submittal information that might be included in a masonry specification. The list will vary as appropriate to the project, the type of construction, and the wishes of the architect or engineer.

17.6.2 Submittal Procedures

Submittals must be reviewed and approved before construction can begin. Material and equipment cannot be ordered or fabricated until specified submittals are approved by both the contractor and the A/E. The general contractor is responsible for submitting required information to the A/E for review and approval. Many of the required submittals may actually be prepared by subcontractors, suppliers, fabricators, or manufacturers. The general contractor must check all submittals, stamp and sign them, assemble them with transmittal forms, and submit them to the A/E for review. Submittals that are not approved must be resubmitted with the required changes, reviewed, and approved before construction can begin. Both the A/E and the contractor should maintain a submittal log to track the progress of all project submittals. A copy of all approved submittals should be kept with the record documents at the job site until the project is complete. Both the A/E and the contractor usually retain copies of approved submittals as part of their permanent project records.

In masonry construction, it is the responsibility of the masonry subcontractor to prepare or assemble the required masonry submittals and turn them over to the general contractor. Manufacturer's literature on masonry accessories, product certifications on masonry units, or metal flashing details, may sometimes be prepared by the supplier, manufacturer, or fabricator, respectively, for submittal by the masonry subcontractor to the general contractor.

17.6.3 Shop Drawings

Shop drawings are prepared to illustrate some details of the construction. They are typically prepared by a manufacturer or fabricator for use in producing items, and as an aid to the contractor in coordinating the work with adjacent construction.

For example, structural engineering drawings typically show reinforcing steel only diagrammatically in plans and sections. The shop drawings show each size, dimension, and type of rebar and its configuration and splice details, as well as a key to its plan location and the quantity required. These drawings are used then in the steel fabricator's shop to prepare the individual elements needed at the project site. The engineer reviews the shop drawings for conformance to design and contract document requirements, but does not generally check the quantities. Projects under the jurisdiction of the MSJC Code are required to have shop drawings for structural reinforcing steel.

The A/E may also wish to have shop drawings submitted to illustrate metal flashing details such as end dams, corners, lap seals, and abutments with other construction. These drawings can then be used to fabricate the required flashing sections in the sheet metal shop for installation at the project site by the masons. Requiring shop drawings for flashing can help assure that the contractor has anticipated and planned for all field installation conditions and has properly interpreted the drawing and specification requirements.

Loose steel angle lintels and prefabricated concrete lintels should require the submittal of shop drawings for verification of dimensions and coordination with masonry coursing. Projects with cut stone may have exten-

sive shop drawings that identify each size and shape of stone, its anchorage conditions, and placement location. In grouted construction, the engineer may also require shop drawings showing the type of temporary construction that will be used to brace uncompleted walls.

17.6.4 Product Data

Fabricated products such as the accessories used in masonry construction typically require the submittal of manufacturers' product data rather than shop drawings. Many specifications list the products of several different manufacturers that are acceptable for use in the construction. Others specify products only by description or by reference standard without mentioning proprietary names. These methods of specifying make it necessary to require the submittal of proprietary product data to verify that the products that the contractor proposes to use meet the specified requirements. Masonry product data might include catalog sheets or brochures for anchors, ties, rebar positioners, joint reinforcement, weep-hole ventilators, and shear keys. The masonry contractor or supplier who prepares the submittal should mark data sheets that include more than one item to clearly show which item or items are proposed for use. If there are various model numbers, materials, sizes, etc., these too should be marked to show the appropriate selection.

Manufactured products such as cement, admixtures, mortar coloring pigments, and cleaning agents may also be included in the A/E's list of required submittals. If more than one brand of proprietary masonry cement or mortar cement is approved for use on the project, the manufacturer's product literature should be submitted to indicate which particular products the contractor is proposing to use, and to verify their conformance to contract document requirements. Product data on approved types of admixtures should clearly indicate the chemical ingredients included to assure that they contain no calcium chloride or other harmful substances. Product data on mortar coloring pigments and proprietary cleaning agents other than hydrochloric acids or detergents should also be submitted for review and approval.

17.6.5 Samples

Samples may be required for masonry units, colored mortars, and some selected accessory items. Unit samples are most often reviewed for color selection purposes during earlier design phases, but if the masonry has been specified on a unit price basis, or only by ASTM reference standard, the A/E must approve samples submitted by the contractor. Cut stone, brick, and architectural CMU samples should indicate the full range of color, texture, shape, and size. Any project requirements for sample panels or mock-ups should be specified under the quality assurance article of Part 1 rather than under this article, which is reserved for individual unit or material samples.

17.6.6 Quality Assurance/Quality Control Submittals

Quality assurance and quality control submittals include test reports, manufacturer's or contractor's certifications, and other documentary data. These submittals are usually for information only. They are processed in the same manner as shop drawings and product data, but do not always require review and approval.