	.217	.219	.220	.221	.221	.222
.405	.126	.149	.164	.175	.184	.191	.197	.202	.206	.210	.213	.216	.218	.220	.222	.223	.224	.225	.226	.226
.410	.128	.152	[illegible]	.178	.187	.195	.201	.206	.210	.214	.217	.220	.222	.224	.226	.227	.229	.230	.230	.231
.415	.130	.155	[illegible]	.182	.191	.198	.204	.209	.214	.218	.221	.224	.226	.228	.230	.232	.233	.234	.235	.236
.420	.133	.157	.173	.185	.194	.201	.208	.213	.218	.222	.225	.228	.230	.233	.234	.236	.237	.239	.239	.240
.425	.135	.160	.176	.188	.197	.205	.211	.217	.221	.225	.229	.232	.235	.237	.239	.240	.242	.243	.244	.245
.430	.137	.163	.179	.191	.201	.208	.215	.221	.225	.229	.233	.236	.239	.241	.243	.245	.246	.247	.248	.249
.435	.139	.165	.182	.194	.204	.212	.219	.224	.229	.233	.237	.240	.243	.245	.247	.249	.251	.252	.253	.254
.440	.142	.168	.185	.197	.207	.215	.222	.228	.233	.237	.241	.244	.247	.250	.252	.254	.255	.257	.258	.259
.445	.144	.171	.188	.201	.211	.219	.226	.232	.237	.241	.245	.249	.251	.254	.256	.258	.260	.261	.262	.263
.450	.146	.173	.191	.204	.214	.223	.230	.236	.241	.245	.249	.253	.256	.258	.261	.263	.264	.266	.267	.268
.455	.148	.176	.194	.207	.217	.226	.233	.239	.245	.249	.253	.257	.260	.263	.265	.267	.269	.270	.272	.273
.460	.151	.179	.197	.210	.221	.230	.237	.243	.249	.253	.258	.261	.264	.267	.270	.272	.273	.275	.276	.277
.465	.153	.181	.200	.214	.224	.233	.241	.247	.253	.258	.262	.265	.269	.272	.274	.276	.278	.280	.281	.282
.470	.155	.184	.203	.217	.228	.237	.245	.251	.257	.262	.266	.270	.273	.276	.279	.281	.283	.284	.286	.287
.475	.158	.187	.206	.220	.231	.241	.248	.255	.261	.266	.270	.274	.277	.280	.283	.285	.287	.289	.291	.292
.480	.160	.190	.209	.223	.235	.244	.252	.259	.265	.270	.274	.278	.282	.285	.288	.290	.292	.294	.295	.297
.485	.162	.193	.212	.227	.238	.248	.256	.263	.269	.274	.279	.283	.286	.289	.292	.295	.297	.299	.300	.302
.490	.165	.195	.215	.230	.242	.252	.260	.267	.273	.278	.283	.287	.291	.294	.297	.299	.301	.303	.305	.306
.495	.167	.198	.218	.233	.245	.255	.264	.271	.277	.282	.287	.291	.295	.298	.301	.304	.306	.308	.310	.311
.500	.169	.201	.221	.237	.249	.259	.267	.275	.281	.287	.291	.296	.300	.303	.306	.309	.311	.313	.315	.316

Table 19 (continued)

h_a^*	$h_a^*-h_b^*$																			
	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.505	.172	.206	.225	.240	.252	.263	.271	.279	.285	.291	.296	.300	.304	.308	.311	.313	.316	.318	.320	.321
.510	.174	.207	.228	.244	.256	.266	.275	.283	.289	.295	.300	.305	.309	.312	.315	.318	.320	.323	.324	.326
.515	.177	.209	.231	.247	.260	.270	.279	.287	.293	.299	.304	.309	.313	.317	.320	.323	.325	.327	.329	.331
.520	.179	.212	.234	.250	.263	.274	.283	.291	.298	.304	.309	.313	.318	.321	.325	.328	.330	.332	.334	.336
.525	.181	.215	.237	.254	.267	.278	.287	.295	.302	.308	.313	.318	.322	.326	.329	.332	.335	.337	.339	.341
.530	.184	.218	.240	.257	.271	.282	.291	.299	.306	.312	.318	.322	.327	.331	.334	.337	.340	.342	.344	.346
.535	.186	.221	.244	.261	.274	.285	.295	.303	.310	.316	.322	.327	.331	.335	.339	.342	.345	.347	.349	.351
.540	.189	.224	.247	.264	.278	.289	.299	.307	.314	.321	.326	.332	.336	.340	.344	.347	.350	.352	.354	.356
.545	.191	.227	.250	.268	.281	.293	.303	.311	.319	.325	.331	.336	.341	.345	.348	.352	.355	.357	.359	.361
.550	.194	.230	.253	.271	.285	.297	.307	.315	.323	.330	.335	.341	.345	.349	.353	.356	.359	.362	.365	.367
.555	.196	.233	.257	.275	.289	.301	.311	.320	.327	.334	.340	.345	.350	.354	.358	.361	.364	.367	.370	.372
.560	.198	.236	.260	.278	.293	.305	.315	.324	.332	.338	.344	.350	.355	.359	.363	.366	.369	.372	.375	.377
.565	.201	.239	.263	.282	.296	.309	.319	.328	.336	.343	.349	.354	.359	.364	.368	.371	.374	.377	.380	.382
.570	.203	.242	.266	.285	.300	.312	.323	.332	.340	.347	.353	.359	.364	.369	.373	.376	.379	.382	.385	.387
.575	.206	.245	.270	.289	.304	.316	.327	.336	.344	.352	.358	.364	.369	.373	.377	.381	.384	.387	.390	.393
.580	.208	.248	.273	.292	.308	.320	.331	.341	.349	.356	.363	.368	.374	.378	.382	.386	.390	.393	.395	.398
.585	.211	.251	.276	.296	.311	.324	.335	.345	.353	.361	.367	.373	.378	.383	.387	.391	.395	.398	.401	.403
.590	.214	.254	.280	.299	.315	.328	.339	.349	.358	.365	.372	.378	.383	.388	.392	.396	.400	.403	.406	.408
.595	.216	.257	.283	.303	.319	.332	.344	.353	.362	.370	.376	.382	.388	.393	.397	.401	.405	.408	.411	.414
.600	.219	.260	.287	.307	.323	.336	.348	.358	.366	.374	.381	.387	.393	.398	.402	.406	.410	.413	.416	.419

Table 19 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.255	.102	.102	.102	.102	.102	.102	.102	.102	.102	.102
.260	.106	.106	.106	.106	.106	.106	.106	.106	.106	.106
.265	.109	.109	.109	.109	.109	.109	.109	.109	.109	.109
.270	.112	.112	.112	.112	.112	.112	.112	.112	.112	.112
.275	.116	.116	.116	.116	.116	.116	.116	.116	.116	.116
.280	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119
.285	.123	.123	.123	.123	.123	.123	.123	.123	.123	.123
.290	.126	.126	.126	.126	.126	.126	.126	.126	.126	.126
.295	.130	.130	.130	.130	.130	.130	.130	.130	.130	.130
.300	.134	.134	.134	.134	.134	.134	.134	.134	.134	.134
.305	.137	.137	.137	.137	.137	.137	.137	.137	.137	.137
.310	.141	.141	.141	.141	.141	.141	.141	.141	.141	.141
.315	.145	.145	.145	.145	.145	.145	.145	.145	.145	.145
.320	.149	.149	.149	.149	.149	.149	.149	.149	.149	.149
.325	.152	.152	.152	.152	.152	.152	.152	.152	.152	.152
.330	.156	.156	.156	.156	.156	.156	.156	.156	.156	.156
.335	.160	.160	.160	.160	.160	.160	.160	.160	.160	.160
.340	.164	.164	.164	.164	.164	.164	.164	.164	.164	.164
.345	.168	.168	.168	.168	.168	.168	.168	.168	.168	.168
.350	.172	.172	.172	.172	.172	.172	.172	.172	.172	.172
.355	.176	.176	.176	.176	.176	.176	.176	.176	.176	.176
.360	.160	.180	.180	.180	.180	.180	.180	.180	.180	.180
.365	.185	.185	.185	.185	.185	.185	.185	.185	.185	.185
.370	.189	.189	.189	.189	.189	.189	.184	.189	.189	.189
.375	.193	.193	.193	.193	.193	.193	.193	.193	.193	.193
.380	.197	.197	.197	.197	.197	.197	.197	.197	.197	.197
.385	.202	.202	.202	.202	.202	.202	.202	.202	.202	.202
.390	.206	.206	.206	.206	.206	.206	.206	.206	.206	.206
.395	.210	.210	.210	.210	.210	.210	.210	.210	.210	.210
.400	.215	.215	.215	.215	.215	.215	.215	.215	.215	.215
.405	.219	.219	.219	.219	.219	.219	.219	.219	.219	.219
.410	.224	.224	.224	.224	.224	.224	.224	.224	.224	.224
.415	.236	.228	.228	.228	.228	.228	.228	.228	.228	.228
.420	.241	.233	.233	.233	.233	.233	.233	.233	.233	.233
.425	.245	.237	.237	.237	.237	.237	.237	.237	.237	.237
.430	.250	.242	.242	.242	.242	.242	.242	.242	.242	.242
.435	.255	.255	.247	.247	.247	.247	.247	.247	.247	.247
.440	.259	.260	.251	.251	.251	.251	.251	.251	.251	.251
.445	.264	.265	.256	.256	.256	.256	.256	.256	.256	.256
.450	.269	.269	.261	.261	.261	.261	.261	.261	.261	.261
.455	.274	.274	.275	.266	.266	.266	.266	.266	.266	.266
.460	.278	.279	.280	.270	.270	.270	.270	.270	.270	.270
.465	.283	.284	.284	.275	.275	.275	.275	.275	.275	.275
.470	.288	.289	.289	.280	.280	.280	.280	.280	.280	.280
.475	.293	.294	.294	.295	.285	.285	.285	.285	.285	.285
.480	.298	.299	.299	.300	.290	.290	.290	.290	.290	.290
.485	.303	.304	.304	.305	.295	.295	.295	.295	.295	.295
.490	.308	.309	.309	.310	.300	.300	.300	.300	.300	.300
.495	.313	.314	.314	.315	.316	.305	.305	.305	.305	.305
.500	.318	.319	.320	.320	.321	.310	.310	.310	.310	.310

Table 19 (continued)

h_a^*	$h_a^*-h_b^*$: .105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.505	.323	.324	.325	.325	.326	.315	.315	.315	.315	.315
.510	.328	.329	.330	.331	.331	.332	.321	.321	.321	.321
.515	.333	.334	.335	.336	.336	.337	.326	.326	.326	.326
.520	.338	.339	.340	.341	.342	.342	.331	.331	.331	.331
.525	.343	.344	.345	.346	.347	.348	.336	.336	.336	.336
.530	.348	.349	.350	.351	.352	.353	.353	.342	.342	.342
.535	.353	.354	.356	.357	.358	.358	.359	.347	.347	.347
.540	.358	.360	.361	.362	.363	.364	.364	.352	.352	.352
.545	.363	.365	.366	.367	.368	.369	.370	.358	.358	.358
.550	.368	.370	.371	.373	.374	.374	.375	.376	.363	.363
.555	.374	.375	.377	.378	.379	.380	.381	.381	.369	.369
.560	.379	.381	.382	.383	.384	.385	.386	.387	.374	.374
.565	.384	.386	.387	.389	.390	.391	.392	.392	.380	.380
.570	.359	.391	.393	.394	.395	.396	.397	.398	.398	.385
.575	.395	.397	.398	.400	.401	.402	.403	.404	.404	.391
.560	.400	.402	.404	.405	.406	.408	.408	.409	.410	.396
.585	.405	.407	.409	.411	.412	.413	.414	.415	.415	.402
.590	.411	.413	.415	.416	.418	.419	.420	.421	.421	.422
.595	.416	.418	.420	.422	.423	.424	.425	.426	.427	.428
.600	.421	.424	.425	.427	.429	.430	.431	.432	.433	.433

