

ABSTRACT

The purpose of this paper is to determine if there are any changes to the mechanical properties of concrete created with saltwater instead of the usual freshwater. In pursuit of this goal, three separate phases of investigation were employed. Saltwater concrete was to have its compressive strength, flexural strength, and bond strength each tested. Per each phase, 4 groups of different salinity values, with 6 concrete units per group, were mixed and tested at 7, 14, and 28 days.

Using saltwater of 3.5% salinity, the compressive strength of concrete improved from 1800 psi to 2400 psi; a 34% increase. Rebar embedded into concrete made of saltwater did not present any evidence for accelerated rusting as compared to rebar in concrete made of freshwater. Finally, saltwater of 3.5% salinity weakened the bond between the concrete and the rebar from 1607 psi to 1194 psi. However, saltwater of 1.75% salinity did result in concrete with a near equivalent bonding strength with freshwater concrete; a steel/concrete bond of 1630 lb/in².

The results of this thesis suggest that it may be possible to replace freshwater in the concrete making process with saltwater. The value of the substitution depends on the intended use of the concrete. Even if the amount of freshwater lowered by volume is only 25%-50%, that amount is still valuable when considering the total amount of concrete generated in the world yearly.