STONEWORK, BONDING, PRINCIPLES OF

by Joe Kenlan

THE ORIGIN OF STONEMASONRY

and, arguably, of architecture, is in the prehistoric development of bonded stonework. This allowed for the construction of free-standing walls of sufficient height and an economical width so that houses and other buildings with load-bearing walls and openings for doors and windows became practical. Think of a lintel as a stone spanning a very wide joint.

Over time, bonded stonework seems to have evolved into two separate styles or systems. At the recent Symposium and in his introduction to the article on Mallorcan dry stone walling, Tomas Lipps has described these as 'static' and 'dynamic.' The static system is principally employed in load-bearing structures. The dynamic system is most useful when there are lateral forces to be resisted (in retaining walls, for instance).

In more dynamic styles of masonry, tension in the wall is dispersed in all directions, causing the composite wall to act as a unit. One example of this is the 'honeycomb' style done so beautifully in Japan and elsewhere. In these walls massive battered corners are laid up and the body of the wall between them filled with six sided stones very carefully set 'on their points' in a honeycomb pattern. Due to the interlocking nature of the pattern pressure is exerted in many directions within the wall, enabling it to accommodate gravity and use it to resist its enemies: the lateral force of the mass held in place behind the wall, hydrostatic pressure, the settling of the earth under the wall and unsettling seismic tremors.

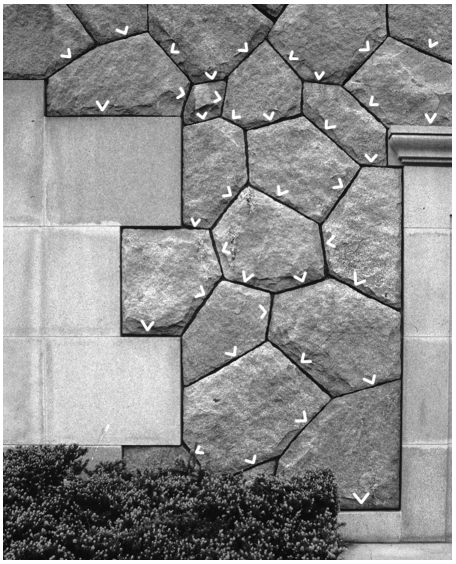
In addition, the weight of the heavy, sloping corners actually bears on the body of the wall (and the backfill), placing the whole structure in compression—the greater the pressure, the stronger the wall becomes. The result is an intuitive response to the stresses expected in a seismically active area.

The static form works on the assumption that gravity always acts perpendicular to the earth. Accordingly, it is designed to resist this by means of a horizontally oriented structure. Its mass, and the integrity of that mass, are all it has to resist lateral or uneven pressures, so care has to be taken in the way it is footed. Much of the world's formal architecture from the pyramids to the great cathedrals is static in nature, although static systems often incorporate dynamic forms: the arch and extensions of the arch—the vault and the dome for example.

Since this level and plumb style of work is what is built and taught in my country, I'll concentrate on that.

The reason I'm bringing it up at all is that a curious thing appears to be happening in recent years in stonemasonry. Apparently, the way in which stonework is bonded has come to be widely regarded as a matter of minor importance, a mere reflection of personal taste. I say this based on the amount of work I see that seems to pay no attention to the principles of bonding, not only in my area of North Carolina and elsewhere, but 'gracing' the pages (and even the covers) of a number of popular 'how to' books and magazines.

This is a common syndrome among apprentice masons and workshop students whose eagerness to get on with the fun of putting stones together causes them to lose sight of the fact that what they are really



Left: Washington, D.C. Polygonal wall showing diagonal forces at work. Photo: T L

Below: Park College, Parkville, Missouri
A section of well-bonded, static style, quadrilateral stonemasonry. Notice that the three rules mentioned in the article have been respected: (1) every vertical (and diagonal) joint between two stones has been covered, (2) with adequate overlap by the stone above and (3) every vertical (and diagonal) joint has a single stone on one side. The horizontal bed joints are broken and the courses tied together by the taller 'jumpers.' The diagonal vertical joints give liveliness to what would be less interesting if every stone were a rectangle. All of the weight of the wall is bearing directly down, but from any one of a number of points—in this case the large stone marked with a dot at the top of the photo—it tends to spread in a roughly triangular pattern. Photo: T L