

Anthony J. Baragona, “Neo-traditional, volcanic pozzolan-lime mortars for the repair of historic structures.” Submitted May 2012. Advisor Professor Norman Weiss

The object of this research is to examine the possibilities of using naturally occurring volcanic pozzolans in lime-cement mortars for the repair of historic structures. Water vapor transmissivity, tensile splitting strength and set time are crucial performance criteria for historic repair mortars.

Mortars samples were prepared from three different pozzolans: ground pozzolana from Pozzuoli, Italy; ground Rhenish trass from Andernach, Germany; and ground ash from Mount St. Helens in Washington State. The samples were tested by Vicat apparatus (per ASTM C807) during their initial set to gauge pozzolanic activity levels. After a curing period, the samples were tested for rate of water vapor transmission (per ASTM E96) as well as subjected to tensile strength testing (per ASTM D3967). The resultant data was compared to that of control mortar samples made of portland cement and lime, comparable to ASTM “Type N” and “Type O” mortars commonly used in repair of historic structures.

While this research is specifically tailored to examine the applicability of using pozzolans in mortars for repair of historic structures (especially those near water or in areas of high humidity), its findings are also pertinent in a wider context to the concrete and construction industries, in particular with regards to the burgeoning field of “green” or environmentally friendly materials. This thesis concludes that it is possible to formulate repair mortars using volcanic pozzolans and lime that exhibit qualities that make them suitable for a wide range of historic repair scenarios.