Table 20 Submerged flow calibration for 60 cm × 180 cm Cutthroat flume, (Q^*, cms)

h_a^* \ $h_a^*-h_b^*$	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.015	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.020	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.025	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.030	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.035	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.040	.007	.008	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.045	.008	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.050	.010	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.055	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.060	.013	.014	.015	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.065	.014	.016	.017	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016
.070	.016	.018	.019	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018
.075	.018	.020	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021
.080	.019	.022	.023	.024	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023
.085	.021	.024	.025	.026	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025
.090	.023	.026	.028	.029	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028	.028
.095	.025	.028	.030	.031	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030
.100	.027	.031	.033	.034	.034	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033	.033
.105	.028	.033	.035	.036	.037	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036
.110	.030	.035	.038	.039	.040	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039
.115	.032	.037	.040	.042	.043	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
.120	.034	.040	.043	.045	.046	.046	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045
.125	.036	.042	.046	.047	.049	.049	.048	.048	.048	.048	.048	.048	.048	.048	.048	.048	.048	.048	.048	.048
.130	.039	.045	.048	.050	.052	.052	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051
.135	.041	.047	.051	.053	.055	.056	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054
.140	.043	.050	.054	.056	.058	.059	.060	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057
.145	.045	.052	.057	.059	.061	.062	.063	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061
.150	.047	.055	.060	.063	.064	.066	.066	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064	.064
.155	.049	.058	.063	.066	.068	.069	.070	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068
.160	.052	.060	.065	.069	.071	.073	.074	.074	.072	.072	.072	.072	.072	.072	.072	.072	.072	.072	.072	.072
.165	.054	.063	.069	.072	.075	.076	.077	.078	.075	.075	.075	.075	.075	.075	.075	.075	.075	.075	.075	.075
.170	.056	.066	.072	.075	.078	.080	.081	.082	.079	.079	.079	.079	.079	.079	.079	.079	.079	.079	.079	.079
.175	.059	.069	.075	.079	.081	.083	.085	.086	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
.180	.061	.072	.078	.082	.085	.087	.089	.090	.090	.087	.087	.087	.087	.087	.087	.087	.087	.087	.087	.087
.185	.063	.074	.081	.085	.089	.091	.092	.094	.094	.091	.091	.091	.091	.091	.091	.091	.091	.091	.091	.091
.190	.066	.077	.084	.089	.092	.095	.096	.098	.098	.095	.095	.095	.095	.095	.095	.095	.095	.095	.095	.095
.195	.068	.080	.087	.092	.096	.098	.100	.102	.102	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099
.200	.071	.083	.091	.096	.099	.102	.104	.106	.107	.107	.104	.104	.104	.104	.104	.104	.104	.104	.104	.104
.205	.073	.086	.094	.099	.103	.106	.108	.110	.111	.112	.108	.108	.108	.108	.108	.108	.108	.108	.108	.108
.210	.076	.089	.097	.103	.107	.110	.112	.114	.115	.116	.112	.112	.112	.112	.112	.112	.112	.112	.112	.112
.215	.078	.092	.101	.105	.111	.114	.116	.118	.120	.120	.117	.117	.117	.117	.117	.117	.117	.117	.117	.117
.220	.081	.095	.104	.110	.115	.118	.121	.123	.124	.125	.125	.121	.121	.121	.121	.121	.121	.121	.121	.121
.225	.084	.098	.107	.114	.118	.122	.125	.127	.128	.129	.130	.126	.126	.126	.126	.126	.126	.126	.126	.126
.230	.086	.102	.111	.119	.122	.126	.129	.131	.133	.134	.135	.130	.130	.130	.130	.130	.130	.130	.130	.130
.235	.089	.105	.114	.121	.126	.130	.133	.136	.137	.139	.139	.135	.135	.135	.135	.135	.135	.135	.135	.135
.240	.092	.108	.118	.125	.130	.134	.138	.140	.142	.143	.144	.145	.140	.140	.140	.140	.140	.140	.140	.140
.245	.094	.111	.121	.129	.134	.139	.142	.144	.146	.148	.149	.150	.145	.145	.145	.145	.145	.145	.145	.145
.250	.097	.114	.125	.133	.138	.143	.146	.149	.151	.153	.154	.155	.150	.150	.150	.150	.150	.150	.150	.150

Table 20 (continued)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.100	.118	.129	.137	.142	.147	.151	.154	.156	.157	.159	.160	.160	.155	.155	.155	.155	.155	.155	.155
.260	.103	.121	.132	.140	.147	.151	.155	.158	.161	.162	.164	.165	.165	.160	.160	.160	.160	.160	.160	.160
.265	.105	.124	.136	.144	.151	.156	.160	.163	.165	.167	.169	.170	.170	.165	.165	.165	.165	.165	.165	.165
.270	.108	.128	.140	.148	.155	.160	.164	.167	.170	.172	.174	.175	.176	.170	.170	.170	.170	.170	.170	.170
.275	.111	.131	.143	.152	.159	.164	.169	.172	.175	.177	.179	.180	.181	.181	.175	.175	.175	.175	.175	.175
.280	.114	.134	.147	.156	.163	.169	.173	.177	.180	.182	.184	.185	.186	.187	.180	.180	.180	.180	.180	.180
.285	.117	.138	.151	.160	.168	.173	.178	.182	.185	.187	.189	.190	.191	.192	.186	.186	.186	.186	.186	.186
.290	.120	.141	.155	.164	.172	.178	.183	.186	.190	.192	.194	.196	.197	.198	.191	.191	.191	.191	.191	.191
.295	.122	.145	.159	.169	.176	.182	.187	.191	.195	.197	.199	.201	.202	.203	.204	.197	.197	.197	.197	.197
.300	.125	.148	.162	.173	.181	.187	.192	.196	.200	.202	.205	.206	.208	.209	.209	.202	.202	.202	.202	.202
.305	.128	.152	.166	.177	.185	.192	.197	.201	.205	.208	.210	.212	.213	.214	.215	.208	.208	.208	.208	.208
.310	.131	.155	.170	.181	.189	.196	.202	.206	.210	.213	.215	.217	.219	.220	.221	.213	.213	.213	.213	.213
.315	.134	.159	.174	.185	.194	.201	.206	.211	.215	.218	.221	.223	.224	.225	.226	.227	.219	.219	.219	.219
.320	.137	.162	.178	.190	.198	.206	.211	.216	.220	.223	.226	.228	.230	.231	.232	.233	.225	.225	.225	.225
.325	.140	.166	.182	.194	.203	.210	.216	.221	.225	.229	.231	.234	.235	.237	.238	.239	.231	.231	.231	.231
.330	.143	.169	.186	.198	.207	.215	.221	.226	.230	.234	.237	.239	.241	.243	.244	.245	.237	.237	.237	.237
.335	.146	.173	.190	.202	.212	.220	.226	.231	.236	.239	.242	.245	.247	.248	.250	.251	.251	.243	.243	.243
.340	.149	.177	.194	.207	.217	.225	.231	.236	.241	.245	.248	.250	.253	.254	.256	.257	.257	.249	.249	.249
.345	.153	.180	.198	.211	.221	.229	.236	.242	.246	.250	.253	.256	.258	.260	.262	.263	.263	.255	.255	.255
.350	.156	.184	.202	.216	.226	.234	.241	.247	.252	.256	.259	.262	.264	.266	.268	.269	.270	.261	.261	.261
.355	.159	.188	.206	.220	.231	.239	.246	.252	.257	.261	.265	.266	.270	.272	.274	.275	.276	.276	.267	.267
.360	.162	.192	.211	.224	.235	.244	.251	.257	.262	.267	.270	.273	.276	.278	.280	.281	.282	.283	.273	.273
.365	.165	.195	.215	.229	.240	.249	.256	.263	.268	.272	.276	.279	.282	.284	.286	.287	.288	.289	.279	.279
.370	.168	.199	.219	.233	.245	.254	.262	.268	.273	.278	.282	.285	.288	.290	.292	.293	.295	.295	.286	.286
.375	.172	.203	.223	.238	.250	.259	.267	.273	.279	.284	.288	.291	.294	.296	.298	.300	.301	.302	.303	.292
.380	.175	.207	.227	.243	.254	.264	.272	.279	.284	.289	.293	.297	.300	.302	.304	.306	.307	.308	.309	.299
.385	.178	.211	.232	.247	.259	.269	.277	.284	.290	.295	.299	.303	.306	.308	.311	.312	.314	.315	.316	.305
.390	.181	.215	.236	.252	.264	.274	.283	.290	.296	.301	.305	.309	.312	.315	.317	.319	.320	.321	.322	.312
.395	.184	.218	.240	.256	.269	.279	.288	.295	.301	.306	.311	.315	.318	.321	.323	.325	.327	.328	.329	.330
.400	.188	.222	.245	.261	.274	.284	.293	.301	.307	.312	.317	.321	.324	.327	.330	.332	.333	.335	.336	.336
.405	.191	.226	.249	.266	.279	.290	.299	.306	.313	.318	.323	.327	.330	.333	.336	.338	.340	.341	.342	.343
.410	.194	.230	.253	.270	.284	.295	.304	.312	.318	.324	.329	.333	.337	.340	.342	.345	.346	.348	.349	.350
.415	.198	.234	.258	.275	.289	.300	.309	.317	.324	.330	.335	.339	.343	.346	.349	.351	.353	.355	.356	.357
.420	.201	.238	.262	.280	.294	.305	.315	.323	.330	.336	.341	.345	.349	.353	.355	.358	.360	.361	.363	.364
.425	.204	.242	.267	.285	.299	.311	.320	.329	.336	.342	.347	.352	.356	.359	.362	.364	.367	.368	.370	.371
.430	.208	.246	.271	.289	.304	.316	.326	.334	.341	.348	.353	.358	.362	.365	.368	.371	.373	.375	.377	.378
.435	.211	.250	.276	.294	.309	.321	.331	.340	.347	.354	.359	.364	.368	.372	.375	.378	.380	.382	.384	.385
.440	.215	.254	.280	.299	.314	.326	.337	.346	.353	.360	.365	.370	.375	.378	.382	.384	.387	.389	.391	.392
.445	.218	.258	.285	.304	.319	.332	.342	.351	.359	.366	.372	.377	.381	.385	.388	.391	.394	.396	.398	.399
.450	.221	.263	.289	.309	.324	.337	.348	.357	.365	.372	.378	.383	.388	.392	.395	.398	.401	.403	.405	.406
.455	.225	.267	.294	.314	.330	.343	.354	.363	.371	.378	.384	.389	.394	.398	.402	.405	.407	.410	.412	.413
.460	.228	.271	.298	.319	.335	.348	.359	.369	.377	.384	.390	.396	.401	.405	.409	.412	.414	.417	.419	.420
.465	.232	.275	.303	.324	.340	.354	.365	.375	.383	.390	.397	.402	.407	.412	.415	.419	.421	.424	.426	.428
.470	.235	.279	.307	.329	.345	.359	.371	.381	.389	.397	.403	.409	.414	.418	.422	.425	.428	.431	.433	.435
.475	.239	.283	.312	.334	.351	.365	.376	.386	.395	.403	.409	.415	.420	.425	.429	.432	.435	.438	.440	.442
.480	.242	.288	.317	.339	.356	.370	.382	.392	.401	.409	.416	.422	.427	.432	.436	.439	.443	.445	.448	.450
.485	.246	.292	.321	.344	.361	.376	.388	.398	.407	.415	.422	.428	.434	.439	.443	.446	.450	.452	.455	.457
.490	.250	.296	.326	.349	.366	.381	.394	.404	.414	.422	.429	.435	.440	.445	.450	.453	.457	.460	.462	.464
.495	.253	.300	.331	.354	.372	.387	.399	.410	.420	.428	.435	.442	.447	.452	.457	.461	.464	.467	.470	.472
.500	.257	.305	.336	.359	.377	.392	.405	.416	.426	.434	.442	.448	.454	.459	.464	.468	.471	.474	.477	.479

Table 20 (continued)

h_a^*	$h_a^*-h_b^*$																			
	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.505	.260	.309	.360	.364	.383	.398	.411	.422	.432	.441	.449	.455	.461	.466	.471	.475	.478	.482	.484	.487
.510	.264	.313	.345	.369	.388	.404	.417	.429	.438	.447	.455	.462	.468	.473	.478	.482	.486	.489	.492	.494
.515	.268	.318	.350	.374	.394	.409	.423	.435	.445	.454	.461	.468	.474	.480	.485	.489	.493	.496	.499	.502
.520	.271	.322	.355	.379	.399	.415	.429	.441	.451	.460	.468	.475	.481	.487	.492	.496	.500	.504	.507	.509
.525	.275	.326	.360	.385	.404	.421	.435	.447	.457	.467	.475	.482	.488	.494	.497	.504	.508	.511	.514	.517
.530	.278	.331	.364	.390	.410	.427	.441	.453	.464	.473	.481	.489	.495	.501	.506	.511	.515	.519	.522	.525
.535	.282	.335	.369	.395	.415	.432	.447	.459	.470	.480	.488	.496	.502	.508	.513	.518	.522	.526	.529	.532
.540	.286	.339	.374	.400	.421	.438	.453	.466	.477	.486	.495	.502	.509	.515	.521	.526	.530	.534	.537	.540
.545	.290	.344	.379	.406	.427	.444	.459	.472	.483	.493	.502	.509	.516	.522	.528	.533	.537	.541	.545	.548
.550	.293	.348	.384	.411	.432	.450	.465	.478	.489	.499	.508	.516	.523	.530	.535	.540	.545	.549	.552	.556
.555	.297	.353	.389	.416	.438	.456	.471	.484	.496	.506	.515	.523	.530	.537	.543	.548	.552	.556	.560	.563
.560	.301	.357	.394	.421	.443	.462	.477	.491	.502	.513	.522	.530	.537	.544	.550	.555	.560	.564	.568	.571
.565	.305	.362	.399	.427	.449	.468	.483	.497	.509	.519	.529	.537	.545	.551	.557	.563	.567	.572	.576	.579
.570	.308	.366	.404	.432	.455	.474	.490	.503	.515	.526	.536	.544	.552	.559	.565	.570	.575	.580	.583	.587
.575	.312	.371	.409	.438	.460	.480	.496	.510	.522	.533	.543	.551	.559	.566	.572	.578	.583	.587	.591	.595
.580	.316	.375	.414	.443	.466	.486	.502	.516	.529	.540	.549	.558	.566	.573	.580	.585	.590	.595	.599	.603
.585	.320	.380	.419	.448	.472	.492	.508	.523	.535	.546	.556	.565	.573	.581	.587	.593	.598	.603	.607	.611
.590	.324	.384	.424	.454	.478	.498	.514	.529	.542	.553	.563	.572	.591	.588	.594	.600	.606	.611	.615	.619
.595	.327	.389	.429	.459	.483	.504	.521	.536	.549	.560	.570	.580	.588	.595	.602	.608	.614	.618	.623	.627
.600	.331	.394	.434	.465	.489	.510	.527	.542	.555	.567	.577	.587	.595	.603	.610	.616	.621	.626	.631	.635

