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TRANSACTIONS.

N.B.—This Society, as a body, does not hold itself responsible for the facts and opinions stated in any of its publications.

CEMENT MORTARS IN FREEZING WEATHER.

By M. J. BUTLER.

(To be read Thursday, 12th April, 1894.)

In considering what is best to be done when it is found necessary to carry on masonry work in freezing weather, if one searches the records of cement mortars found in the Proceedings of the various Engineering Societies, in the standard text-books used as a guide in the practice of the Profession, it will be found that the verdict is "don't do it." Failures in the past can be, no doubt, traceable to the effects of frost; nevertheless, success may be had by taking the necessary precautions.

In the late fall of 1892 the writer was compelled to construct about 600 cubic yards of masonry. After consulting all available sources for information and precedents, added the following clause to the specifications governing the works under his direction:—

"No masonry will be allowed to be laid in freezing weather unless so ordered by the engineer, in which case the following precautions shall be taken:—The stones shall be warmed to remove any ice from the surface, and the mortar mixed with brine made as follows:—Dissolve one pound of salt in 18 gallons of water when the temperature is 32° F, and add one ounce of salt for every degree the temperature is below 30° F, or enough salt, whatever the temperature to prevent freezing."

"The sand shall be heated sufficiently to thaw any frozen particles." Cement and salt were furnished by the Railway Co.

In the actual carrying on of the work the steps taken were as follows:—

CEMENT.

A careful chemical analysis of the cement supplied showed the following composition:—

Lime	60.16
Silica	24.30
Aluminum and Iron Oxid	10.78
Magnesia	1.18
Alkalies	1.60

FINENESS.

Seven per cent. residue was left on a standard sieve of 10,000 meshes to the square inch, 6 per cent. of which passed through a sieve of 22,000 meshes to the square inch.

Quoted by J. J. R. Cross, Transactions American Society of Civil Engineers, Vol. XVI, p. 84, and there credited to the Royal Engineers; see also Baker's Treatise on Masonry Construction, page 543.