



CASE STUDY

NYSP21 Performs Feasibility Study for Urban Mining Northeast, LLC.

Urban Mining Northeast, LLC, (Urban Mining) located in New Rochelle, New York, is a licensed regional producer of Pozzotive[®], a high-performance pozzolan derived from post-consumer recycled glass. Pozzotive[®] is used in a multitude of applications, including as a supplementary cementitious material in cement.

Challenge

According to the U.S. Geological Survey, the U.S. cement industry produced 83.4 million metric tons of cement in 2015, which was only 2% of the world's total 4.1 billion metric tons produced. Supplementary cementitious materials such as Pozzotive[®] can be blended to make up a significant portion of cement, resulting in an environmental benefit by replacing virgin materials and reducing waste to landfill. Urban Mining seeks to continuously expand this business opportunity. As such, Urban Mining requested assistance from the New York State Pollution Prevention Institute (NYSP21) to evaluate the performance of Cathode Ray Tube (CRT) panel glass as an alternative feedstock for Pozzotive[®].

Solution

NYSP21, in partnership with Clarkson University, completed ASTM material and performance testing of concrete mixtures. Testing employed a total of three concrete mixtures, all with a design compressive strength of 5,000 psi. Two concrete mixtures contained blends of CRT panel glass co-milled with Pozzotive[®] at 5% and 15%, blended with ordinary Portland cement (OPC) at a cement replacement rate of 20% by weight. The third concrete mixture consisted solely of OPC serving as the control mix for the study.

Results

The work performed by NYSP21 and Clarkson University yielded the following key findings:

- Both the 5% and 15% CRT-Pozzotive[®] concrete mixtures achieved more than the design strength at 28 days, and continued to increase until 56 days
- The chloride permeability of both 5% and 15% CRT-Pozzotive[®] concrete mixtures were very low, indicating that the CRT-Pozzotive[®] can be used in high strength and high-performance concrete
- The CRT-Pozzotive[®] concrete mixtures exhibited better sulfate resistance at 56 days of exposure compared to the OPC control mixture
- The Toxicity Characteristic Leaching Test (TCLP) results were significantly lower than the maximum allowable values eliminating leaching concerns of hazardous heavy metals

Within the scope of the tests performed, the study suggests that CRT-Pozzotive[®] can be successfully recycled in concrete at 20% replacement level (by weight) as a substitution for OPC cement.

Testimonial

"While at the Google headquarters in Mountain View, California, we were challenged to find a solution to the problem of CRT glass disposal. With the cooperation of Electronic Recycling International and the support of Staples Office, we worked with NYSP21 to test new formulations of cement using CRT glass. The results have assured us that this is a winning solution for the electronics, recycling and building industries: eliminating a growing waste glass problem and creating a superior product for green building."

- Dale Hauke, Project Executive; Urban Mining Northeast, LLC.

¹<https://minerals.usgs.gov/minerals/pubs/commodity/cement/mcs-2016-cemen.pdf>

CHALLENGE

- Urban Mining was challenged with evaluating the performance of Cathode Ray Tube panel glass as an alternative feedstock for Pozzotive[®]

SOLUTION

- NYSP21 partnered with Clarkson University to complete ASTM material and performance testing of concrete mixtures

RESULTS

- The study suggests that CRT- Pozzotive[®] powder can be successfully recycled in concrete at 20% replacement level (by weight) as a substitution for OPC cement



NYSP21 PARTNERS



New York Manufacturing Extension Partnership

Funding provided by the New York State Department of Environmental Conservation.

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