Table 20 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.255	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155
.260	.160	.160	.160	.160	.160	.160	.160	.160	.160	.160
.265	.165	.165	.165	.165	.165	.165	.165	.165	.165	.165
.270	.170	.170	.170	.170	.170	.170	.170	.170	.170	.170
.275	.175	.175	.175	.175	.175	.175	.175	.175	.175	.175
.280	.180	.180	.180	.180	.180	.180	.180	.180	.180	.180
.285	.186	.186	.186	.186	.186	.186	.186	.186	.186	.186
.290	.191	.191	.191	.191	.191	.191	.191	.191	.191	.191
.295	.197	.197	.197	.197	.197	.197	.197	.197	.197	.197
.300	.202	.202	.202	.202	.202	.202	.202	.202	.202	.202
.305	.208	.208	.208	.208	.208	.208	.208	.208	.208	.208
.310	.213	.213	.213	.213	.213	.213	.213	.213	.213	.213
.315	.219	.219	.219	.219	.219	.219	.219	.219	.219	.219
.320	.225	.225	.225	.225	.225	.225	.225	.225	.225	.225
.325	.231	.231	.231	.231	.231	.231	.231	.231	.231	.231
.330	.237	.237	.237	.237	.237	.237	.237	.237	.237	.237
.335	.243	.243	.243	.243	.243	.243	.243	.243	.243	.243
.340	.249	.249	.249	.249	.249	.249	.249	.249	.249	.249
.345	.255	.255	.255	.255	.255	.255	.255	.255	.255	.255
.350	.261	.261	.261	.261	.261	.261	.261	.261	.261	.261
.355	.267	.267	.267	.267	.267	.267	.267	.267	.267	.267
.360	.273	.273	.273	.273	.273	.273	.273	.273	.273	.273
.365	.279	.279	.279	.279	.279	.279	.279	.279	.279	.279
.370	.286	.286	.286	.286	.286	.286	.286	.286	.286	.286
.375	.292	.292	.292	.292	.292	.292	.292	.292	.292	.292
.380	.299	.299	.299	.299	.299	.299	.299	.299	.299	.299
.385	.305	.305	.305	.305	.305	.305	.305	.305	.305	.305
.390	.312	.312	.312	.312	.312	.312	.312	.312	.312	.312
.395	.318	.318	.318	.318	.318	.318	.318	.318	.318	.318
.400	.325	.325	.325	.325	.325	.325	.325	.325	.325	.325
.405	.332	.332	.332	.332	.332	.332	.332	.332	.332	.332
.410	.339	.339	.339	.339	.339	.339	.339	.339	.339	.339
.415	.358	.345	.345	.345	.345	.345	.345	.345	.345	.345
.420	.365	.352	.352	.352	.352	.352	.352	.352	.352	.352
.425	.372	.359	.359	.359	.359	.359	.359	.359	.359	.359
.430	.379	.366	.366	.366	.366	.366	.366	.366	.366	.366
.435	.386	.386	.373	.373	.373	.373	.373	.373	.373	.373
.440	.393	.394	.380	.380	.380	.380	.380	.380	.380	.380
.445	.400	.401	.388	.388	.388	.388	.388	.388	.388	.388
.450	.407	.408	.395	.395	.395	.395	.395	.395	.395	.395
.455	.415	.416	.416	.402	.402	.402	.402	.402	.402	.402
.460	.422	.423	.424	.409	.409	.409	.409	.409	.409	.409
.465	.429	.430	.431	.417	.417	.417	.417	.417	.417	.417
.470	.436	.438	.439	.424	.424	.424	.424	.424	.424	.424
.475	.444	.445	.446	.447	.432	.432	.432	.432	.432	.432
.480	.451	.453	.454	.454	.439	.439	.439	.439	.439	.439
.485	.459	.460	.461	.462	.447	.447	.447	.447	.447	.447
.490	.466	.468	.469	.470	.454	.454	.454	.454	.454	.454
.495	.474	.475	.477	.478	.478	.462	.462	.462	.462	.462
.500	.481	.483	.484	.485	.486	.470	.470	.470	.470	.470

Table 20 (continued)

h_a^*	$h_a^* - h_b^*$: .105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.505	.489	.491	.492	.493	.494	.477	.477	.477	.477	.477
.510	.496	.498	.500	.501	.502	.503	.485	.485	.485	.485
.515	.504	.506	.508	.509	.510	.511	.493	.493	.493	.493
.520	.512	.514	.515	.517	.518	.519	.501	.501	.501	.501
.525	.519	.521	.523	.525	.526	.527	.509	.509	.509	.509
.530	.527	.529	.531	.533	.534	.535	.536	.517	.517	.517
.535	.535	.537	.539	.541	.542	.543	.544	.525	.525	.525
.540	.543	.545	.547	.549	.550	.551	.552	.533	.533	.533
.545	.551	.553	.555	.557	.558	.559	.560	.541	.541	.541
.550	.558	.561	.563	.565	.566	.568	.569	.569	.550	.550
.555	.566	.569	.571	.573	.574	.576	.577	.578	.558	.558
.560	.574	.577	.579	.581	.583	.584	.585	.586	.566	.566
.565	.582	.585	.587	.589	.591	.592	.594	.595	.575	.575
.570	.590	.593	.595	.597	.599	.601	.602	.603	.604	.583
.575	.598	.601	.604	.606	.608	.609	.611	.612	.612	.591
.580	.606	.609	.612	.614	.616	.618	.619	.620	.621	.600
.585	.614	.617	.620	.622	.624	.626	.628	.629	.630	.609
.590	.622	.625	.628	.631	.633	.635	.636	.637	.638	.639
.595	.631	.634	.637	.639	.641	.643	.645	.646	.647	.648
.600	.639	.642	.645	.647	.650	.652	.653	.655	.656	.657

Table 21 Submerged flow calibration for 30 cm × 270 cm Cutthroat flume, (Q^*, cms)

h_a^* \ $h_a^*-h_b^*$	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.015	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.020	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.025	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.030	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.035	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.040	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.045	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.050	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
.055	.006	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.060	.007	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.065	.008	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.070	.009	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
.075	.010	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.080	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.085	.012	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
.090	.013	.014	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015	.015
.095	.014	.015	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016
.100	.015	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017
.105	.016	.018	.018	.019	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018
.110	.018	.019	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020
.115	.019	.020	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021	.021
.120	.020	.022	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023
.125	.021	.023	.024	.024	.025	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024	.024
.130	.022	.024	.025	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026
.135	.024	.026	.027	.027	.028	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027
.140	.025	.027	.028	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029	.029
.145	.026	.029	.030	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031	.031
.150	.027	.030	.031	.032	.032	.033	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032
.155	.029	.031	.033	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
.160	.030	.033	.034	.035	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036	.036
.165	.031	.034	.036	.037	.038	.038	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037	.037
.170	.033	.036	.038	.039	.039	.040	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039
.175	.034	.037	.039	.040	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041	.041
.180	.035	.039	.041	.042	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043
.185	.037	.041	.043	.044	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045	.045
.190	.038	.042	.044	.046	.046	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047
.195	.040	.044	.046	.047	.048	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049
.200	.041	.045	.048	.049	.050	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051	.051
.205	.042	.047	.049	.051	.052	.053	.053	.053	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052
.210	.044	.049	.051	.053	.054	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055	.055
.215	.045	.050	.053	.055	.056	.056	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057	.057
.220	.047	.052	.055	.056	.058	.058	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059
.225	.048	.054	.056	.058	.060	.060	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061	.061
.230	.050	.055	.058	.060	.062	.062	.063	.063	.064	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063
.235	.051	.057	.060	.062	.064	.064	.065	.065	.066	.065	.065	.065	.065	.065	.065	.065	.065	.065	.065	.065
.240	.053	.059	.062	.064	.066	.067	.067	.068	.068	.067	.067	.067	.067	.067	.067	.067	.067	.067	.067	.067
.245	.054	.060	.064	.066	.068	.069	.069	.070	.070	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069
.250	.056	.062	.066	.068	.070	.071	.071	.072	.072	.072	.072	.072	.072	.072	.072	.072	.072	.072	.072	.072

