CHAPTER

3

Durability and Protection

OUTLINE

Special Exposure Conditions 19 Corrosion Protection 21

The durability of concrete must be assured through proper handling and protection. Common sense and experience play a role in this phase of concrete construction, but, code requirements mandate minimum standards and procedures, which will be discussed in this chapter.

To comply with your local code requirements, consult the tables provided in your local code book or the American Concrete Institute (ACI) guide to concrete installations and repairs. I could fill this chapter with sample tables, but they would only be examples. You need to work in the real world, so consult your local code materials to determine the finer points of maintaining the durability of concrete and protecting it.

Tip

Normalweight and lightweight concrete exposed to freezing and thawing or deicing chemicals must be air-entrained. Seek specifications from your local code for exact amounts of air content required.

SPECIAL EXPOSURE CONDITIONS

Special exposure conditions exist and are allowed for in code requirements. Four such special conditions include the following:

• Concrete meant to have low permeability when it is in contact with water
• Concrete that may freeze or thaw in moist conditions
• Concrete exposed to deicing chemicals
• Corrosion protection of reinforcement in concrete exposed to chlorides from deicing chemicals, salt, salt water, brackish water, seawater, or spray from any of these sources
When dealing with special conditions, use a code-provided table to determine what is needed; for example, if you need to know what the maximum water–cementitious material ratio by weight of normalweight concrete is used. You will also need to establish the pounds per square inch (PSI) allowable for these conditions.

**FIGURE 3.1** Inspecting a fresh concrete pour.

**Tip**

Concrete that is to be exposed to sulfate-containing solutions must be made with a type of cement that provides sulfate resistance.
Corrosion protection is needed for the reinforcement materials used in concrete structures. This generally means the maximum water-soluble chloride ion concentrations in hardened concrete from 28 to 42 days old contributed from the ingredients including water, aggregates, cementitious materials, and admixtures that meet code requirements.

Concrete with reinforcement exposed to chlorides from deicing, chemicals, salt, salt water, brackish water, seawater, or spray from such sources must be protected.