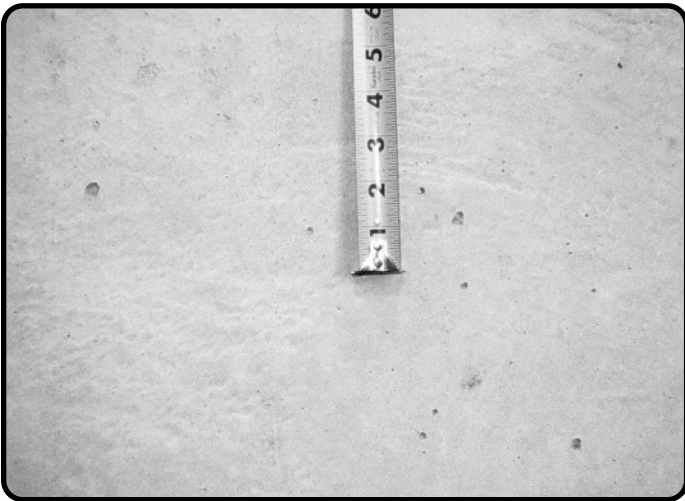


wall defects

Air Pockets / Bugholes

■ **Problem.** Small voids or pits, which often appear in vertical or sloping surfaces. They result from pockets of air or water trapped against the forms during placing and are generally less than 1/2" in diameter. The main objection is appearance. Bugholes do not lead to deterioration or harm the structural qualities of the concrete.



■ **Causes.** Main cause is placement methods. Air is entrapped within the plastic concrete during mixing and placing. Large voids quickly exit the surface. Medium size voids exit during consolidation. Smaller voids are not worked out as easy, tend to stay within the concrete. External vibration will often cause bubbles to collect on the form face. Some form release agents also cause air to collect on the surface.

■ **Solution/Prevention.** It is extremely difficult to fully eliminate bugholes. Thorough consolidation efforts with smaller lifts will minimize the size and number of voids. Do not over vibrate. Minimize the fall of concrete during placement, by whatever means available. Determine which form release agent results in best appearance and ensure it is applied at the recommended rate. Work with your ready mix producer to optimize concrete mix for best appearance. Lower sand to total aggregate ratios tend to lead to less bugholes. Self-consolidating concrete may be a solution.

Honeycomb / Rock Pockets

■ **Problem.** Both the most common defect and the easiest to prevent. It consists of exposed pockets of coarse aggregate not covered by mortar. May also be evident, to a lesser degree, by "shadowing" (mortar loss) along form joints.



■ **Causes.** Most often caused by improper consolidation, or leaky forms which allows mortar to escape. May also be caused by a stiff, unworkable mix, which cannot be properly consolidated. Coarse aggregate may also separate from mix when dropped from bucket or pump. This separated stone is then pushed into a corner or collects along some obstruction causing a honeycomb.

■ **Solution/Prevention.** Attention to detail! Before placement, check tightness of forms at joints and penetrations. Do not exceed 4" slump mix unless using mid-range or high-range water reducer. Deposit concrete as vertically and uniformly as possible. Use a tremie if necessary. Place smaller lifts and thoroughly vibrate each lift. Adjust mix to include intermediate aggregate. Consider use of self consolidating concrete.

wall defects

Sandstreaking

■ **Problem.** A vertical streak of exposed fine aggregate on a formed concrete surface, characterized by irregular lines, usually at the top of a lift.

■ **Causes.** Too much water and/or improper aggregate gradation are the causes of sand streaking. These lines develop when excess water moves through the mix towards the surface (bleeds). High-range water reducers can aggravate an unstable mix, causing additional bleed.

■ **Solution/Prevention.** Avoid excessive amounts of water in the mix. Air-entrained concrete, containing well-graded sand and the proper amount of water will not produce sand streaking.



References

U.S. Army Corps of Engineers, "Concrete Construction Inspection" September 1984
NRMCA, "Concrete in Practice"