Table 21 (continued)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.058	.064	.068	.070	.072	.073	.074	.074	.074	.075	.074	.074	.074	.074	.074	.074	.074	.074	.074	.074
.260	.059	.066	.070	.072	.074	.075	.076	.076	.077	.077	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076
.265	.061	.068	.071	.074	.076	.077	.078	.079	.079	.079	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078
.270	.062	.069	.073	.076	.078	.079	.080	.081	.081	.082	.081	.081	.081	.081	.081	.081	.081	.081	.081	.081
.275	.064	.071	.075	.078	.080	.081	.082	.083	.084	.084	.084	.083	.083	.083	.083	.083	.083	.083	.083	.083
.280	.066	.073	.077	.080	.082	.084	.085	.085	.086	.086	.086	.085	.085	.085	.085	.085	.085	.085	.085	.085
.285	.067	.075	.079	.082	.084	.086	.067	.088	.088	.089	.089	.088	.088	.088	.088	.088	.088	.088	.088	.088
.290	.069	.077	.081	.084	.086	.088	.089	.090	.091	.091	.091	.090	.090	.090	.090	.090	.090	.090	.090	.090
.295	.071	.079	.083	.086	.089	.090	.091	.092	.093	.093	.094	.093	.093	.093	.093	.093	.093	.093	.093	.093
.300	.072	.081	.085	.088	.091	.093	.094	.095	.095	.096	.096	.096	.095	.095	.095	.095	.095	.095	.095	.095
.305	.074	.082	.087	.091	.093	.095	.096	.097	.098	.098	.099	.099	.098	.098	.098	.098	.098	.098	.098	.098
.310	.076	.084	.089	.093	.095	.097	.098	.099	.100	.101	.101	.101	.100	.100	.100	.100	.100	.100	.100	.100
.315	.077	.086	.091	.095	.097	.099	.101	.102	.103	.103	.104	.104	.103	.103	.103	.103	.103	.103	.103	.103
.320	.079	.088	.093	.097	.100	.102	.103	.104	.105	.106	.106	.106	.105	.105	.105	.105	.105	.105	.105	.105
.325	.081	.090	.096	.099	.102	.104	.106	.107	.108	.108	.109	.109	.109	.108	.108	.108	.106	.108	.108	.108
.330	.083	.092	.098	.101	.104	.106	.108	.109	.110	.111	.111	.111	.112	.110	.110	.110	.110	.110	.110	.110
.335	.084	.094	.100	.104	.107	.109	.110	.112	.113	.113	.114	.114	.114	.113	.113	.113	.113	.113	.113	.113
.340	.086	.096	.102	.106	.109	.111	.113	.114	.115	.116	.116	.117	.117	.116	.116	.116	.116	.116	.116	.116
.345	.088	.098	.104	.108	.111	.113	.115	.117	.118	.118	.119	.119	.120	.118	.118	.118	.118	.118	.118	.118
.350	.090	.100	.106	.110	.113	.116	.118	.119	.120	.121	.122	.122	.122	.122	.121	.121	.121	.121	.121	.121
.355	.092	.102	.108	.113	.116	.118	.120	.122	.123	.124	.124	.125	.125	.125	.124	.124	.124	.124	.124	.124
.360	.093	.104	.111	.115	.118	.121	.123	.124	.125	.126	.127	.127	.128	.128	.126	.126	.126	.126	.126	.126
.365	.095	.106	.113	.117	.121	.123	.125	.127	.128	.129	.130	.130	.130	.131	.129	.129	.129	.129	.129	.129
.370	.097	.108	.115	.120	.123	.126	.128	.129	.131	.132	.132	.133	.133	.133	.132	.132	.132	.132	.132	.132
.375	.099	.110	.117	.122	.125	.128	.130	.132	.133	.134	.135	.136	.136	.136	.136	.135	.135	.135	.135	.135
.380	.101	.112	.119	.124	.128	.131	.133	.134	.136	.137	.138	.138	.139	.139	.139	.138	.138	.138	.138	.138
.385	.103	.114	.122	.127	.130	.133	.135	.137	.138	.140	.140	.141	.142	.142	.142	.140	.140	.140	.140	.140
.390	.105	.117	.124	.129	.133	.136	.138	.140	.141	.142	.143	.144	.144	.145	.145	.143	.143	.143	.143	.143
.395	.106	.119	.126	.131	.135	.138	.140	.142	.144	.145	.146	.147	.147	.147	.148	.146	.146	.146	.146	.146
.400	.108	.121	.128	.134	.138	.141	.143	.145	.146	.148	.149	.149	.150	.150	.151	.151	.149	.149	.149	.149
.405	.110	.123	.131	.136	.140	.143	.146	.148	.149	.150	.151	.152	.153	.153	.154	.154	.152	.152	.152	.152
.410	.112	.125	.133	.138	.143	.146	.148	.150	.152	.153	.154	.155	.156	.156	.156	.157	.155	.155	.155	.155
.415	.114	.127	.135	.141	.145	.148	.151	.153	.155	.156	.157	.158	.159	.159	.159	.160	.158	.158	.158	.158
.420	.116	.129	.138	.143	.148	.151	.154	.156	.157	.159	.160	.161	.162	.162	.162	.163	.161	.161	.161	.161
.425	.118	.132	.140	.146	.150	.153	.156	.158	.160	.162	.163	.164	.164	.165	.165	.166	.166	.164	.164	.164
.430	.120	.134	.142	.148	.153	.156	.159	.161	.163	.164	.166	.167	.167	.168	.168	.169	.169	.167	.167	.167
.435	.122	.136	.145	.151	.155	.159	.162	.164	.166	.167	.169	.170	.170	.171	.171	.172	.172	.170	.170	.170
.440	.124	.138	.147	.153	.158	.161	.164	.167	.169	.170	.171	.172	.173	.174	.174	.175	.175	.173	.173	.173
.445	.126	.140	.149	.156	.160	.164	.167	.169	.171	.173	.174	.175	.176	.177	.177	.178	.178	.176	.176	.176
.450	.128	.143	.152	.158	.163	.167	.170	.172	.174	.176	.177	.178	.179	.180	.180	.181	.181	.181	.179	.179
.455	.130	.145	.154	.161	.165	.169	.172	.175	.177	.179	.180	.181	.182	.183	.184	.184	.184	.184	.182	.182
.460	.132	.147	.156	.163	.168	.172	.175	.178	.180	.182	.183	.184	.185	.186	.187	.187	.187	.187	.185	.185
.465	.134	.149	.159	.166	.171	.175	.178	.181	.183	.185	.186	.187	.188	.189	.190	.190	.190	.191	.189	.189
.470	.136	.152	.161	.168	.173	.177	.181	.183	.186	.188	.189	.190	.191	.192	.193	.193	.194	.194	.192	.192
.475	.138	.154	.164	.171	.176	.180	.183	.186	.189	.190	.192	.193	.194	.195	.196	.196	.197	.197	.197	.195
.480	.140	.156	.166	.173	.179	.183	.186	.189	.191	.193	.195	.196	.197	.198	.199	.200	.200	.200	.200	.198
.485	.142	.158	.169	.176	.181	.186	.189	.192	.194	.196	.198	.199	.201	.201	.202	.203	.203	.203	.204	.201
.490	.144	.161	.171	.178	.184	.188	.192	.195	.197	.199	.201	.202	.204	.205	.205	.206	.206	.207	.207	.205
.495	.146	.163	.173	.181	.187	.191	.195	.198	.200	.202	.204	.206	.207	.208	.209	.209	.210	.210	.210	.208
.500	.148	.165	.176	.184	.189	.194	.198	.201	.203	.205	.207	.209	.210	.211	.212	.212	.213	.213	.213	.213

Table 21 (continued)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.505	.150	.168	.178	.186	.192	.197	.200	.204	.206	.208	.210	.212	.213	.214	.215	.216	.216	.216	.217	.217
.510	.152	.170	.181	.189	.195	.199	.203	.206	.209	.211	.213	.215	.216	.217	.218	.219	.219	.220	.220	.220
.515	.154	.172	.183	.191	.197	.202	.206	.209	.212	.214	.216	.218	.219	.220	.221	.222	.223	.223	.223	.224
.520	.156	.175	.186	.194	.200	.205	.209	.212	.215	.217	.219	.221	.222	.224	.225	.225	.226	.226	.227	.227
.525	.158	.177	.189	.197	.203	.208	.212	.215	.218	.221	.223	.224	.226	.227	.228	.229	.229	.230	.230	.230
.530	.160	.179	.191	.199	.206	.211	.215	.218	.221	.224	.226	.227	.229	.230	.231	.232	.233	.233	.233	.234
.535	.163	.182	.194	.202	.208	.214	.218	.221	.224	.227	.229	.231	.232	.233	.234	.235	.236	.236	.237	.237
.540	.165	.184	.196	.205	.211	.216	.221	.224	.227	.230	.232	.234	.235	.237	.238	.239	.239	.240	.240	.241
.545	.167	.187	.199	.207	.214	.219	.224	.227	.230	.233	.235	.237	.239	.240	.241	.242	.243	.243	.244	.244
.550	.169	.189	.201	.210	.217	.222	.227	.230	.233	.236	.238	.240	.242	.243	.244	.245	.246	.247	.247	.247
.555	.171	.191	.204	.213	.220	.225	.230	.233	.237	.239	.241	.243	.245	.246	.248	.249	.249	.250	.251	.251
.560	.173	.194	.206	.215	.222	.228	.233	.236	.240	.242	.245	.247	.248	.250	.251	.252	.253	.253	.254	.254
.565	.175	.196	.209	.218	.225	.231	.236	.239	.243	.245	.248	.250	.252	.253	.254	.255	.256	.257	.257	.258
.570	.178	.199	.212	.221	.228	.234	.239	.243	.246	.249	.251	.253	.255	.256	.258	.259	.260	.260	.261	.261
.575	.180	.201	.214	.224	.231	.237	.242	.246	.249	.252	.254	.256	.258	.260	.261	.262	.263	.264	.264	.265
.580	.182	.204	.217	.226	.234	.240	.245	.249	.252	.255	.258	.260	.262	.263	.264	.266	.267	.267	.268	.268
.585	.184	.206	.220	.229	.237	.243	.248	.252	.255	.258	.261	.263	.265	.267	.268	.269	.270	.271	.271	.272
.590	.186	.209	.222	.232	.240	.246	.251	.255	.258	.261	.264	.266	.268	.270	.271	.273	.274	.274	.275	.276
.595	.189	.211	.225	.235	.242	.249	.254	.258	.262	.265	.267	.270	.272	.273	.275	.276	.277	.278	.279	.279
.600	.191	.214	.228	.238	.245	.252	.257	.261	.265	.268	.271	.273	.275	.277	.278	.279	.281	.281	.282	.283
.605	.193	.216	.230	.240	.248	.255	.260	.264	.268	.271	.274	.276	.278	.280	.282	.283	.284	.285	.286	.286
.610	.195	.219	.233	.243	.251	.258	.263	.247	.271	.274	.277	.280	.282	.284	.285	.286	.288	.289	.289	.290
.615	.197	.221	.236	.246	.254	.261	.266	.271	.274	.278	.281	.283	.285	.287	.289	.290	.291	.292	.293	.294
.620	.200	.224	.238	.249	.257	.264	.269	.274	.278	.281	.284	.286	.289	.290	.292	.293	.295	.296	.297	.297
.625	.202	.226	.241	.252	.260	.267	.272	.277	.281	.284	.287	.290	.292	.294	.296	.297	.298	.299	.300	.301
.630	.204	.229	.244	.255	.263	.270	.275	.280	.284	.288	.291	.293	.295	.297	.299	.301	.302	.303	.304	.304
.635	.206	.231	.246	.257	.266	.273	.278	.283	.287	.291	.294	.297	.299	.301	.303	.304	.305	.306	.307	.308
.640	.209	.234	.249	.260	.269	.276	.282	.286	.291	.294	.297	.300	.302	.304	.306	.308	.309	.310	.311	.312
.645	.211	.236	.252	.263	.272	.279	.285	.290	.294	.298	.301	.303	.306	.308	.310	.311	.313	.314	.315	.316
.650	.213	.239	.255	.266	.275	.282	.288	.293	.297	.301	.304	.307	.309	.311	.313	.315	.316	.317	.318	.319
.655	.216	.241	.257	.269	.278	.285	.291	.246	.300	.304	.307	.310	.313	.315	.317	.318	.320	.321	.322	.323
.660	.218	.244	.260	.272	.281	.288	.294	.299	.304	.308	.311	.314	.316	.318	.320	.322	.324	.325	.326	.327
.665	.220	.247	.263	.275	.284	.291	.297	.303	.307	.311	.314	.317	.320	.322	.324	.326	.327	.328	.330	.330
.670	.223	.249	.266	.278	.287	.294	.301	.306	.310	.314	.318	.321	.323	.326	.32[illegible]	.329	.331	.332	.333	.334
.675	.225	.252	.269	.281	.290	.298	.304	.309	.314	.318	.321	.324	.327	.329	.331	.333	.335	.336	.337	.338
.680	.227	.254	.271	.284	.293	.301	.307	.313	.317	.321	.325	.328	.330	.333	.335	.337	.338	.340	.341	.342
.685	.230	.257	.274	.286	.296	.304	.310	.316	.321	.325	.328	.331	.334	.336	.338	.340	.342	.343	.345	.346
.690	.232	.260	.277	.289	.299	.307	.314	.319	.324	.328	.332	.335	.338	.340	.342	.344	.346	.347	.348	.349
.695	.234	.262	.280	.292	.302	.310	.317	.322	.327	.331	.335	.338	.341	.344	.346	.348	.349	.351	.352	.353
.700	.237	.265	.283	.295	.305	.313	.320	.326	.331	.335	.339	.342	.345	.347	.349	.351	.353	.355	.356	.357
.705	.239	.268	.285	.298	.308	.317	.323	.329	.334	.338	.342	.345	.348	.351	.353	.355	.357	.358	.360	.361
.710	.241	.270	.288	.301	.311	.320	.327	.332	.337	.342	.346	.349	.352	.355	.357	.359	.361	.362	.364	.365
.715	.244	.273	.291	.304	.315	.323	.330	.336	.341	.345	.349	.353	.356	.358	.360	.363	.364	.366	.367	.369
.720	.246	.276	.294	.307	.318	.326	.333	.339	.344	.349	.353	.356	.359	.362	.364	.366	.368	.370	.371	.372
.725	.248	.278	.297	.310	.321	.329	.336	.343	.348	.352	.356	.360	.363	.366	.368	.370	.372	.374	.375	.376
.730	.251	.281	.300	.313	.324	.333	.340	.346	.351	.356	.360	.363	.366	.369	.372	.374	.376	.377	.379	.380
.735	.253	.284	.303	.316	.327	.336	.343	.349	.355	.359	.363	.367	.370	.373	.375	.378	.380	.381	.383	.384
.740	.256	.286	.306	.319	.330	.339	.346	.353	.358	.363	.367	.371	.374	.377	.379	.381	.383	.385	.387	.388
.745	.258	.289	.308	.322	.333	.342	.350	.356	.362	.366	.371	.374	.377	.380	.383	.385	.387	.389	.391	.392
.750	.260	.292	.311	.326	.337	.346	.353	.360	.365	.370	.374	.378	.381	.384	.387	.389	.391	.393	.394	.396

