SE INSIGHTS

FOR MASONRY DESIGN

Key Points for Contractors Regarding Masonry

Masonry has the opportunity to be used more, and in better ways in structural engineering designs:

1. Increase the understanding of **actual masonry design strength (f'm)**, designers should be using a default of 2500 psi (NOT 1500 psi) - see the following website: www.FORSEI.com/cmudata

   A. Designs strengths should start at **f'm= 2,500 psi**, verify with test results from manufacturer, and this is a FREE upgrade, we are advocating using the actual block strengths already being supplied.

   - Design strengths can be specified even higher, up to 4,000 psi.
   - More efficient design w/ higher f'm.
     - Case studies showing 15-30% savings when correct f'm is used.

2. Create an awareness of the **availability of masonry design software**
   - Efficient masonry design comes from same software that designs steel and concrete.
   - STOP designing masonry from tables, that is very conservative, very expensive.
   - STOP basing estimates using design from tables or other old, inefficiently designed projects.
3. Be aware **engineers must locate CJ for structural masonry walls**. Check that control joints (CJ)'s are located on plans:
   - **CJ's in reinforced structural walls are NOT at edge of openings**
     - CJ away from edge of openings in concrete masonry leads to a more efficient/robust design.
4. Learn about the **benefits of masonry lintels**, over other materials that could be used for lintels
   - masonry lintels can be designed with significant capacity by:
     - correct f'm (see number 1), utilizing more depth, using top and bottom bars, and using stirrups.
   - the only reason to use lintels of 'other' materials, is shoring. Masons are solving this issue with several methods including **prefabricating masonry lintels**.
   - lintels of 'other' materials often require additional CJ's, and need to be designed for higher loads.
5. Increase engineer's knowledge of the **capacity of masonry shear walls.**
   - CJ locations are critical to shear wall capacity, the less CJ is better for shear walls.
   - Boxed wall groups (stair and elevator shafts) have significant lateral shear capacity.

Structural Masonry in Building Systems

There are many different ways in which structural masonry can serve within building systems. In the chart below, structural masonry is shown where it can be a part of the solution for each framing system, and in certain situations, masonry can excel as a preferred material.

WHERE MASONRY FITS IN	PRIMARY FRAMING SYSTEM						MASONRY BEARING WALL BUILDING
	WOOD BUILDING	COLD-FORMED STEEL	STEEL	CONCRETE	CONCRETE/ with PT SLABS	PRECAST	
MASONRY STEM WALLS	●●	●●	●	●	●	●	●●
MASONRY BASEMENT WALLS	●●	●●	●	●	●	●	●●
SHEAR/SHAFT WALLS	●●	●●	●●	●		●●	●●
HYBRID W/MASONRY INFILL			●	●	●●	●	
INTERIOR BEARING WALLS			●			●●	●●
INTERIOR PARTITION WALLS			●	●●	●●	●●	●●
EXTERIOR BEARING WALLS			●			●●	●●

Underlying Message - Why Architects Use Structural Masonry

The above reasons are all related to structural engineering. Of course we all need to remember the underlying reasons for why architects choose use masonry. Structural masonry benefits the design of both structural engineers and architects.

- **safe & secure**: does not burn, blast-resistant, weather-resistant
- **durable**: water-resistant, abuse-resistant, low maintenance
- **healthy**: low VOC, mold-resistant, CO_2 absorbing
- **energy efficient**: local, thermal mass, low embodied energy
- **cost effective**: high resale value, low insurance cost, competitive initial cost, low maintenance cost
- **comfortable**: quiet, efficient space use, constant temperature
- **adaptable**: modular, easy to modify, design flexibility
- **aesthetic**: solid, colorful, human scale