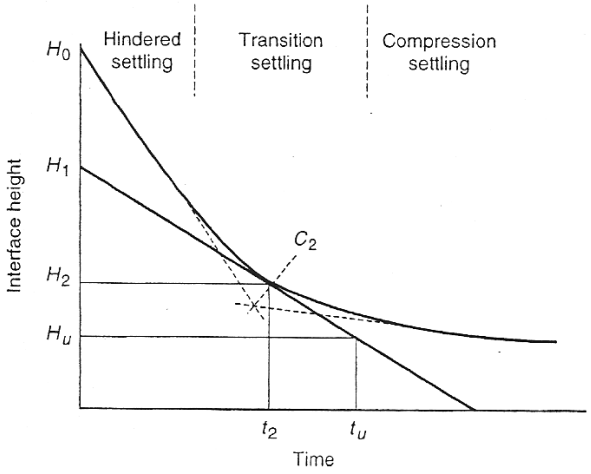

Figure 5–29
Graphical analysis of hindered (zone) interface settling curves.

process where stray, light fluffy floc particles may be present, it is conceivable that the free flocculent settling velocity of these particles could control the design.

The area requirement for thickening is determined according to a method developed by Talmadge and Fitch (1955). A column of height H_0 is filled with a suspension of solids of uniform concentration C_0. The position of the interface as time elapses and the suspension settles is given on Fig. 5–29. The rate at which the interface subsides is then equal to the slope of the curve at that point in time. According to the procedure, the area required for thickening is given by Eq. (5–41):

$$A = \frac{Qt_u}{H_0} \tag{5–41}$$

where A = area required for sludge thickening, L^2 (m^2)
Q = flowrate into tank, L^3T^{-1} (m^3/s)
H_0 = initial height of interface in column, L (m)
t_u = time to reach desired underflow concentration, T (s)

The critical concentration controlling the solids handling capability of the tank occurs at a height H_2 where the concentration is C_2. This point is determined by extending the tangents to the hindered settling and compression regions of the subsidence curve to the point of intersection and bisecting the angle thus formed, as shown on Fig. 5–29. The time t_u can be determined as follows:

1. Construct a horizontal line at the depth H_u that corresponds to the depth at which the solids are at the desired underflow concentration C_u. The value of H_u is determined using the following expression:

$$H_u = \frac{C_0 H_0}{C_u} \tag{5–42}$$

2. Construct a tangent to the settling curve at the point indicated by C_2.
3. Construct a vertical line from the point of intersection of the two lines drawn in steps 1 and 2 to the time axis to determine the value of t_u.