h_a^* \ $h_a^*-h_b^*$	.105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.505	.214	.214	.214	.214	.214	.214	.214	.214	.214	.214
.510	.218	.218	.218	.218	.218	.218	.218	.218	.218	.218
.515	.221	.221	.221	.221	.221	.221	.221	.221	.221	.221
.520	.227	.224	.224	.224	.224	.224	.224	.224	.224	.224
.525	.230	.228	.228	.228	.228	.228	.228	.228	.228	.228
.530	.234	.231	.231	.231	.231	.231	.231	.231	.231	.231
.535	.237	.235	.235	.235	.235	.235	.235	.235	.235	.235
.540	.241	.238	.238	.238	.238	.238	.238	.238	.238	.238
.545	.244	.244	.242	.242	.242	.242	.242	.242	.242	.242
.550	.248	.248	.245	.245	.245	.245	.245	.245	.245	.245
.555	.251	.251	.249	.249	.249	.249	.249	.249	.249	.249
.560	.255	.255	.252	.252	.252	.252	.252	.252	.252	.252
.565	.258	.258	.256	.256	.256	.256	.256	.256	.256	.256
.570	.262	.262	.262	.259	.259	.259	.259	.259	.259	.259
.575	.265	.265	.266	.263	.263	.263	.263	.263	.263	.263
.580	.269	.269	.269	.266	.266	.266	.266	.266	.266	.266
.585	.272	.273	.273	.270	.270	.270	.270	.270	.270	.270
.590	.276	.276	.276	.273	.273	.273	.273	.273	.273	.273
.595	.280	.280	.280	.280	.277	.277	.277	.277	.277	.277
.600	.283	.283	.284	.284	.281	.281	.281	.281	.281	.281
.605	.287	.287	.287	.267	.284	.284	.284	.284	.284	.284
.610	.290	.291	.291	.291	.288	.288	.288	.288	.288	.288
.615	.294	.294	.295	.295	.292	.292	.292	.292	.292	.292
.620	.298	.298	.298	.299	.299	.295	.295	.295	.295	.295
.625	.301	.302	.302	.302	.302	.299	.299	.299	.299	.299
.630	.305	.306	.306	.306	.306	.303	.303	.303	.303	.303
.635	.309	.309	.310	.310	.310	.307	.307	.307	.307	.307
.640	.313	.313	.313	.314	.314	.310	.310	.310	.310	.310
.645	.316	.317	.317	.317	.318	.318	.314	.314	.314	.314
.650	.320	.321	.321	.321	.321	.322	.318	.318	.318	.318
.655	.324	.324	.325	.325	.325	.325	.322	.322	.322	.322
.660	.327	.328	.329	.329	.329	.329	.326	.326	.326	.326
.665	.331	.332	.332	.333	.333	.333	.330	.330	.330	.330
.670	.335	.336	.336	.337	.337	.337	.337	.333	.333	.333
.675	.339	.339	.340	.348	.341	.341	.341	.337	.337	.337
.680	.343	.343	.344	.344	.345	.345	.345	.341	.341	.341
.685	.346	.347	.348	.348	.349	.349	.349	.345	.345	.345
.690	.350	.351	.352	.352	.353	.353	.353	.349	.349	.349
.695	.354	.355	.356	.356	.356	.357	.357	.357	.353	.353
.700	.358	.359	.359	.360	.360	.361	.361	.361	.357	.357
.705	.362	.363	.363	.364	.364	.365	.365	.365	.361	.361
.710	.366	.367	.367	.368	.368	.369	.369	.369	.365	.365
.715	.370	.370	.371	.372	.372	.373	.373	.373	.369	.369
.720	.373	.374	.375	.376	.376	.377	.377	.377	.377	.373
.725	.377	.378	.379	.380	.380	.381	.381	.381	.381	.377
.730	.381	.382	.383	.384	.384	.385	.385	.385	.385	.381
.735	.385	.386	.387	.388	.388	.389	.389	.389	.390	.385
.740	.389	.390	.391	.392	.392	.393	.393	.394	.394	.389
.745	.393	.394	.395	.396	.396	.397	.397	.398	.398	.398
.750	.397	.398	.399	.400	.401	.401	.401	.402	.402	.402

Table 22 Submerged flow calibration for 60 cm × 270 cm Cutthroat flume, (Q^*, cms)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.010	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.015	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.020	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.025	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
.030	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.035	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.040	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008	.008
.045	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
.050	.011	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012	.012
.055	.013	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.060	.015	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016	.016
.065	.017	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018	.018
.070	.019	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020
.075	.021	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022	.022
.080	.023	.024	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025	.025
.085	.025	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027	.027
.090	.027	.029	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030
.095	.029	.031	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032	.032
.100	.031	.034	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035	.035
.105	.033	.036	.037	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038
.110	.036	.039	.040	.041	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040	.040
.115	.038	.041	.043	.044	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043	.043
.120	.040	.044	.046	.047	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046
.125	.043	.047	.049	.050	.050	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049	.049
.130	.045	.050	.052	.053	.053	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052	.052
.135	.048	.052	.055	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056	.056
.140	.050	.055	.058	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059
.145	.053	.058	.061	.062	.063	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062	.062
.150	.055	.061	.064	.065	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066	.066
.155	.058	.064	.067	.068	.069	.070	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069
.160	.061	.067	.070	.072	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073
.165	.063	.070	.073	.075	.076	.077	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076
.170	.066	.073	.076	.078	.080	.080	.080	.080	.080	.080	.080	.080	.080	.080	.080	.080	.080	.080	.085	.080
.175	.069	.076	.080	.082	.083	.084	.084	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
.180	.072	.079	.083	.085	.087	.088	.088	.087	.087	.087	.087	.087	.087	.087	.087	.087	.087	.087	.087	.087
.185	.074	.082	.086	.089	.090	.091	.092	.091	.091	.091	.091	.091	.091	.091	.091	.091	.091	.091	.091	.091
.190	.077	.085	.090	.092	.094	.095	.096	.095	.095	.095	.095	.095	.095	.095	.095	.095	.095	.095	.095	.095
.195	.080	.089	.093	.096	.098	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099
.200	.083	.092	.097	.100	.102	.103	.103	.104	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103	.103
.205	.086	.095	.100	.103	.105	.107	.107	.108	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107	.107
.210	.089	.099	.104	.107	.109	.111	.111	.112	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111
.215	.092	.102	.107	.111	.113	.115	.116	.116	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115	.115
.220	.095	.105	.111	.115	.117	.119	.120	.120	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119	.119
.225	.098	.109	.115	.118	.121	.123	.124	.124	.125	.123	.123	.123	.123	.123	.123	.123	.123	.123	.123	.123
.230	.101	.112	.118	.122	.125	.127	.128	.129	.129	.128	.128	.128	.128	.128	.128	.128	.128	.128	.128	.128
.235	.104	.116	.122	.126	.129	.131	.132	.133	.133	.132	.132	.132	.132	.132	.132	.132	.132	.132	.132	.132
.240	.107	.119	.126	.130	.133	.135	.136	.137	.138	.137	.137	.137	.137	.137	.137	.137	.137	.137	.137	.137
.245	.111	.123	.130	.134	.137	.139	.141	.142	.142	.141	.141	.141	.141	.141	.141	.141	.141	.141	.141	.141
.250	.114	.126	.133	.138	.141	.144	.145	.146	.147	.147	.146	.146	.146	.146	.146	.146	.146	.146	.146	.146

Table 22 (continued)

h_a^*	$h_a^*-h_b^*$: .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.117	.130	.137	.142	.145	.148	.149	.151	.151	.151	.150	.150	.150	.150	.150	.150	.150	.150	.150	.150
.260	.120	.133	.141	.146	.150	.152	.154	.155	.156	.156	.155	.155	.155	.155	.155	.155	.155	.155	.155	.155
.265	.123	.137	.145	.150	.154	.156	.158	.160	.160	.161	.159	.159	.159	.159	.159	.159	.159	.159	.159	.159
.270	.127	.141	.149	.154	.158	.161	.163	.164	.165	.165	.164	.164	.164	.164	.164	.164	.164	.164	.164	.164
.275	.130	.145	.153	.158	.162	.165	.167	.169	.170	.170	.170	.169	.169	.169	.169	.169	.169	.169	.169	.169
.280	.133	.148	.157	.153	.167	.170	.172	.173	.174	.175	.175	.174	.174	.174	.174	.174	.174	.174	.174	.174
.285	.137	.152	.161	.167	.171	.174	.176	.178	.179	.180	.180	.179	.179	.179	.179	.179	.179	.179	.179	.179
.290	.140	.156	.165	.171	.175	.179	.181	.183	.184	.185	.185	.183	.183	.183	.183	.183	.183	.183	.183	.183
.295	.143	.160	.169	.175	.180	.183	.186	.187	.189	.190	.190	.188	.188	.188	.188	.188	.188	.188	.188	.188
.300	.147	.163	.173	.180	.184	.188	.190	.192	.194	.194	.195	.195	.193	.193	.193	.193	.193	.193	.193	.193
.305	.150	.167	.177	.184	.189	.192	.195	.197	.198	.199	.200	.200	.199	.199	.199	.199	.199	.199	.199	.199
.310	.154	.171	.181	.188	.193	.197	.200	.202	.203	.204	.205	.205	.204	.204	.204	.204	.204	.204	.204	.204
.315	.157	.175	.186	.193	.198	.202	.205	.207	.208	.209	.210	.211	.209	.209	.209	.209	.209	.209	.209	.209
.320	.161	.179	.190	.197	.202	.206	.209	.212	.213	.215	.215	.216	.214	.214	.214	.214	.214	.214	.214	.214
.325	.164	.183	.194	.202	.207	.211	.214	.217	.218	.220	.220	.221	.221	.219	.219	.219	.219	.219	.219	.219
.330	.168	.187	.198	.206	.212	.216	.219	.222	.223	.225	.226	.226	.227	.224	.224	.224	.224	.224	.224	.224
.335	.171	.191	.203	.210	.216	.221	.224	.227	.228	.230	.231	.232	.232	.230	.230	.230	.230	.230	.230	.230
.340	.175	.195	.207	.215	.221	.225	.229	.232	.234	.235	.236	.237	.237	.235	.235	.235	.235	.235	.235	.235
.345	.179	.199	.211	.220	.226	.230	.234	.237	.239	.240	.241	.242	.243	.241	.241	.241	.241	.241	.241	.241
.350	.182	.203	.216	.224	.230	.235	.239	.242	.244	.246	.247	.248	.248	.248	.246	.246	.246	.246	.246	.246
.355	.186	.207	.220	.229	.235	.240	.244	.247	.249	.251	.252	.253	.254	.254	.252	.252	.252	.252	.252	.252
.360	.190	.211	.224	.233	.240	.245	.249	.252	.254	.256	.258	.259	.259	.259	.257	.257	.257	.257	.257	.257
.365	.193	.216	.229	.238	.245	.250	.254	.257	.260	.262	.263	.264	.265	.265	.263	.263	.263	.263	.263	.263
.370	.197	.220	.233	.243	.250	.255	.259	.262	.265	.267	.268	.270	.270	.271	.268	.268	.268	.268	.268	.268
.375	.201	.224	.238	.247	.254	.260	.264	.268	.270	.272	.274	.275	.276	.276	.277	.274	.274	.274	.274	.274
.380	.205	.228	.242	.252	.259	.265	.269	.273	.276	.278	.279	.281	.282	.282	.282	.280	.280	.280	.280	.280
.385	.208	.232	.247	.257	.264	.270	.275	.278	.281	.283	.285	.286	.287	.288	.288	.286	.286	.286	.286	.286
.390	.212	.237	.261	.262	.269	.275	.280	.283	.286	.289	.291	.292	.293	.294	.294	.291	.291	.291	.291	.291
.395	.216	.241	.256	.266	.274	.280	.285	.289	.292	.294	.296	.298	.299	.299	.300	.297	.297	.297	.297	.297
.400	.220	.245	.261	.271	.279	.285	.290	.294	.297	.300	.302	.303	.304	.305	.306	.306	.303	.303	.303	.303
.405	.224	.250	.265	.276	.284	.291	.296	.300	.303	.305	.307	.309	.310	.311	.312	.312	.309	.309	.309	.309
.410	.227	.254	.270	.281	.289	.296	.301	.305	.308	.311	.313	.315	.316	.317	.318	.318	.315	.315	.315	.315
.415	.231	.258	.274	.286	.294	.301	.306	.310	.314	.317	.319	.321	.322	.323	.324	.324	.321	.321	.321	.321
.420	.235	.263	.279	.291	.299	.306	.312	.316	.320	.322	.325	.326	.328	.329	.330	.330	.327	.327	.327	.327
.425	.239	.267	.284	.296	.305	.311	.317	.321	.325	.328	.330	.332	.334	.335	.336	.336	.336	.333	.333	.323
.430	.243	.272	.289	.301	.310	.317	.322	.327	.331	.334	.336	.338	.340	.341	.342	.342	.342	.339	.339	.339
.435	.247	.276	.293	.306	.315	.322	.328	.333	.336	.340	.342	.344	.346	.347	.348	.348	.349	.346	.346	.346
.440	.251	.280	.298	.311	.320	.327	.333	.338	.342	.345	.348	.350	.352	.353	.354	.355	.355	.352	.352	.352
.445	.255	.285	.303	.316	.325	.333	.339	.344	.348	.351	.354	.356	.358	.359	.360	.361	.361	.358	.358	.358
.450	.259	.289	.308	.321	.331	.338	.344	.349	.354	.357	.360	.362	.364	.365	.366	.367	.367	.368	.364	.364
.455	.263	.294	.313	.326	.336	.344	.350	.355	.359	.363	.366	.368	.370	.371	.372	.373	.374	.374	.371	.371
.460	.267	.299	.317	.331	.341	.349	.356	.361	.365	.369	.372	.374	.376	.378	.379	.380	.380	.380	.377	.377
.465	.271	.303	.322	.336	.346	.355	.361	.367	.371	.375	.378	.380	.382	.384	.385	.386	.386	.387	.383	.383
.470	.275	.308	.327	.341	.352	.360	.367	.372	.377	.381	.384	.386	.388	.390	.391	.392	.393	.393	.390	.390
.475	.279	.312	.332	.346	.357	.366	.372	.378	.383	.387	.390	.392	.395	.396	.398	.399	.399	.400	.400	.396
.480	.284	.317	.337	.352	.362	.371	.378	.384	.389	.393	.396	.399	.401	.403	.404	.405	.406	.406	.407	.403
.485	.288	.322	.342	.357	.368	.377	.384	.390	.395	.399	.402	.405	.407	.409	.410	.412	.412	.413	.413	.409
.490	.292	.326	.347	.362	.373	.382	.390	.396	.400	.405	.408	.411	.413	.415	.417	.418	.419	.419	.420	.416
.495	.296	.331	.352	.367	.379	.388	.395	.401	.406	.411	.414	.417	.420	.422	.423	.424	.425	.426	.426	.423
.500	.300	.336	.357	.372	.384	.393	.401	.407	.412	.417	.420	.423	.426	.428	.430	.431	.432	.433	.433	.433

