“Ethyl Silicate as an Alternative Binder for Grout and Mortar for Use with American Sandstones”

Traditionally, grouts for masonry materials have been based on lime, hydrated lime, and cement, often in combination, and sometimes with pozzolan or casein as additives. Good results have been achieved with these formulas; however, lime- and cement-based grouts can produce soluble salts and surface discoloration associated with lime streaking. For repairs and consolidation of siliceous stone, ethyl silicate has been proposed as an alternative binder for grouts. Ethyl silicate would eliminate both the production of salts and lime streaking, while allowing for strength modification and excellent adhesion to a silicate substrate. In addition, this would take advantage of the inherent low viscosity of alkoxysilanes, reducing the need for fluidizing additives. Ethyl silicate binders for grouts and mortars have already been employed by Hans Leisen and the APSARA team on the sandstone at Angkor Wat; however, they have not been evaluated with materials available in America or on common American building sandstones. In order to determine if these new grouts are more compatible with these silicate substrates than traditional ones, a testing program measuring adhesion, capillary uptake, water vapor transmission, and strength and modulus through biaxial flexure will be conducted according to ASTM and modified ASTM protocols. The results of this testing program have the potential to significantly impact the field of stone conservation, especially the conservation of silicate cemetery markers which often utilize grout injection as a major method of treatment.