

# Retaining Walls

By Carson Dunlop

**ANALYZING RETAINING WALLS** is a tricky business. With most retaining walls, the most important components are not visible. Also, determining the rate of movement of a retaining wall is impossible from a one-time visit. Monitoring is normally required. In some cases, the angle of the wall gives a clue to the performance. Most walls are built with a slight lean to the higher side. If the wall is leaning away from the high side, it probably has moved. Once retaining walls begin to move, they rarely stop, although movement may be slow and seasonal.

## Cantilevered walls

Poured concrete retaining walls are typically a cantilever design. Looking at a cross-section through the wall, the wall would look like an inverted "T." The bottom portion of the inverted "T" is buried beneath the soil. The portion of the "T" under the high side of the wall uses the weight of the soil to resist movement of the wall. The portion of the "T" protruding under the soil on the low side of the wall keeps it from tilting forward. Steel reinforcing bars keep the "T" from breaking at the joint. Cantilevered retaining walls extend below the frost line in cold climates to prevent heaving.

## Pile walls

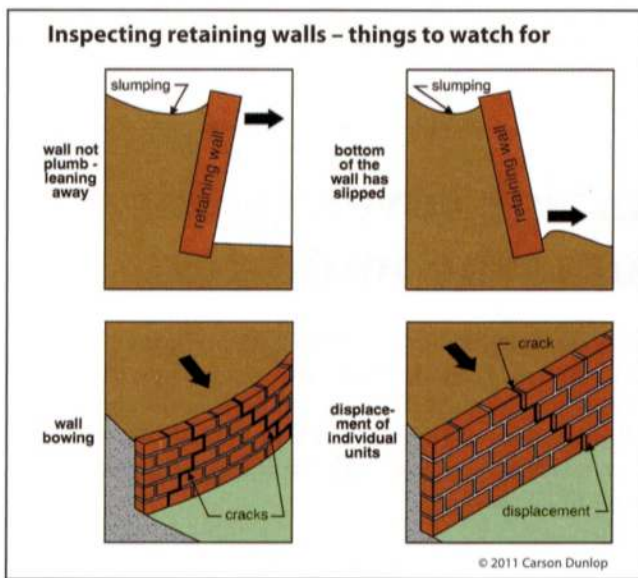
Pile walls have vertical members driven into the soil. They resist rotational movement caused by the soil on the high side of the wall. Piles can be wood or steel.

## Wood walls

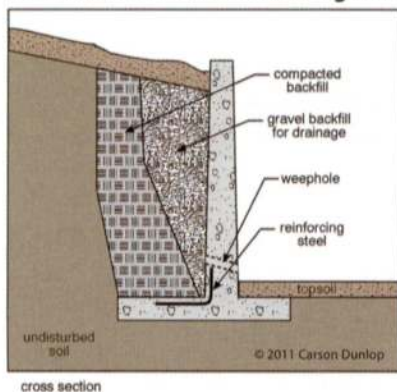
Wood retaining walls are common. Horizontal members are tied back into the soil with anchors (tie-backs) — wood members heading back into the soil. Tie-backs are staggered through the wall system to provide resistance to movement. In some cases, "dead men" are attached to the ends of the anchors to help secure the anchors. These horizontal members run parallel to the retaining wall itself. These walls do not extend below the frost line.

## Prefab walls

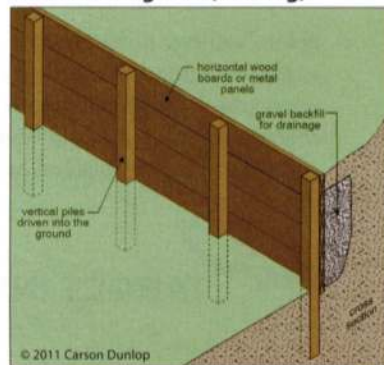
Precast concrete wall systems with interlocking sections also use tie-backs and dead men.



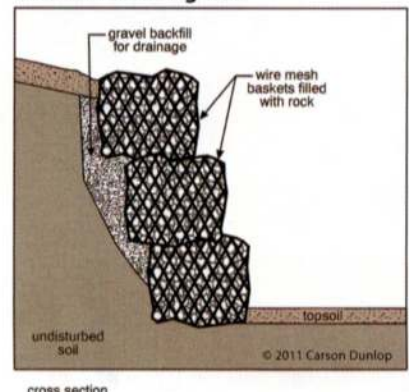
## Cantilevered concrete retaining wall



## Pile retaining wall (shoring)



## Gabion retaining wall



## Gabions

Gabions are also used as retaining wall systems. A gabion is a rectangular wire mesh basket filled with rock. They are commonly seen along river banks to prevent erosion.

## Common problems with retaining walls

### Movement/cracked/rot

The single biggest enemy of retaining walls is water. Saturated soil puts pressure on retaining walls. If saturated soil freezes, expansion forces can be significant. Walls may move as a single unit, leaning away from the hill, or may crack and break apart. Water also promotes rot of wooden retaining wall systems.

## Poor drainage

Well-built retaining walls have a layer of gravel behind the wall and weep/drainage holes at the bottom. We don't want water trapped behind the wall. Open-wall systems with wood timbers, for example, have enough natural openings that drainage holes are not needed.

Minor repairs to retaining walls can be done by the homeowner. Patching cracked concrete retaining walls allows for monitoring of future movement. Major retaining wall repairs or modifications should be left to an expert. Retaining walls are often poorly built and can be very expensive to repair or replace. ■

From "The Home Reference Book, the Encyclopedia of Homes" by Carson Dunlop. © Carson Dunlop. Reprinted with permission.