Table 22 (continued)

h_a^*	$h_a^*-h_b^*$ .005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.505	.304	.340	.362	.378	.390	.399	.407	.413	.418	.423	.427	.430	.432	.434	.436	.438	.439	.439	.440	.440
.510	.309	.345	.367	.383	.395	.405	.413	.419	.425	.429	.433	.436	.439	.441	.443	.444	.445	.446	.447	.447
.515	.313	.350	.372	.388	.401	.411	.418	.425	.431	.435	.439	.442	.445	.447	.449	.451	.452	.453	.453	.454
.520	.317	.355	.377	.394	.406	.416	.424	.431	.437	.441	.445	.449	.452	.454	.456	.457	.459	.460	.460	.461
.525	.321	.359	.383	.399	.412	.422	.430	.437	.443	.448	.452	.455	.458	.460	.462	.464	.465	.466	.467	.467
.530	.326	.364	.388	.405	.417	.428	.436	.443	.449	.454	.458	.462	.465	.467	.469	.471	.472	.473	.474	.474
.535	.330	.369	.393	.410	.423	.434	.442	.449	.455	.460	.464	.468	.471	.474	.476	.477	.479	.480	.481	.481
.540	.334	.374	.398	.415	.429	.439	.448	.455	.461	.466	.471	.475	.478	.480	.482	.484	.486	.487	.488	.488
.545	.339	.379	.403	.421	.434	.445	.454	.461	.468	.473	.477	.481	.484	.487	.489	.491	.493	.494	.495	.495
.550	.343	.384	.409	.426	.440	.451	.460	.467	.474	.479	.484	.488	.491	.494	.496	.498	.499	.501	.502	.502
.555	.347	.389	.414	.432	.446	.457	.466	.474	.480	.485	.490	.494	.497	.500	.503	.505	.506	.508	.509	.509
.560	.352	.393	.419	.437	.451	.463	.472	.480	.486	.492	.497	.501	.504	.507	.509	.511	.513	.515	.516	.516
.565	.356	.398	.424	.443	.457	.469	.478	.486	.493	.498	.503	.507	.511	.514	.516	.518	.520	.522	.523	.523
.570	.360	.403	.430	.448	.463	.475	.484	.492	.499	.505	.510	.514	.517	.520	.523	.525	.527	.529	.530	.531
.575	.365	.408	.435	.454	.469	.481	.490	.498	.505	.511	.516	.520	.524	.527	.530	.532	.534	.536	.537	.538
.580	.369	.413	.440	.460	.475	.487	.496	.505	.512	.518	.523	.527	.531	.534	.537	.539	.541	.543	.544	.545
.585	.374	.418	.446	.465	.480	.493	.503	.511	.518	.524	.529	.534	.538	.541	.544	.546	.548	.550	.551	.552
.590	.378	.423	.451	.471	.486	.499	.509	.517	.525	.531	.536	.541	.544	.548	.551	.553	.555	.557	.558	.559
.595	.383	.428	.456	.477	.492	.505	.515	.524	.531	.537	.543	.547	.551	.555	.558	.560	.562	.564	.565	.567
.600	.387	.433	.462	.482	.498	.511	.521	.530	.537	.544	.549	.554	.558	.562	.565	.567	.569	.571	.573	.574
.605	.392	.439	.467	.488	.504	.517	.527	.536	.544	.550	.556	.561	.565	.569	.572	.574	.577	.578	.580	.581
.610	.396	.444	.473	.494	.510	.523	.534	.543	.550	.557	.563	.568	.572	.576	.579	.581	.584	.586	.587	.588
.615	.401	.449	.478	.499	.516	.529	.540	.549	.557	.564	.569	.574	.579	.583	.586	.588	.591	.593	.594	.596
.620	.405	.454	.484	.505	.522	.535	.546	.556	.563	.570	.576	.581	.586	.590	.593	.596	.598	.600	.602	.603
.625	.410	.459	.489	.511	.528	.541	.553	.562	.570	.577	.583	.588	.593	.597	.600	.603	.605	.607	.609	.611
.630	.415	.464	.495	.517	.534	.547	.559	.568	.577	.584	.590	.595	.600	.604	.607	.610	.613	.615	.617	.618
.635	.419	.469	.500	.522	.540	.554	.565	.575	.583	.590	.597	.602	.607	.611	.614	.617	.620	.622	.624	.625
.640	.424	.474	.506	.528	.546	.560	.572	.581	.590	.597	.603	.609	.614	.618	.621	.624	.627	.629	.631	.633
.645	.428	.480	.511	.534	.552	.566	.578	.588	.597	.604	.610	.616	.621	.625	.629	.632	.634	.637	.639	.640
.650	.433	.485	.517	.540	.558	.572	.584	.595	.603	.611	.617	.623	.628	.632	.636	.639	.642	.644	.646	.648
.655	.438	.490	.522	.546	.564	.579	.591	.601	.610	.618	.624	.630	.635	.639	.643	.646	.649	.652	.654	.656
.660	.442	.495	.528	.552	.570	.585	.597	.608	.617	.624	.631	.637	.642	.646	.650	.654	.657	.659	.661	.663
.665	.447	.501	.534	.558	.576	.591	.604	.614	.623	.631	.638	.644	.649	.654	.658	.661	.664	.667	.669	.671
.670	.452	.506	.539	.564	.582	.598	.610	.621	.630	.638	.645	.651	.656	.661	.665	.668	.671	.674	.676	.678
.675	.456	.511	.545	.570	.589	.604	.617	.628	.637	.645	.652	.658	.663	.668	.672	.676	.679	.682	.684	.686
.680	.461	.517	.551	.575	.595	.610	.623	.634	.644	.652	.659	.665	.671	.675	.680	.683	.686	.689	.692	.694
.685	.466	.522	.556	.581	.601	.617	.630	.641	.651	.659	.666	.672	.678	.683	.687	.691	.694	.697	.699	.701
.690	.471	.527	.562	.587	.607	.623	.636	.648	.657	.666	.673	.679	.685	.690	.694	.698	.702	.704	.707	.709
.695	.475	.533	.568	.593	.613	.630	.643	.654	.664	.673	.680	.687	.692	.697	.702	.706	.709	.712	.715	.717
.700	.480	.538	.574	.599	.620	.636	.650	.661	.671	.680	.687	.694	.700	.705	.709	.713	.717	.720	.722	.725
.705	.485	.543	.579	.606	.626	.642	.656	.668	.678	.687	.694	.701	.707	.712	.717	.721	.724	.727	.730	.732
.710	.490	.549	.585	.612	.632	.649	.663	.675	.685	.694	.702	.708	.714	.720	.724	.728	.732	.735	.738	.740
.715	.495	.554	.591	.618	.639	.655	.670	.682	.692	.701	.709	.716	.722	.727	.732	.736	.740	.743	.746	.748
.720	.499	.560	.597	.624	.645	.662	.676	.688	.699	.708	.716	.723	.729	.734	.739	.743	.747	.751	.753	.756
.725	.504	.565	.603	.630	.651	.669	.683	.695	.706	.715	.723	.730	.736	.742	.747	.751	.755	.758	.761	.764
.730	.509	.570	.608	.636	.658	.675	.690	.702	.713	.722	.730	.737	.744	.749	.754	.759	.763	.766	.769	.772
.735	.514	.576	.614	.642	.664	.682	.696	.709	.720	.729	.738	.745	.751	.757	.762	.766	.770	.774	.777	.780
.740	.519	.581	.620	.648	.670	.688	.703	.716	.727	.736	.745	.752	.759	.764	.770	.774	.778	.782	.785	.788
.745	.524	.587	.626	.655	.677	.695	.710	.723	.734	.744	.752	.760	.766	.772	.777	.782	.786	.790	.793	.796
.750	.529	.592	.632	.661	.683	.701	.717	.730	.741	.751	.759	.767	.774	.780	.785	.790	.794	.797	.801	.804

Table 22 (continued)

h_a^*	$h_a^*-h_b^*$ .105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.505	.436	.436	.436	.436	.436	.436	.436	.436	.436	.436
.510	.443	.443	.443	.443	.443	.443	.443	.443	.443	.443
.515	.450	.450	.450	.450	.450	.450	.450	.450	.450	.450
.520	.461	.457	.457	.457	.457	.457	.457	.457	.457	.457
.525	.468	.463	.463	.463	.463	.463	.463	.463	.463	.463
.530	.475	.470	.470	.470	.470	.470	.470	.470	.470	.470
.535	.482	.477	.477	.477	.477	.477	.477	.477	.477	.477
.540	.489	.484	.484	.484	.484	.484	.484	.484	.484	.484
.545	.496	.496	.491	.491	.491	.491	.491	.491	.491	.491
.550	.503	.503	.498	.498	.498	.498	.498	.498	.498	.498
.555	.510	.510	.505	.505	.505	.505	.505	.505	.505	.505
.560	.517	.517	.513	.513	.513	.513	.513	.513	.513	.513
.565	.524	.524	.520	.520	.520	.520	.520	.520	.520	.520
.570	.531	.532	.532	.527	.527	.527	.527	.527	.527	.527
.575	.538	.539	.539	.534	.534	.534	.534	.534	.534	.534
.580	.546	.546	.546	.541	.541	.541	.541	.541	.541	.541
.585	.553	.553	.554	.549	.549	.549	.549	.549	.549	.549
.590	.560	.561	.561	.556	.556	.556	.556	.556	.556	.556
.595	.567	.568	.568	.569	.563	.563	.563	.563	.563	.563
.600	.575	.575	.576	.576	.571	.571	.571	.571	.571	.571
.605	.582	.583	.583	.583	.578	.578	.578	.578	.578	.578
.610	.589	.590	.591	.591	.586	.586	.586	.586	.586	.586
.615	.597	.598	.598	.599	.593	.593	.593	.593	.593	.593
.620	.604	.605	.606	.606	.606	.601	.601	.601	.601	.601
.625	.612	.613	.613	.614	.614	.608	.608	.608	.608	.608
.630	.619	.620	.621	.621	.622	.616	.616	.616	.616	.616
.635	.627	.628	.628	.629	.629	.624	.624	.624	.624	.624
.640	.634	.635	.636	.637	.637	.631	.631	.631	.631	.631
.645	.642	.643	.644	.644	.645	.645	.639	.639	.639	.639
.650	.649	.651	.651	.652	.652	.653	.647	.647	.647	.647
.655	.657	.658	.659	.660	.660	.660	.655	.655	.655	.655
.660	.665	.666	.667	.668	.668	.668	.662	.662	.662	.662
.665	.672	.674	.675	.675	.676	.676	.670	.670	.670	.670
.670	.680	.681	.682	.683	.684	.684	.684	.678	.678	.678
.675	.688	.689	.690	.691	.692	.692	.692	.686	.686	.686
.680	.695	.697	.698	.699	.700	.700	.700	.694	.694	.694
.685	.703	.705	.706	.707	.708	.708	.708	.702	.702	.702
.690	.711	.712	.714	.715	.715	.716	.716	.710	.710	.710
.695	.719	.720	.722	.723	.723	.724	.724	.725	.718	.718
.700	.727	.728	.730	.731	.731	.732	.733	.733	.726	.726
.705	.734	.736	.738	.739	.740	.740	.741	.741	.734	.734
.710	.742	.744	.745	.747	.748	.748	.749	.749	.742	.742
.715	.750	.752	.753	.755	.756	.756	.757	.757	.750	.750
.720	.758	.760	.761	.763	.764	.765	.765	.766	.766	.759
.725	.766	.768	.770	.771	.772	.773	.773	.774	.774	.767
.730	.774	.776	.778	.779	.780	.781	.782	.782	.782	.775
.735	.782	.784	.786	.787	.788	.789	.790	.790	.791	.784
.740	.790	.792	.794	.795	.796	.797	.798	.799	.799	.792
.745	.798	.800	.802	.803	.805	.806	.806	.807	.807	.808
.750	.806	.808	.810	.812	.813	.814	.815	.815	.816	.816

