

## MAY 2008 MEETING

Wednesday May 14, 2008

### TECHNICAL PROGRAM

#### Coatings and Sealers for Protecting Concrete Facilities

**Speaker:** Dr. C. Vipulanandan, Ph.D., P.E., Chairman and Professor of Civil Engineering and director of CIGMAT and THC-IT at the University of Houston, Tel. No. 713-743-4278

#### PRESENTATION SUMMARY

To a room of about 45, Dr. Vipu, a licensed professional engineer in Texas who has earned a BSCE degree from University of Moratuwa, Sri Lanka, and MS and PhD degrees in Civil Engineering from Northwestern University presented, "Coatings and Sealers for Protecting Concrete Facilities".

Dr. Vipu began by describing the differences between coatings & sealants stating coatings are positioned on top of concrete whereas sealants either plug the gaps between cracks or seals the sides down in the cracks. He stated that Houston, TX. has approximately 6000 miles of wastewater pipe and approximately 50 lift stations. Much of that pipe is concrete exposed to concrete eating bacteria. Hydrogen sulfide enters with the waste and partially converts to sulfuric acid vapors and rises to stick to the pipe.

Dr. Vipu and the U of H lab conducted a study evaluating the applicability of either coating or sealing the pipes for concrete maintenance versus pipe restoration or replacement. He utilized pipe-in-pipe pressure testing in the lab by applying products to the inside of the smaller inside pipe and monitored how the products protected the pipes when vapors penetrated the inner pipe walls.



(a) Hydrostatic Test Facility

Dr. Vipu described tests conducted with coatings and/or sealers being added to inner surfaces of waste lift stations. There they were conducting in-situ product bonding and water vapor emission tests. Additional product testing included using concrete cylinders with 'holiday' pinholes drilled into the coatings, then coating and/or sealing them and partially immersing them in assorted chemicals simulating environmental conditions. The cylinders were periodically removed, tested, and then returned to their test conditions for future bonding tests. He discovered the coating decay in lift stations closely matched simulation tests he conducted in the lab.



(b) Coated Concrete Specimens

Dr. Vipu then worked to create diffusion equations to help predict corrosion mathematically so experts can learn what properties need to be included in coating mixtures. He also ran tests to see if contractors could apply coatings and/or sealants in situ, or whether concrete pipe would need to be removed and cleaned before applying the products.

The U of H lab was asked to run tests to learn practical ways to protect columns under the now-being-constructed Galveston causeway bridge where the concrete columns were exposed to calcium chloride (salt). These tests included immersion, bonding, thermal expansion, and U.V resistance tests.

The test conclusions suggested the use of a Silane sealant which utilizes silica and an organic compound to help resist those environmental conditions. Ultimately, the tests prescribed an appropriate surface preparation followed with a latex and Silane sealant and coating combination. Dr. Vipu reiterated that these products do not permanently solve

the issues but do prolong the useful life of the concrete.

Dr. Vipu answered a concrete surface preparation question, describing the need to raise the concrete surface PH. to 8 or 9 to help the products adhere and work.

For a summary of Dr. Vipu's slide presentation, [click here](#)

[Click here](#) for a summary of Dr. Vipu's June 2005 FPA presentation - [Designing, Constructing and Testing ACIP Piles in Texas Gulf Coast Soils](#)