

### ***Masonry***

Courtesy the Fairmont Park Conservancy

It is fair to say that the earliest settlers favored the use of plentiful and easily machined wood, but construction in masonry also flourished. Bringing building traditions with them from Northern Europe, most early masonry buildings were constructed from fieldstone laid up in a random rubble pattern. In the cities and small towns brick construction grew at a steady pace. By the middle of the 19<sup>th</sup> century, quarrying and stone cutting had advanced to such a degree that masonry buildings were as common as wood.

### ***Mortar***

Mortar for masonry is traditionally composed of 2 principle ingredients: lime and sand. Since ancient times, lime was traditionally mixed with sand in a ratio of about 3 parts sand to 1 part lime. This was the predominant mortar until the last quarter of the 19<sup>th</sup> centuy, when a harder, hydraulic, version of lime called Portland cement arrived on the scene. This new material was invented in England in 1824 and could be imported. The first domestic Portland cement factory however, was established in 1871 in the Lehigh Valley.

### ***What's the difference?***

Lime mortars are soft and fairly water vapor permeable. In contrast,

Portland cements are hydraulic, hard and do not allow the easy passage of water vapor.

### ***Why is it important to know the difference?***

In early masonry construction, the bricks were soft by modern standards and the fieldstone was a potpourri of stones of varying hardnesses. The softer lime mortars were perfect with these. The mortar easily transpired water vapor and became the sacrificial element in the masonry wall. These mortars moved with the early soft brick and a wide variety of soft sandstones. This characteristic allowed water vapor to escape through the mortar joint. Since water vapor could sometimes carry crystallizing salts or condense into destructive freezing water, the mortar bore the brunt of the destructive power of water. Every 25 years or so, the mortar joints were repointed. That is, the surface mortar for about a depth of 1-2 inches was removed and new lime mortar was installed.

Problems arise when older softer masonry is repointed with hard Portland cement. This product, although perfect for masonry construction of the past 100 years, forces water vapor to take the path of least resistance which is often the softer brick or stonework. When this

happens, water vapor can deposit salts under the surface of the masonry unit (subflorescence) and stonework begins to erode and brick faces spall.

When in doubt, always use a mix that is softer (more lime) than harder. Houses constructed around the turn of the 20<sup>th</sup> century often benefit from a mix of lime AND Portland cement. Its soft enough to retain superior water vapor permeability but hard enough to work with new harder brick and quarried stone.

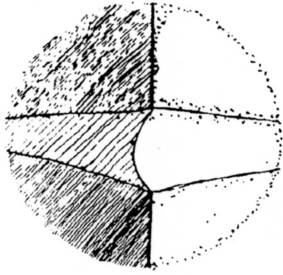
### ***Mortar matching***

The sand or aggregate will greatly determine the overall appearance of the mortar. Try to match any pointing mortar to the original in color and texture. Samples can be sent to DeGruchy masonry in Quakertown for example for free matching.

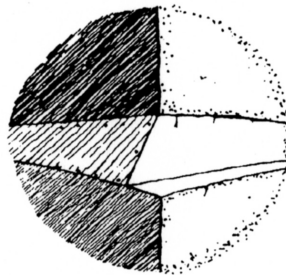
### ***Finishes***

Masonry does not usually require a finish in the form of a coating. However, when the erosion of brick and stone cannot be arrested, it may be necessary to apply a surface coating. There are a variety of high

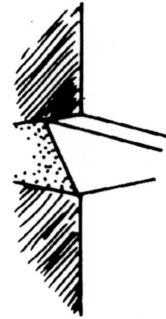
tech masonry consolidants that can be used when the original appearance needs to be maintained. Otherwise, an opaque coating is a reasonable alternative. The most important quality of the coating is that it is virtually transparent to the passage of water vapor. There are a few materials that are designed for this. An old traditional coating is simply limewash. Basically, lime is added to water to achieve the consistency of a thin paint. A dry pigment can be added to color the coating, These traditional coatings will last for about 5+ years and are easily renewed. Best of all they cost about \$2.00 per gallon. Beyond that there are a variety of mineral silicate paints that were developed in Germany in the late 19<sup>th</sup> century. Keim Paints and coatings by Masonre offer a wide variety of colors with better than 90% vapor permeability. Avoid all of the elastomeric paints labeled as "masonry paints." These are thick rubbery coatings that excel at keeping water out, but, they also keep water in. They fail by peeling off in large sheets sometimes still attached to the brick or stonework. Avoid ordinary latex and alkyd paints as well as water seals.



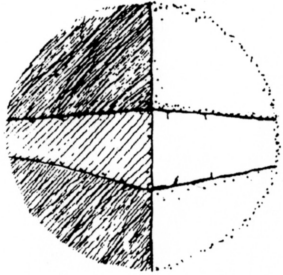
Concave Joint



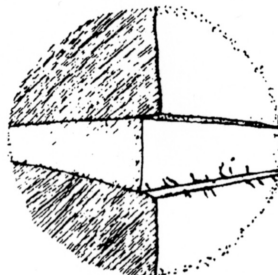
Incorrect Joint



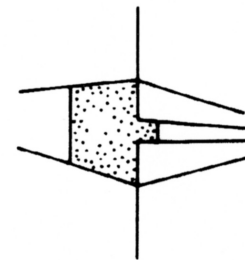
Weathered  
or Weather  
Struck Joint



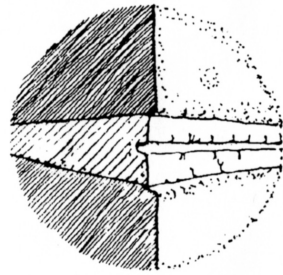
Flush Joint



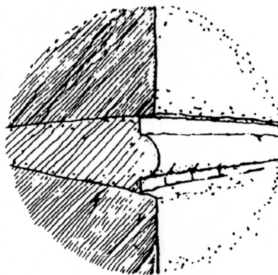
Raked Joint



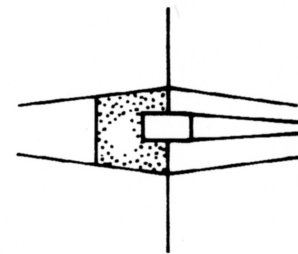
Bastard  
Tuck Pointing



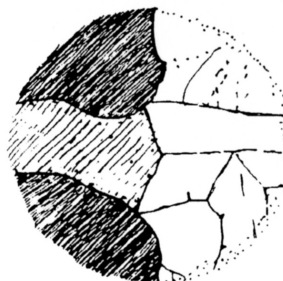
Grapevine Joint



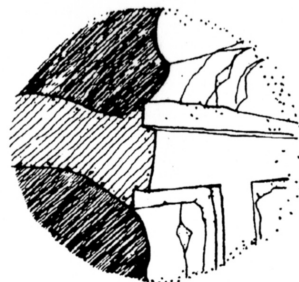
Beaded Joint



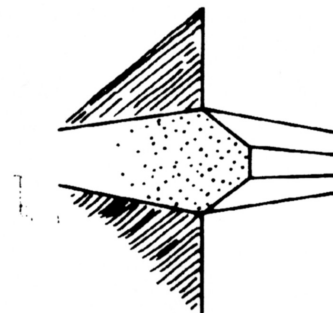
Tuck Pointing



Prism or Bevel Joint



Ribbon Joint



Masons V  
Joint

from Conserving Buildings by Weaver and Matero