

20.6. COUNTERFORT RETAINING WALLS

For counterfort retaining walls, the general proportions of the stem and the base slab are almost the

same as that in the cantilever walls. The counterforts are about 0.3 m thick and have the centre-to-centre spacing of $0.3 H$ to $0.7 H$.

The analysis is also similar to that of a cantilever retaining wall. The pressure p_{\max} and p_{\min} are determined, as in the case of cantilever walls.

The basic difference between the counterfort retaining wall and the cantilever retaining wall is in the determination of the bending moment and shear forces.

- (1) In cantilever retaining walls, the stem acts as a vertical cantilever fixed at base whereas in the counterfort retaining walls, it acts, as a continuous slab supported between the counterforts. The slab has positive moments in the middle and the negative moments at the supports. The reinforcement is provided in the horizontal direction on the front side of the stem in the middle and on the rear side at the supports. In cantilever walls, the main reinforcement is in the vertical direction at the rear face.
- (2) In cantilever walls, the toe slab and the heel slab both act as cantilevers subjected to the upward pressure. The reinforcement is provided at the bottom face.

In counterfort retaining walls, although the toe slab acts as a cantilever, the heel slab acts as a continuous slab supported on the counterforts. The main reinforcement is at the top face in the middle portion and at the bottom face near the supports.

- (3) In counterfort retaining walls, the counterforts are designed as cantilever of varying section and fixed at the base. The main reinforcement is provided at the back face of the counterfort.

In addition, the vertical and horizontal ties are provided in the counterforts to join the base and the stem to the counterforts.

The structural design of the counterfort and cantilever retaining walls is outside the scope of this text.