

# STRUCTURAL PRACTICES

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## Building Unit Masonry Specifications

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Many structural engineers like to submit the masonry specification to architects and their specifiers; however, many specifiers prefer to author the masonry specification for the structural engineer's review. The reason why is simple. Engineers are concerned with the structural integrity of the specification, including performance requirements, unit compressive strength, ties, and anchors. The structural components of the specification are very important. But with all of the options available within the unit masonry specification, the structural components comprise only a small portion of the entire specification.

The components of the unit masonry specification include options for concrete unit masonry, decorative concrete unit masonry, face brick, glazed brick, structural-clay facing tile, firebrick, and stone trim unit to start. Then the various accessories associated with the unit masonry must be considered, including mortar and grout, embedded flashing, weeps and vents, cavity drainage materials, and insulation. All

of these components are options that must be selected by the architect. For the most part, once the engineering has been completed, the structural engineer is done with the specification. As budgeting prices are reviewed, and re-evaluated, the brick selections may change, the insulation types may change, and even the flashing materials may change. Many structural engineers do not want to be involved with these types of changes, whereas architects may make changes regularly.

All good unit masonry specifications start at the foundation of specifying:

- 1) What version of MasterFormat (or another guideline) is to be used?
- 2) Is the project attempting to attain LEED certification?
- 3) What is the format for the specifications?
- 4) Is the terminology consistent between the specifications and the drawings?

By now, most engineers and specifiers have converted over to the 2004 version of MasterFormat, the numbering system produced by the Construction Specifications Institute. Although there are still some entities using the 1995 version, the 2004 version has become the standard. One easy way to tell the difference between the versions is by the number of digits used for section numbering. The 1995 version of MasterFormat had 5 digits and the 2004 version has 6 digits. The majority of the

engineering sections not only added a digit but moved divisions. Unit masonry remained in Division 4 – Masonry.

If an architect has determined a project will attempt to obtain LEED certification, the unit masonry section can help contribute to LEEDS points. Regional materials and recycled content for the masonry units, mortar and grout, and reinforcing materials can be included in the specifications. Staying on top of which points are in or out, which materials are to be regionally sourced, and the percentage of recycled content are not aspects of the unit masonry specification the structural engineers want to constantly edit as a project progresses from design development to construction documents.

Formatting a unit specification section to match the correct font, header and footer information, and margins is not a difficult task, but the format does change with each issue of the specification section. Projects have been known to start in schematic design with one name, progress to design development with another name, to finally be issued at 100% construction documents with a third name. Each issue also will have had a different date on the specification section. This is another reason that structural engineers may not wish to author the unit masonry section.

Terminology between the drawings and the unit masonry specifications is another easily handled issue. Many times a product such as Mortar Net® will appear on the drawings and be specified as cavity drainage material in the unit masonry specifications. The terminology on the drawings will need to be changed to a non-proprietary term to ensure bidding competition. Many structural engineers may prefer not to perform this task.

Building on the foundation of the unit masonry specification, and looking at the wall, structural engineers determine how the unit masonry wall is to be engineered, by either analytical or empirical methods. If an analytical method is used, then the structural engineer can determine compressive strengths either by ACI 530.1 or ASTM C 1314. Although architects can figure this out, they would prefer not to make the determination. The same is true for deciding what the unit compressive strength of concrete unit masonry and brick unit masonry needs to be to in order to support the loads on the wall.

Once compressive strengths for the unit masonry are determined, many other factors for the correct and complete specification of unit masonry come into play. For concrete unit masonry, the density classification needs to be specified. Is an integral water repellent

required? Will the concrete unit masonry be part of an exterior single wythe masonry wall requiring additional products for flashing and weep systems? Decorative concrete unit masonry may also require integral water repellents along with patterns, textures, and colors that need to be ascertained from the Architect and then specified. With brick, additional options include brick grade, brick type, sizes, along with color and texture are required. Other less commonly specified unit masonry types include concrete building brick, pre-face concrete masonry units, concrete facing brick, building (common) brick, hollow brick, glazed face brick, glazed hollow brick, structural-clay facing tile, firebox brick, and clay flue lining units.

The unit masonry section extends beyond unit masonry to include stone trim units, both natural stone and cast stone products. The products are included in the unit masonry section when they are used in conjunction with masonry walls as base, sills, copings, and other trim piece locations. Since they are installed as the masonry wall construction progresses, they have been included in this section.

Once the various types of unit masonry are specified, the structural engineers can turn their attention to the mortar and grout types required and the locations for the specific project. Inclusion of cold-weather admixtures may or may not be allowed within the specification as determined by the structural engineer. Water-repellent admixtures requirements may also be required if an integral water repellent has been specified for the concrete unit masonry.

Structural engineers are important when the masonry reinforcement, ties, and anchors are specified. The current master specifications for unit masonry include several different types of anchors, including anchors for anchoring to structural steel, anchors for anchoring to concrete, adjustable masonry veneer anchors, and seismic masonry veneer anchors. Once the anchors, ties, and reinforcement are specified, the other masonry accessories need to be selected to complete the masonry wall.

Over the years, each architectural firm has developed their office standard for their exterior wall assemblies based on their firms' experience and lessons as the school of hard knocks. Because of that

experience and those lessons, the selection for the unit masonry accessories varies from firm to firm, and from project owner to project owner. One project may allow the use of rubberized asphalt flashing with a stainless steel drip edge while another project requires stainless steel flashing only. Masonry wall flashing materials continue to evolve, bringing new materials and methods to the market every year, challenging even the best specifiers to keep up with the changes. Weep systems and cavity drainage system change just as frequently. Another shift in unit masonry specifications recently seen is the use of air barriers within the wall cavity. The type and location of cavity wall insulation materials have been changing. The trend for unit masonry walls has been moving towards using more rain screens and pressure-equalized systems.

Although a structural engineer's input into a unit masonry specification is essential, thought is required as to whether or not the structural engineer is the best entity to author the specification based on all the additional non-structural specifications items required to build a strong, sturdy unit masonry specification. ■

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