# RESEARCH NOTES

Contract: 59A0632
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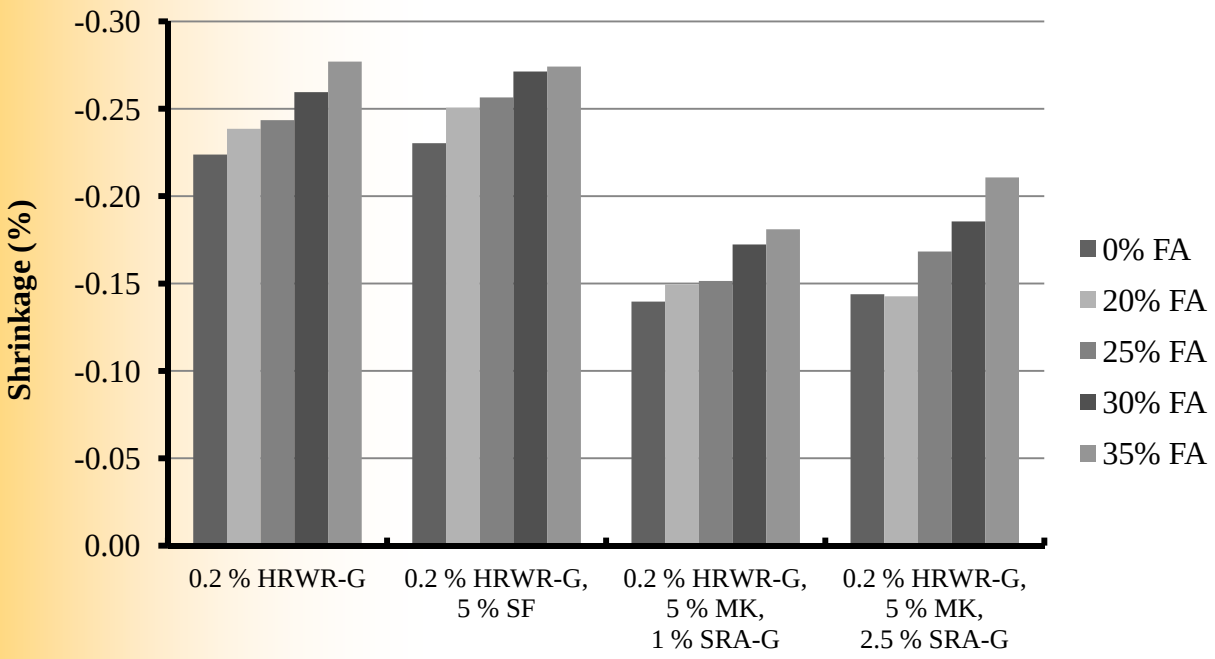
# *Creep and Shrinkage of High Performance Concrete for the Skyway Structures of the New San Francisco Oakland Bay Bridge*

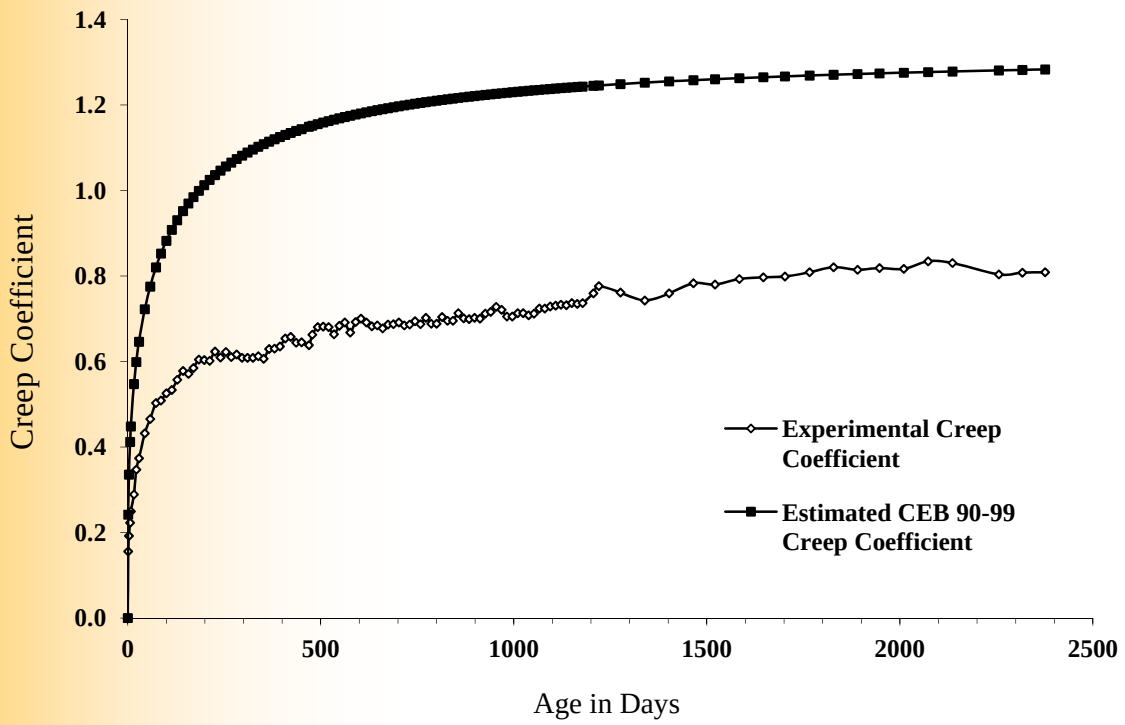
***RESULTS:** This study reveals that the type and amount of admixture are factors that can affect drying shrinkage, creep and compressive strength. The mixtures used showed that most of the drying shrinkage occurs during the first 100 days after mixing. Shrinkage reducing admixtures (SRA) can reduce the shrinkage and creep of concrete over a long period of time.*

## *Background*

The volume change in concrete structures has to be accounted for as part of design and construction. The smaller the volume change, the more controllable the behavior the structure is over its lifetime. In any event the volume change must be known to accurately design and predict the behavior of a structure over time.




**Drying shrinkage of cement paste containing admixtures with different Fly Ash percentages**




**Creep coefficient versus age for the *Skyway Super Structure Concrete mix of the New San Francisco Oakland Bay Bridge***

## Why We Pursued This Research

To determine the influence of chemical and mineral admixtures on long term drying shrinkage and creep of high strength concrete (HSC).

## What We Did

Office of Earthquake Engineering from Engineering Service Center contracted with San Jose State University to investigate the long-term effect of chemical and mineral admixtures on drying shrinkage and to determine the creep and shrinkage of the concrete mix used for the skyway structure of the new San Francisco Oakland Bay Bridge (SFOBB). The SFOBB consists of several interconnected structures that that require actual measurement for creep and shrinkage in the concrete superstructure. This information helps to provide more efficient and accurate design for subsequent structures.

## Research Results

The observations from this study showed that adding SRA to concrete also reduces long-term drying shrinkage and creep; hence admixtures minimize cracking over the life-time of the structures. The study showed it was beneficial to utilize the SRA in the actual mix of the skyway structure for the new SFOBB.

## Recommendations

To continue the use of SRA in concrete bridge structures because it is effective in reducing drying shrinkage and creep.

## Reference

Akthem Al-Manaseer, Abdullah Fayyaz, Ric Maggenti, Peter Lee: “Creep and Drying Shrinkage of High Performance Concrete for the Skyway Structures of the New San Francisco-Oakland Bay Bridge and Cement Past”, Final Report, March 2011, 232 pp.

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