Table 23 Submerged flow calibration for 100cm × 270cm Cutthroat flume, (Q^*, cms)

h_a^* \ $h_c^*-h_b^*$	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.005	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.010	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.015	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003
.020	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005	.005
.025	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007	.007
.030	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009	.009
.035	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
.040	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
.045	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017	.017
.050	.019	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020
.055	.022	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023	.023
.060	.025	.027	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026
.065	.028	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030	.030
.070	.032	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
.075	.035	.037	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038	.038
.080	.038	.041	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042	.042
.085	.042	.045	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046	.046
.090	.045	.049	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050
.095	.049	.053	.055	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054	.054
.100	.053	.057	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059	.059
.105	.056	.061	.063	.064	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063	.063
.110	.060	.066	.068	.069	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068	.068
.115	.064	.070	.073	.074	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073	.073
.120	.068	.075	.077	.079	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078	.078
.125	.072	.079	.082	.084	.084	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083	.083
.130	.076	.084	.087	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089	.089
.135	.081	.088	.092	.094	.095	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094	.094
.140	.085	.093	.097	.099	.100	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099	.099
.145	.089	.098	.102	.105	.106	.105	.105	.105	.105	.105	.105	.105	.105	.105	.105	.105	.105	.105	.105	.105
.150	.094	.103	.108	.110	.111	.112	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111	.111
.155	.098	.108	.113	.116	.117	.118	.117	.117	.117	.117	.117	.117	.117	.117	.117	.117	.117	.117	.117	.117
.160	.103	.113	.118	.121	.123	.124	.122	.122	.122	.122	.122	.122	.122	.122	.122	.122	.122	.122	.122	.122
.165	.107	.118	.124	.127	.129	.130	.129	.129	.129	.129	.129	.129	.129	.129	.129	.129	.129	.129	.129	.129
.170	.112	.123	.129	.133	.135	.136	.135	.135	.135	.135	.135	.135	.135	.135	.135	.135	.135	.135	.135	.135
.175	.116	.128	.135	.139	.141	.142	.142	.141	.141	.141	.141	.141	.141	.141	.141	.141	.141	.141	.141	.141
.180	.121	.134	.140	.144	.147	.148	.149	.147	.147	.147	.147	.147	.147	.147	.147	.147	.147	.147	.147	.147
.185	.126	.139	.146	.150	.153	.154	.155	.154	.154	.154	.154	.154	.154	.154	.154	.154	.154	.154	.154	.154
.190	.131	.144	.152	.156	.159	.161	.162	.160	.160	.160	.160	.160	.160	.160	.160	.160	.160	.160	.160	.160
.195	.136	.150	.158	.162	.165	.167	.168	.167	.167	.167	.167	.167	.167	.167	.167	.167	.167	.167	.167	.167
.200	.141	.155	.164	.169	.172	.174	.175	.175	.174	.174	.174	.174	.174	.174	.174	.174	.174	.174	.174	.174
.205	.146	.161	.170	.175	.178	.180	.182	.182	.180	.180	.180	.180	.180	.180	.180	.180	.180	.180	.180	.180
.210	.151	.167	.176	.181	.185	.187	.188	.189	.187	.187	.187	.187	.187	.187	.187	.187	.187	.187	.187	.187
.215	.156	.172	.182	.187	.191	.194	.195	.196	.194	.194	.194	.194	.194	.194	.194	.194	.194	.194	.194	.194
.220	.161	.178	.188	.194	.198	.201	.202	.203	.201	.201	.201	.201	.201	.201	.201	.201	.201	.201	.201	.201
.225	.166	.184	.194	.200	.205	.207	.209	.210	.211	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209	.209
.230	.171	.190	.200	.207	.211	.214	.216	.218	.218	.216	.216	.216	.216	.216	.216	.216	.216	.216	.216	.216
.235	.176	.196	.206	.213	.218	.221	.224	.225	.225	.223	.223	.223	.223	.223	.223	.223	.223	.223	.223	.223
.240	.182	.201	.213	.220	.225	.228	.231	.232	.233	.231	.231	.231	.231	.231	.231	.231	.231	.231	.231	.231
.245	.187	.207	.219	.227	.232	.236	.238	.240	.240	.238	.238	.238	.238	.238	.238	.238	.238	.238	.238	.238
.250	.192	.213	.226	.233	.239	.243	.245	.247	.248	.248	.246	.246	.246	.246	.246	.246	.246	.246	.246	.246

Table 23 (continued)

h_a^*	$h_a^*-h_b^*$																			
	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.255	.198	.220	.232	.240	.246	.250	.253	.255	.256	.256	.254	.254	.254	.254	.254	.254	.254	.254	.254	.254
.260	.203	.226	.239	.247	.253	.257	.260	.262	.263	.264	.261	.261	.261	.261	.261	.261	.261	.261	.261	.261
.265	.209	.232	.245	.254	.260	.265	.268	.270	.271	.272	.269	.269	.269	.269	.269	.269	.269	.269	.269	.269
.270	.214	.238	.252	.261	.267	.272	.275	.278	.279	.280	.277	.277	.277	.277	.277	.277	.277	.277	.277	.277
.275	.220	.244	.258	.268	.275	.279	.283	.285	.287	.288	.288	.285	.285	.285	.285	.285	.285	.285	.285	.285
.280	.226	.251	.265	.275	.282	.287	.291	.293	.295	.296	.296	.293	.293	.293	.293	.293	.293	.293	.293	.293
.285	.231	.257	.272	.282	.289	.294	.298	.301	.303	.304	.305	.302	.302	.302	.302	.302	.302	.302	.302	.302
.290	.237	.263	.279	.289	.297	.302	.306	.309	.311	.312	.313	.310	.310	.310	.310	.310	.310	.310	.310	.310
.295	.243	.270	.286	.296	.304	.310	.314	.317	.319	.321	.321	.318	.318	.318	.318	.318	.318	.318	.318	.318
.300	.248	.276	.293	.304	.312	.318	.322	.325	.327	.329	.330	.330	.327	.327	.327	.327	.327	.327	.327	.327
.305	.254	.283	.300	.311	.319	.325	.330	.333	.336	.337	.338	.339	.335	.335	.335	.335	.335	.335	.335	.335
.310	.260	.289	.307	.318	.327	.333	.338	.341	.344	.346	.347	.347	.344	.344	.344	.344	.344	.344	.344	.344
.315	.266	.296	.314	.326	.335	.341	.346	.350	.352	.354	.355	.356	.353	.353	.353	.353	.353	.353	.353	.353
.320	.272	.303	.321	.333	.342	.349	.354	.358	.361	.363	.364	.365	.361	.361	.361	.361	.361	.361	.361	.361
.325	.278	.309	.328	.341	.350	.357	.362	.366	.369	.371	.373	.374	.374	.370	.370	.370	.370	.370	.370	.370
.330	.284	.316	.335	.348	.358	.365	.370	.375	.378	.380	.382	.383	.383	.379	.379	.379	.379	.379	.379	.379
.335	.290	.323	.343	.356	.366	.373	.379	.383	.386	.389	.390	.392	.392	.388	.388	.388	.388	.388	.388	.388
.340	.296	.330	.350	.364	.374	.381	.387	.392	.395	.398	.399	.401	.401	.397	.397	.397	.397	.397	.397	.397
.345	.302	.337	.357	.371	.382	.389	.395	.400	.404	.406	.408	.410	.410	.406	.406	.406	.406	.406	.406	.406
.350	.308	.344	.365	.379	.390	.398	.404	.409	.412	.415	.417	.419	.420	.420	.416	.416	.416	.416	.416	.416
.355	.314	.351	.372	.387	.398	.406	.412	.417	.421	.424	.426	.428	.429	.429	.425	.425	.425	.425	.425	.425
.360	.321	.356	.379	.395	.406	.414	.421	.426	.430	.433	.436	.437	.438	.439	.434	.434	.434	.434	.434	.434
.365	.327	.365	.387	.402	.414	.423	.430	.435	.439	.442	.445	.446	.448	.448	.444	.444	.444	.444	.444	.444
.370	.333	.372	.394	.410	.422	.431	.438	.444	.448	.451	.454	.456	.457	.458	.453	.453	.453	.453	.453	.453
.375	.340	.379	.402	.418	.430	.440	.447	.453	.457	.461	.463	.465	.467	.467	.468	.463	.463	.463	.463	.463
.380	.346	.386	.410	.426	.439	.448	.456	.461	.466	.470	.473	.475	.476	.477	.477	.473	.473	.473	.473	.473
.385	.352	.393	.417	.434	.447	.457	.464	.470	.475	.479	.482	.484	.486	.487	.487	.482	.482	.482	.482	.482
.390	.359	.400	.425	.442	.455	.465	.473	.479	.484	.488	.491	.494	.495	.496	.497	.492	.492	.492	.492	.492
.395	.365	.407	.433	.450	.464	.474	.482	.488	.494	.498	.501	.503	.505	.506	.507	.502	.502	.502	.502	.502
.400	.372	.415	.441	.459	.472	.483	.491	.498	.503	.507	.510	.513	.515	.516	.517	.517	.512	.512	.512	.512
.405	.378	.422	.448	.467	.481	.491	.500	.507	.512	.516	.520	.523	.525	.526	.527	.527	.522	.522	.522	.522
.410	.385	.429	.456	.475	.489	.500	.509	.516	.521	.526	.530	.532	.534	.536	.537	.537	.532	.532	.532	.532
.415	.391	.437	.464	.483	.498	.509	.518	.525	.531	.536	.539	.542	.544	.546	.547	.548	.542	.542	.542	.542
.420	.398	.444	.472	.492	.506	.518	.527	.534	.540	.545	.549	.552	.554	.556	.557	.558	.552	.552	.552	.552
.425	.405	.452	.480	.500	.515	.527	.536	.544	.550	.555	.559	.562	.564	.566	.567	.568	.569	.563	.563	.563
.430	.411	.459	.488	.508	.524	.536	.545	.553	.559	.564	.569	.572	.574	.576	.578	.579	.579	.573	.573	.573
.435	.418	.467	.496	.517	.532	.545	.555	.562	.559	.574	.578	.582	.585	.587	.588	.589	.590	.584	.584	.584
.440	.425	.474	.504	.525	.541	.554	.564	.572	.579	.584	.588	.592	.595	.597	.598	.599	.600	.594	.594	.594
.445	.431	.482	.512	.534	.550	.563	.573	.581	.588	.594	.598	.602	.605	.607	.609	.610	.611	.605	.605	.605
.450	.438	.489	.520	.542	.559	.572	.582	.591	.598	.604	.608	.612	.615	.618	.619	.621	.621	.622	.615	.615
.455	.445	.497	.529	.551	.568	.581	.592	.601	.608	.614	.616	.622	.625	.628	.630	.631	.632	.632	.626	.626
.460	.452	.505	.537	.560	.577	.590	.601	.610	.618	.624	.629	.633	.636	.638	.640	.642	.643	.643	.637	.637
.465	.459	.513	.545	.568	.586	.600	.611	.620	.627	.634	.639	.643	.646	.649	.651	.653	.654	.654	.648	.648
.470	.466	.520	.553	.577	.595	.609	.620	.630	.637	.644	.649	.653	.657	.660	.662	.663	.664	.665	.659	.659
.475	.473	.528	.562	.586	.604	.618	.630	.639	.647	.654	.659	.664	.667	.670	.672	.674	.675	.676	.676	.669
.480	.480	.536	.570	.594	.613	.628	.639	.649	.657	.664	.669	.674	.678	.681	.683	.685	.686	.687	.688	.681
.485	.487	.544	.579	.603	.622	.637	.649	.659	.667	.674	.680	.684	.688	.691	.694	.696	.697	.698	.699	.692
.490	.494	.552	.587	.612	.631	.646	.659	.669	.677	.684	.690	.695	.699	.702	.705	.707	.708	.709	.710	.703
.495	.501	.560	.595	.621	.640	.656	.668	.679	.587	.695	.701	.706	.710	.713	.716	.718	.719	.720	.721	.714
.500	.508	.568	.604	.630	.650	.665	.678	.689	.697	.705	.711	.716	.720	.724	.727	.729	.731	.732	.732	.733

