or extensive damage to a major structure, values closer to 2.0 should be used. Equation (12-5) is a substantial simplification used to estimate overturning resistance. On-site overturning is accompanied by passive resistances at (1) the top region of the base slab at the toe, (2) a zone along the heel at *cb* that tends to lift a soil column along the virtual back face line *ab*, and (3) the slip of the Rankine wedge on both sides of *ab*. Few walls have ever overturned—failure is usually by sliding or by shearoff of the stem.

The $\sum(W_c + W_s)$ and location $\bar{x}$ are best determined by dividing the wall and soil over the heel into rectangles and triangles so the areas (and masses) can be easily computed and the centroidal locations identified. Then it becomes a simple matter to obtain

$$(W_c + W_s + P'_{av})\bar{x} = P_{ah}\bar{y} - P_p\bar{y}_p$$

$$\bar{x} = \frac{M_o - P_p\bar{y}_p}{W_c + W_s + P'_{av}}$$

If there is no passive toe resistance (and/or P'_{av} is ignored) the preceding equations are somewhat simplified.

12-6.2 Rotational Stability

In Fig. 12-13 we see that in certain cases a wall can rotate as shown—usually when there are lower strata that are of poorer quality than the base soil. This failure is similar to a slope stability analysis using trial circles. These computations can be done by hand. Where several circles (but all passing through the heel point) are tried for a minimum stability number N_r, though, the busywork becomes prohibitive; and a computer program (see author's B-22) for slope stability analysis—adjusted for this type of problem as an option—should be used. This procedure is illustrated later in Example 12-4.

12-6.3 General Comments on Wall Stability

It is common—particularly for low walls—to use the Rankine earth-pressure coefficients K_a and K_p (or Table 11-5), because these are somewhat conservative. If the wall angle α of Fig. 11-4 is greater than 90°, consider using the Coulomb equations with $\delta \geq 0$.

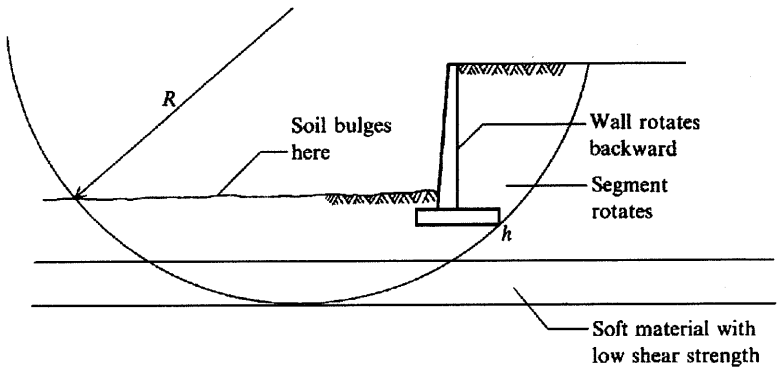

Figure 12-13 Wall-soil shear failure may be analyzed by the Swedish-circle method. A "shallow" failure occurs when base soil fails. A "deep" failure occurs if the poor soil stratum is underlying a better soil, as in the figure.