by the project specs. Face shell bedding of hollow units also governs except in piers, columns, pilasters, starting courses at the foundation, and at grouted cells or cavities, where cross webs must also be mortared. If there are other locations that require full mortar bedding, these should be identified in the project specification. Variations from the standard full bedding requirements for solid units should also be noted, such as beveling to minimize mortar droppings in the cavity. The location of embedded sleeves for pipes and conduits should be shown on the drawings, and only the requirements for their installation covered in the specifications. Requirements for the size and spacing of both rigid and adjustable wall ties, if different from those in the specification, should be given. The location and types of movement of joints are required to be indicated on the drawings.

The construction tolerances listed in the MSJC Specifications are structural tolerances intended to limit the eccentricity of applied loads. For veneer and other exposed masonry applications, tighter tolerances for aesthetic considerations may be included in the project specifications.

***Cleaning.*** If acid or other caustic cleaning materials are permitted, the optional checklist requires that the project specification cover methods of neutralization following cleaning.

There are many items not mentioned in the MSJC Specification that still must be covered in the project spec. Among these are delivery, storage, handling, and protection of materials; placement requirements for flashing and weep holes; and protection of walls during construction. Coordinate your office master specs with the requirements of the MSJC to make sure that all Specification material and workmanship requirements are covered.

## 18.4 FIELD OBSERVATION AND INSPECTION

Field observation and inspection have become increasingly important with the explosion of construction litigation. The intent of these site visits is to ensure that the finished work complies with the contract documents, and that the workmanship meets the required standards.

Good workmanship affects masonry performance, and is essential to high-quality construction. Masonry construction requires skilled craftsmen working cooperatively with the architect and engineer to execute the design. The goal of quality workmanship is common to all concerned parties for various reasons of aesthetics, performance, and liability.

Responsibility for construction in design-bid-build projects rests with the contractor. The A/E is not a party to the construction contract, but acts solely as the owner's representative in the field. As part of the team, the architect can assist the contractor and offer expertise in solving or avoiding potential problems. The architect must also act as interpreter of design intent, and safeguard the project quality by assuring proper execution of the work according to the requirements of the contract documents.

Independent inspection agencies or testing laboratories serve a different function. If required by the specifications, it is their responsibility to test various materials and assemblies to verify compliance with reference standards, design strengths, and performance criteria. Field observation and inspection procedures are necessary to assure the successful translation of the design, drawings, and specifications into a completed structure that functions as intended. An independent inspector's authority does not extend to supervision of the work, or to revision of details or methods without the written approval of the architect, owner, and contractor.

The following is intended as a comprehensive guide to field observation of masonry construction. It is not intended for structural inspection of load-bearing masonry. For a discussion of structural inspection requirements, refer to Chapters 12 and 17.

### 18.4.1 Materials

An inspector must be familiar with the project specifications and must verify compliance of materials at the job site with the written requirements. Manufacturers must supply test certificates showing that the material properties meet or exceed the referenced standards as to ingredients, strength, dimensional tolerances, durability, and so on.

*Unit masonry* may be visually inspected for color, texture, and size and compared to approved samples. Units delivered to the job site should be inspected for physical damage, and storage/protection provisions checked. Stone, brick, or concrete masonry that has become soiled, cracked, chipped, or broken in transit should be rejected. If the manufacturer does not supply test certificates, random samples should be selected and sent to the testing agency for laboratory verification of minimum standards. The inspector should also check the moisture condition of clay masonry at the time of laying since initial rates of absorption affect the bond between unit and mortar, and the strength of the mortar itself. Visual inspection of a broken unit can indicate whether field tests of absorption rates should be performed (refer to Chapter 15).

*Mortar and grout* ingredients should be checked on delivery for damage or contamination, and to assure compliance with the specified requirements. Packaged materials should be sealed with the manufacturer's identifying labels legible and intact. Cementitious ingredients that show signs of water absorption should be rejected. If material test certificates are required, check compliance with the specifications.

Acceptable mixing and batching procedures should be established at the preconstruction conference to assure quality and consistency throughout the job. If field testing of mortar prisms is required, preconstruction laboratory samples should be prepared and tested sufficiently in advance of construction to serve as a benchmark. Retempering time should be monitored to preclude the use of mortar or grout that has begun to set.

*Accessories* must also be checked for design compliance. The inspector must assure use of proper anchoring devices, ties, inserts, flasing, weep and drainage accessories, and reinforcement. Steel shelf angles and lintels should carry certification of yield strength and be properly bundled and identified for location within the structure.

### 18.4.2 Construction

Foundations, beams, floors, and other structural elements that will support the masonry should be checked for completion to proper line and grade before the work begins. Adequate structural support must be assured, and areas cleaned of dirt, grease, oil, laitance, or other materials that might impair bond of the mortar or grout. Overall dimensions and layout must be verified against the drawings and field adjustments made to correct discrepancies. Steel reinforcing dowels must be checked for proper location in relation to cores, joints, or cavities. The inspector should also keep a log of weather conditions affecting the progress or performance of the work. Inspectors should