Table 23 (continued)

h_a^*	$h_a^* - h_b^*$									
	.105	.110	.115	.120	.125	.130	.135	.140	.145	.150
.505	.737	.737	.737	.737	.737	.737	.737	.737	.737	.737
.510	.748	.748	.748	.748	.748	.748	.748	.748	.748	.748
.515	.760	.760	.760	.760	.760	.760	.760	.760	.760	.760
.520	.779	.771	.771	.771	.771	.771	.771	.771	.771	.771
.525	.791	.783	.783	.783	.783	.783	.783	.783	.783	.783
.530	.803	.794	.794	.794	.794	.794	.794	.794	.794	.794
.535	.814	.806	.806	.806	.806	.806	.806	.806	.806	.806
.540	.826	.818	.818	.818	.818	.818	.818	.818	.818	.818
.545	.838	.838	.830	.830	.830	.830	.830	.830	.830	.830
.550	.850	.850	.842	.842	.842	.842	.842	.842	.842	.842
.555	.862	.862	.854	.854	.854	.854	.854	.854	.854	.854
.560	.874	.875	.866	.866	.866	.866	.866	.866	.866	.866
.565	.886	.887	.878	.878	.878	.878	.878	.878	.878	.878
.570	.898	.899	.899	.890	.890	.890	.890	.890	.890	.890
.575	.910	.911	.911	.902	.902	.902	.902	.902	.902	.902
.580	.923	.923	.924	.914	.914	.914	.914	.914	.914	.914
.585	.935	.936	.936	.927	.927	.927	.927	.927	.927	.927
.590	.947	.948	.949	.939	.939	.939	.939	.939	.939	.939
.595	.960	.961	.961	.961	.952	.952	.952	.952	.952	.952
.600	.972	.973	.974	.974	.964	.964	.964	.964	.964	.964
.605	.984	.986	.986	.987	.977	.977	.977	.977	.977	.977
.610	.997	.998	.999	.999	.989	.989	.989	.989	.989	.989
.615	1.009	1.011	1.012	1.012	1.002	1.002	1.002	1.002	1.002	1.002
.620	1.022	1.023	1.024	1.025	1.025	1.015	1.015	1.015	1.015	1.015
.625	1.035	1.036	1.037	1.038	1.038	1.028	1.028	1.028	1.028	1.028
.630	1.047	1.049	1.050	1.051	1.051	1.040	1.040	1.040	1.040	1.040
.635	1.060	1.062	1.063	1.064	1.064	1.053	1.053	1.053	1.053	1.053
.640	1.073	1.074	1.076	1.077	1.077	1.066	1.046	1.066	1.066	1.066
.645	1.085	1.087	1.089	1.090	1.090	1.090	1.079	1.079	1.079	1.079
.650	1.098	1.100	1.102	1.103	1.103	1.104	1.092	1.092	1.092	1.092
.655	1.111	1.113	1.115	1.116	1.117	1.117	1.106	1.106	1.106	1.106
.660	1.124	1.126	1.128	1.129	1.130	1.130	1.119	1.119	1.119	1.119
.665	1.137	1.139	1.141	1.142	1.143	1.144	1.132	1.132	1.132	1.132
.670	1.150	1.152	1.154	1.155	1.156	1.157	1.157	1.145	1.145	1.145
.675	1.163	1.165	1.167	1.169	1.170	1.170	1.171	1.159	1.159	1.159
.680	1.176	1.178	1.180	1.182	1.183	1.184	1.184	1.172	1.172	1.172
.685	1.189	1.192	1.194	1.195	1.196	1.197	1.198	1.186	1.186	1.186
.690	1.202	1.205	1.207	1.209	1.210	1.211	1.211	1.199	1.199	1.199
.695	1.215	1.218	1.220	1.222	1.223	1.224	1.225	1.225	1.213	1.213
.700	1.229	1.231	1.234	1.236	1.237	1.238	1.239	1.239	1.226	1.226
.705	1.242	1.245	1.247	1.249	1.251	1.252	1.252	1.253	1.240	1.240
.710	1.255	1.258	1.261	1.263	1.264	1.265	1.266	1.267	1.254	1.254
.715	1.269	1.272	1.274	1.276	1.278	1.279	1.280	1.281	1.268	1.268
.720	1.282	1.285	1.288	1.290	1.292	1.293	1.294	1.295	1.295	1.281
.725	1.295	1.299	1.301	1.304	1.305	1.307	1.308	1.308	1.309	1.295
.730	1.309	1.312	1.315	1.317	1.319	1.321	1.322	1.322	1.323	1.309
.735	1.322	1.326	1.329	1.331	1.333	1.335	1.336	1.337	1.337	1.323
.740	1.336	1.339	1.342	1.345	1.347	1.349	1.350	1.351	1.351	1.337
.745	1.349	1.353	1.356	1.359	1.361	1.363	1.364	1.365	1.365	1.366
.750	1.363	1.367	1.370	1.373	1.375	1.377	1.378	1.379	1.380	1.380

Table 23 (continued)

h_a^*	$h_a^*-h_b^*$																			
	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100
.505	.515	.576	.613	.639	.659	.675	.688	.699	.708	.715	.721	.727	.731	.735	.738	.740	.742	.743	.744	.744
.510	.522	.584	.621	.648	.668	.685	.698	.709	.718	.726	.732	.737	.742	.746	.749	.751	.753	.754	.755	.756
.515	.529	.592	.630	.657	.678	.694	.708	.719	.728	.736	.743	.748	.753	.757	.760	.762	.764	.766	.767	.767
.520	.536	.600	.638	.666	.687	.704	.718	.729	.738	.746	.753	.759	.764	.768	.771	.774	.776	.777	.778	.779
.525	.543	.608	.647	.675	.696	.714	.728	.739	.749	.757	.764	.770	.775	.779	.782	.785	.787	.789	.790	.790
.530	.551	.616	.656	.684	.706	.723	.738	.749	.759	.768	.775	.781	.786	.790	.793	.796	.798	.800	.801	.802
.535	.558	.624	.664	.693	.715	.733	.748	.760	.770	.778	.785	.791	.797	.801	.805	.807	.810	.812	.813	.814
.540	.565	.632	.673	.703	.725	.743	.758	.770	.780	.789	.796	.802	.808	.812	.816	.817	.821	.823	.825	.826
.545	.573	.641	.682	.712	.735	.753	.768	.780	.791	.799	.807	.813	.819	.823	.827	.830	.833	.835	.836	.837
.550	.580	.649	.691	.721	.744	.763	.778	.791	.801	.810	.818	.824	.830	.835	.839	.842	.844	.847	.848	.849
.555	.587	.657	.700	.730	.754	.773	.788	.801	.812	.821	.829	.835	.841	.846	.850	.853	.856	.858	.860	.861
.560	.595	.665	.709	.740	.764	.783	.798	.811	.822	.832	.840	.847	.852	.857	.861	.865	.868	.870	.872	.873
.565	.602	.674	.718	.749	.773	.793	.809	.822	.833	.843	.851	.858	.864	.869	.873	.877	.880	.882	.884	.885
.570	.610	.682	.727	.758	.783	.803	.819	.832	.844	.854	.862	.869	.875	.880	.885	.888	.891	.894	.896	.897
.575	.617	.691	.736	.768	.793	.813	.829	.843	.855	.864	.873	.880	.886	.892	.896	.900	.903	.906	.908	.909
.580	.625	.699	.745	.777	.803	.823	.840	.853	.865	.875	.884	.891	.898	.903	.908	.912	.915	.918	.920	.921
.585	.632	.707	.754	.787	.812	.833	.850	.864	.876	.886	.895	.903	.909	.915	.920	.924	.927	.930	.932	.934
.590	.640	.716	.763	.796	.822	.843	.860	.875	.887	.897	.906	.914	.921	.926	.931	.935	.939	.942	.944	.946
.595	.647	.724	.772	.806	.832	.853	.871	.885	.898	.908	.918	.925	.932	.938	.943	.947	.951	.954	.956	.958
.600	.655	.733	.781	.815	.842	.864	.881	.896	.909	.920	.929	.937	.944	.950	.955	.959	.963	.966	.968	.970
.605	.662	.742	.790	.825	.852	.874	.892	.907	.920	.931	.940	.948	.955	.961	.967	.971	.975	.978	.981	.983
.610	.670	.750	.799	.835	.862	.884	.902	.918	.931	.942	.952	.960	.967	.973	.979	.983	.987	.990	.993	.995
.615	.678	.759	.809	.844	.872	.895	.913	.929	.942	.953	.963	.971	.979	.985	.991	.995	.999	1.003	1.005	1.008
.620	.686	.767	.818	.854	.882	.905	.924	.939	.953	.964	.974	.983	.990	.997	1.002	1.007	1.011	1.015	1.018	1.020
.625	.693	.776	.827	.864	.892	.915	.934	.950	.964	.976	.986	.995	1.002	1.009	1.014	1.019	1.024	1.027	1.030	1.033
.630	.701	.785	.836	.874	.903	.926	.945	.961	.975	.987	.997	1.006	1.014	1.021	1.027	1.032	1.036	1.040	1.043	1.045
.635	.709	.794	.846	.884	.913	.936	.956	.972	.986	.998	1.009	1.018	1.026	1.03	1.039	1.044	1.046	1.052	1.055	1.058
.640	.717	.802	.855	.893	.923	.947	.967	.983	.998	1.010	1.020	1.030	1.038	1.045	1.051	1.056	1.061	1.064	1.068	1.070
.645	.724	.811	.865	.903	.933	.957	.977	.994	1.009	1.021	1.032	1.041	1.050	1.05[illegible]	1.063	1.068	1.073	1.077	1.080	1.083
.650	.732	.820	.874	.913	.943	.968	.988	1.005	1.020	1.033	1.044	1.053	1.062	1.06[illegible]	1.075	1.081	1.085	1.089	1.093	1.096
.655	.740	.829	.884	.923	.954	.979	.999	1.017	1.031	1.044	1.055	1.065	1.074	1.081	1.087	1.093	1.098	1.102	1.106	1.109
.660	.748	.838	.893	.933	.964	.989	1.010	1.028	1.043	1.056	1.067	1.077	1.086	1.093	1.100	1.105	1.110	1.115	1.118	1.121
.665	.756	.847	.903	.943	.974	1.000	1.021	1.039	1.054	1.067	1.079	1.089	1.098	1.105	1.112	1.118	1.123	1.127	1.131	1.134
.670	.764	.856	.912	.953	.985	1.011	1.032	1.050	1.066	1.079	1.091	1.101	1.119	1.118	1.124	1.130	1.136	1.140	1.144	1.147
.675	.772	.864	.922	.963	.995	1.021	1.043	1.061	1.077	1.091	1.102	1.113	1.122	1.130	1.137	1.143	1.148	1.153	1.157	1.160
.680	.780	.873	.931	.973	1.006	1.032	1.054	1.073	1.089	1.102	1.114	1.125	1.134	1.142	1.149	1.155	1.161	1.166	1.170	1.173
.685	.789	.882	.941	.933	1.016	1.043	1.065	1.094	1.100	1.114	1.126	1.137	1.146	1.15[illegible]	1.162	1.168	1.174	1.178	1.183	1.186
.690	.796	.891	.951	.993	1.027	1.054	1.076	1.095	1.112	1.126	1.138	1.149	1.159	1.167	1.174	1.181	1.186	1.191	1.195	1.199
.695	.804	.901	.960	1.004	1.037	1.065	1.087	1.107	1.123	1.138	1.150	1.161	1.171	1.179	1.187	1.193	1.199	1.204	1.208	1.212
.700	.812	.910	.970	1.014	1.048	1.076	1.099	1.118	1.135	1.149	1.162	1.173	1.183	1.192	1.199	1.206	1.212	1.217	1.222	1.225
.705	.820	.919	.980	1.024	1.058	1.086	1.110	1.130	1.147	1.161	1.174	1.186	1.195	1.204	1.212	1.219	1.225	1.230	1.235	1.239
.710	.828	.928	.990	1.034	1.069	1.097	1.121	1.141	1.158	1.173	1.186	1.198	1.208	1.217	1.225	1.232	1.238	1.243	1.248	1.252
.715	.836	.937	.999	1.045	1.080	1.108	1.132	1.153	1.170	1.185	1.198	1.210	1.220	1.229	1.237	1.244	1.251	1.256	1.261	1.265
.720	.845	.946	1.009	1.055	1.090	1.119	1.144	1.164	1.182	1.197	1.211	1.222	1.233	1.242	1.250	1.257	1.264	1.269	1.274	1.278
.725	.853	.955	1.019	1.065	1.101	1.130	1.155	1.176	1.194	1.209	1.223	1.235	1.245	1.255	1.263	1.270	1.277	1.282	1.287	1.292
.730	.861	.965	1.029	1.076	1.112	1.142	1.166	1.187	1.205	1.221	1.235	1.247	1.258	1.267	1.276	1.283	1.290	1.295	1.301	1.305
.735	.869	.974	1.039	1.086	1.123	1.153	1.178	1.199	1.217	1.233	1.247	1.259	1.270	1.280	1.289	1.296	1.303	1.309	1.314	1.318
.740	.877	.983	1.049	1.096	1.134	1.164	1.189	1.211	1.229	1.245	1.259	1.272	1.283	1.293	1.301	1.309	1.316	1.322	1.327	1.332
.745	.886	.993	1.059	1.107	1.144	1.175	1.201	1.222	1.241	1.257	1.272	1.284	1.296	1.306	1.314	1.322	1.329	1.335	1.341	1.345
.750	.894	1.002	1.069	1.117	1.155	1.186	1.212	1.234	1.253	1.270	1.284	1.297	1.308	1.318	1.327	1.335	1.342	1.348	1.354	1.359