

Joint Spacing Requirements

The spacing of contraction joints is by code a function of the height of the walls (see below references on background). The code has an upper limit on the spacing for contraction joints. We have shown the spacing at a reasonable limit based on these two code criteria. We assume the construction joints will be placed at the maximum spacing of the contraction joints and replace the contraction joint at that location since these are water retaining structures, they will require a water stop at the joints which is not typical of the standard contraction joint. So, we place a construction type joint in place of the contraction joint due to the need for water retainage and crack control combined.

As far as contraction joints go this is what we are trying to prevent in the structure:

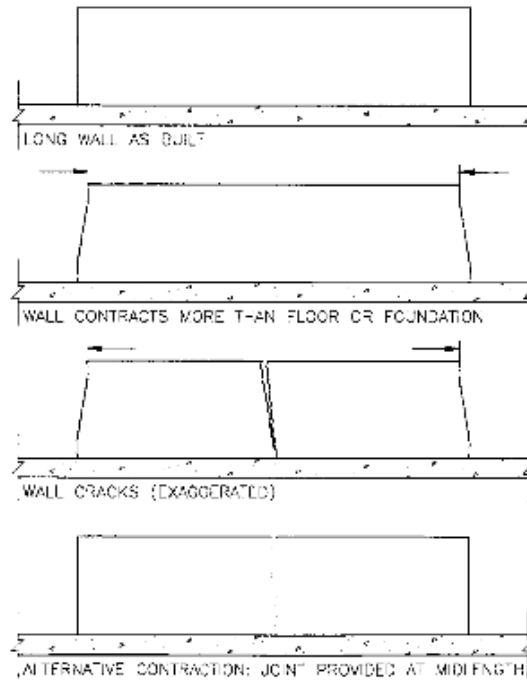


Fig. 8.1—Cracking of a long wall due to contraction.

JOINTS IN CONCRETE CONSTRUCTION (ACI 224.3R-95)

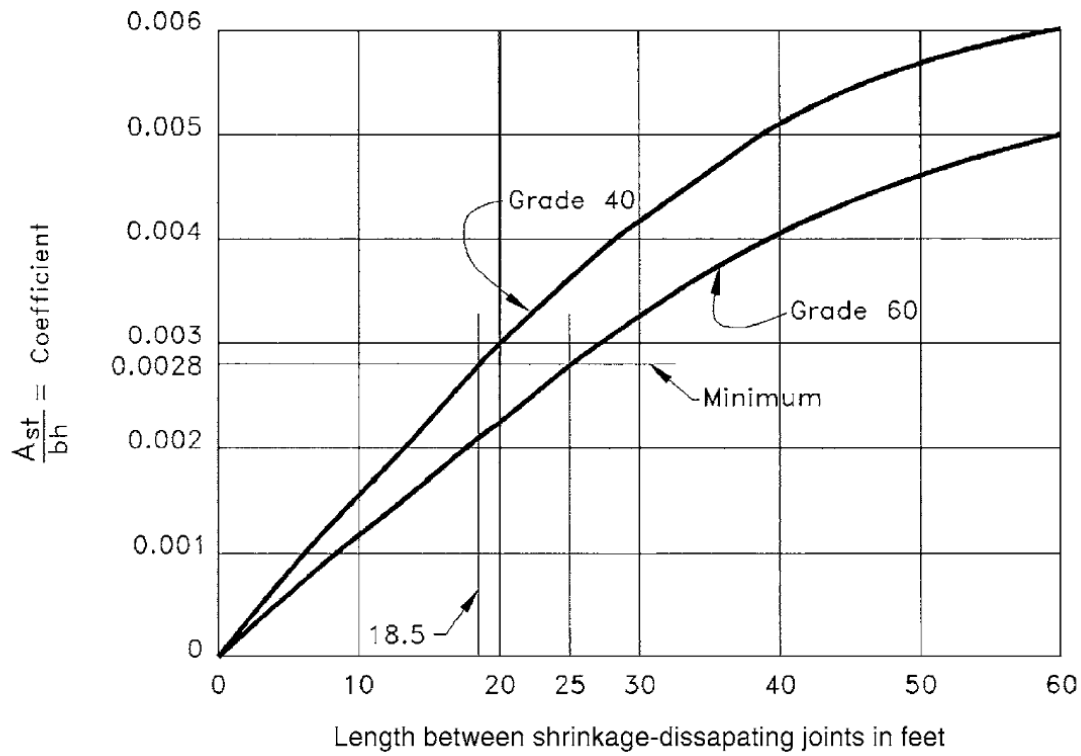


Fig. 9.1—Shrinkage and temperature reinforcement for environmental engineering concrete structures (ACI 350R).

To prevent this from happening Section 8.2 of ACI 224—01 recommends that contraction joints be spaced at no more than H (height of the wall) distance apart for walls over 12 feet tall and $3H$ distance apart for walls under 8 feet tall.

ACI 224-3R has a slightly different opinion:

A wall restrained at its base by being placed atop previous concrete construction will tend to have full height cracks spaced at 1-1/2 to 2 times the wall height. Larger crack spacings are found with less base restraint. Contraction joints may be used to locate the full-height wall cracks.

There are no exact rules for locating contraction joints. Each structure should be examined individually to determine where the contraction joints should be placed. The following guidelines are suggested:

- For walls 9- to 12-ft (3- to 4-m) high with openings, contraction joint spacing should be 15 to 20 ft (5 to 6.5 m). Walls without openings or taller walls with openings may have joints up to 25 ft (8.3 m) apart. For shorter walls, the spacing of contraction joints should be reduced.
- For walls 9- to 12-ft (3- to 4-m) high:
- Locate joints within 10 to 15 ft (3 to 5 m) from wall corners if possible. Placing joints closer than 10 ft (3 m) may result in excessive deformation in the joint.
- Locate joints at the edge of openings, changes in wall thickness, or any other obvious locations for a potential vertical crack.