

Compute resultant passive force by trial failure wedge analysis. (See Figure 9). When wall friction is included, compute pressures from a failing mass bounded by a circular arc and straight plane. Determine location of passive resultant by summing moments about toe of wall of all forces on that portion of the failing mass above the circular arc. Depending on complexity of cross section, distribute passive pressures to conform to location of resultant, or analyze trial failure surfaces at intermediate heights in the passive zone. When wall friction is neglected, the trial failure surface is a straight plane. See Figure 2.

(1) Simple Cross Section. For a simple cross section behind a wall, analyze the trial failure plane extending upward from the lowest point of the active zone on the wall. Determine the location of the active resultant by summing moments of all forces on the wedge about toe of wedge. Distribute active pressures to conform to the location of resultant.

(2) Complicated Cross Section. For complicated cross sections, analyze trial wedges at intermediate heights above the base of the active zone to determine pressure distribution in more detail. Force acting on an increment of wall height equals difference in resultant forces for wedges taken from the top and bottom of that increment.

3. EFFECT OF GROUNDWATER CONDITIONS. Include in pressure computations the effect of the greatest unbalanced water head anticipated to act across the wall.

a. General Conditions. For a major structure, analyze seepage and drainage effect by flow net procedures. Uplift pressures influencing wall forces are those acting on failure surface of active or passive wedge. Resultant uplift force on failure surface determined from flow net is applied in force diagram of the failure wedge. See vector U, the resultant water force, in Figures 7 and 9.

b. Static Differential Head. Compute water pressures on walls as shown in top panel of Figure 10.

c. Rainfall on Drained Walls. For cohesionless materials, sustained rainfall increases lateral force on wall 20 to 40 percent over dry backfill, depending on backfill friction angle. The center panel of Figure 10 (Reference 3, Contribution to the Analysis of Seepage Effects in Backfills, by Gray) shows flow net set up by rainfall behind a wall with vertical drain. This panel gives the magnitude of resultant uplift force on failure wedge for various inclinations of failure plane to be used in analysis of the active wedge.

d. Seepage Beneath Wall. See bottom panel of Figure 10 (Reference 4, The Effect of Seepage on the Stability of Sea Walls, by Richart and Schmertmann) for correction to be applied to active and passive pressures in cohesionless material for steady seepage beneath a wall.

4. SURCHARGE LOADING. For the effects of surcharge loading, see Figures 7 and 9.

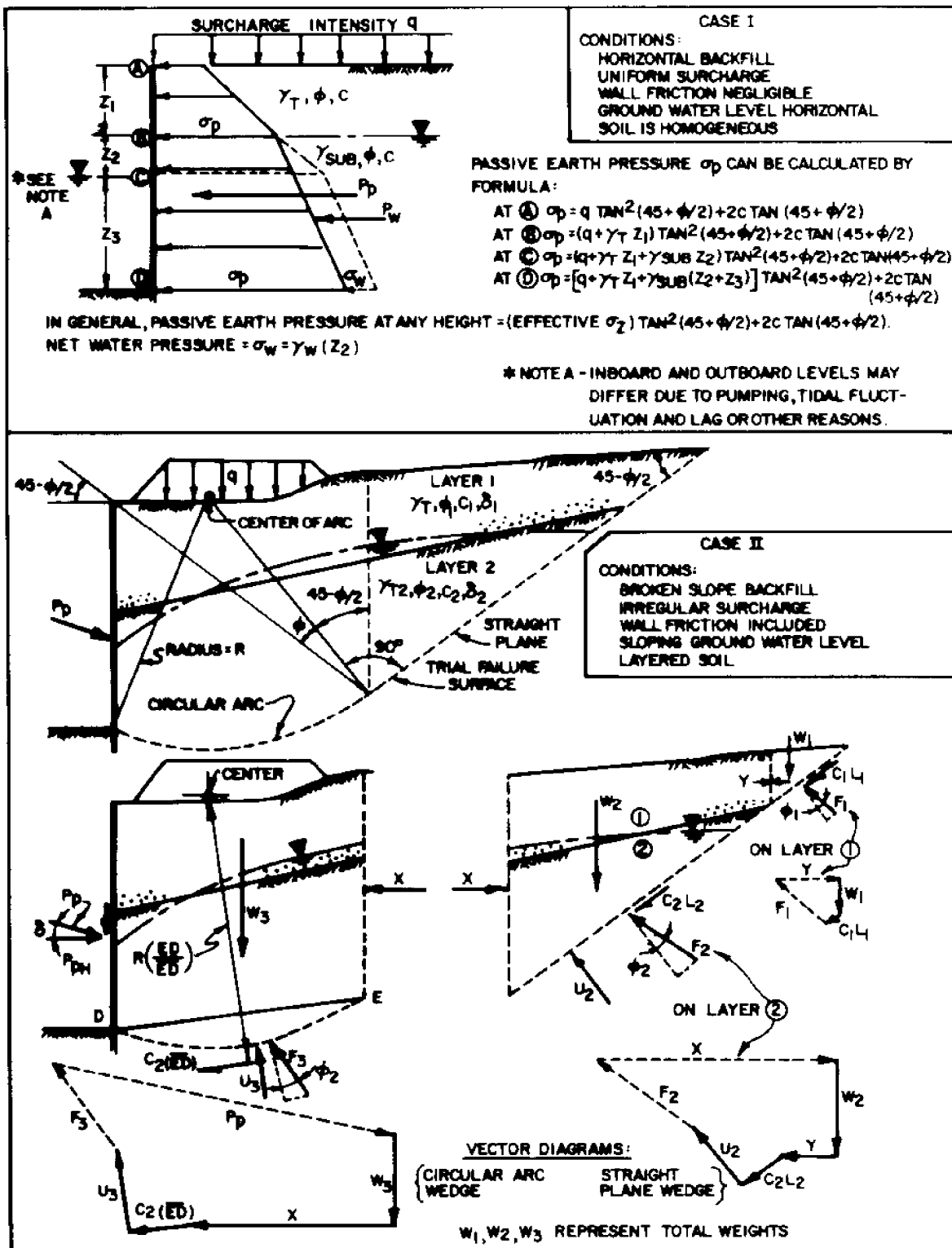


FIGURE 9
Computation of General Passive Pressures

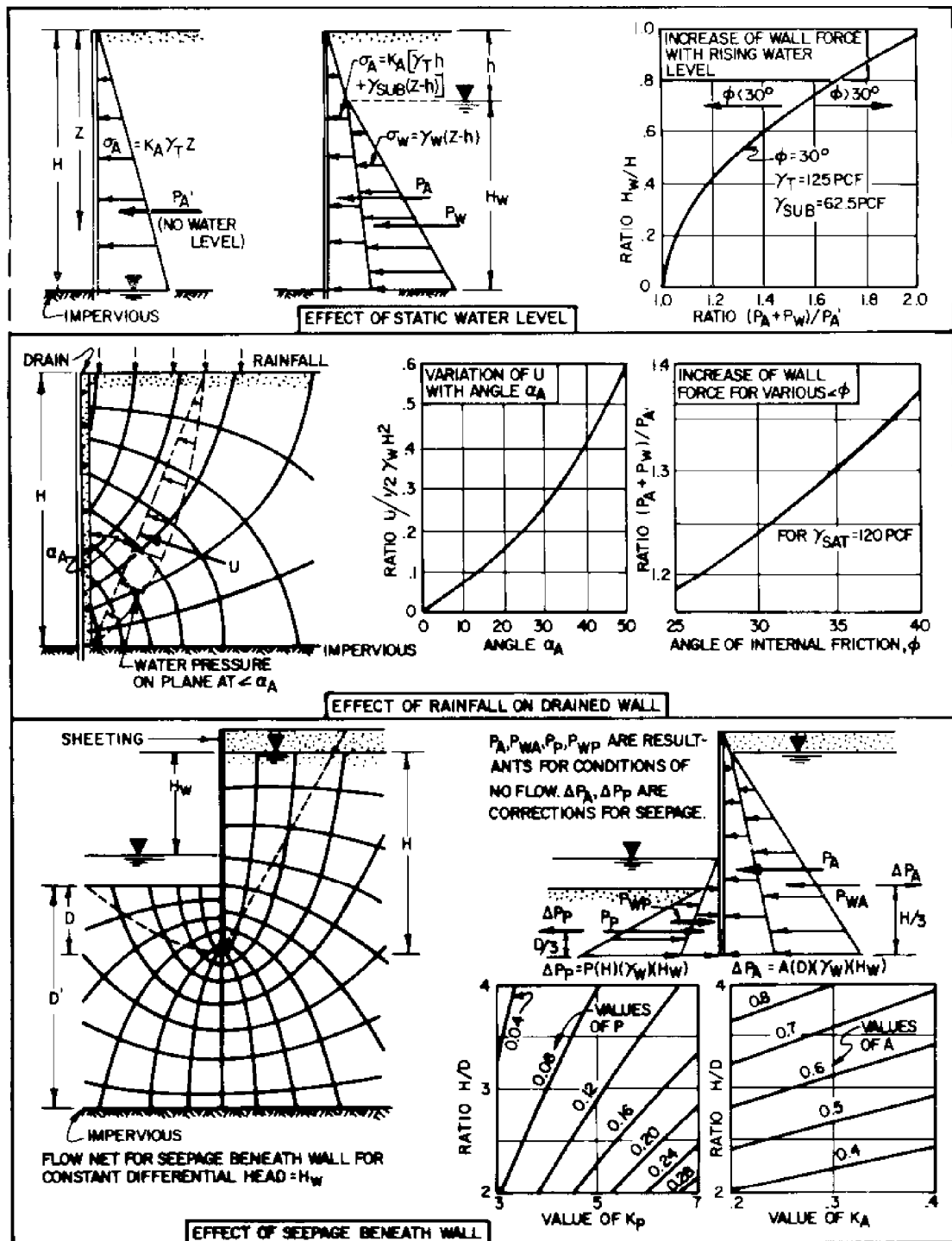


FIGURE 10
 Effect of Groundwater Conditions on Wall Pressures