Building for the FUTURE by Recycling Industrial Materials

Industrial materials, such as coal ash, foundry sand, construction and demolition materials, slag, and gypsum, are valuable products of industrial processes. These materials have many of the same properties as the virgin materials they replace. Putting these commodities into productive use saves resources and contributes to a sustainable future. Following are examples:

Comcast Center — Located in Philadelphia, PA, the 1.2 million square foot, 58-story skyscraper is owned and developed by Liberty Property Trust with Comcast Corporation as the lead tenant. Through deconstruction of an existing 9-story building that housed the Philadelphia Public Defenders Office, Liberty was able to achieve a 90 percent recycling rate. Discarded oil tanks located under the building were cleaned for reuse to store captured stormwater. This effort removed the potential source of water contamination by old oil tanks and now contributes to water savings. Energy and fuel are saved from removal efforts and the tanks are kept out of a landfill. Combined, the tanks hold up to a total of 12,000 gallons of stormwater for reuse as irrigation water, saving 45,000 gallons of fresh drinking water every year. In addition, 90 percent, or 5.4 million tons, of the construction waste and debris generated throughout the project will be recycled. The new building also contains recycled slag in its concrete. (www.libertyproperty.com)

Dundas Residence — This project, located in Prescott, AZ, was designed by architect Michael Frerking and constructed by P.M. Taylor Development. It is a high mass, passive heated and cooled home that utilizes the mass as heat and cool storage. The exterior wall is a 20" thick "poured soil cement." At the center of each exterior wall is a 4" rigid foam thermal break, giving the wall an R value exceeding R-20. The walls utilize an ultra high fly ash (type F) "6 sack mix." This combines 2 sacks of Portland cement with 4 sacks of fly ash per yard. Compressive strengths exceed 2400 psi. The Portland cement use is reduced by 67 percent with the substitution of the fly ash; other future projects will yield as much as 80 percent reduction. (www.michaelfrerking.com)

Naval Facilities Engineering Command Building 33 — The developers of Building 33, located in the historic Washington Navy Yard, Washington, D.C., used an existing building as the foundation for its new facility. The renovation of the original open-bay factory building was completed in 1998. The new building houses the Headquarters offices of the Naval Facilities Engineering Command. In addition to using a pre-existing structure, the project incorporated sustainable building features such as ceiling tiles containing recycled newsprint, concrete and concrete masonry units (blocks) using fly ash, and drywall containing recycled gypsum. Bricks also were recovered during demolition activities, cleaned up, and reused on the site. (http://www.eere.energy.gov/femp/highperformance/overview.cfm?ProjectID=495)

Photo by Menomonee Valley Partners, Inc.

Menomonee Valley Industrial Center and Community Park Project — The 1,200 acre Menomonee Valley revitalization is the largest Brownfields cleanup in Wisconsin history. The revitalization leveraged $700 million, created 4,000 new jobs, and built 60 acres of park space and 4 miles of trails. The Valley's redevelopment is a nationally recognized model of public-private partnership and a major civic achievement for Milwaukee. This project used crushed concrete for building foundations and roadway subgrade, and broken concrete for subsurface transmissive layer within the Stormwater Park. In addition, the County Stadium recycling effort will result in 95 percent of the old ballpark being used again. The Industrial Center and Community Park Project was the redevelopment of a 140 acre Brownfields site within the Valley. The entire site was raised 6 to 10 feet out of the floodplain. Various types of industrial materials from the Valley were used in the redevelopment, including foundry sand from the neighboring Falk foundry and nearly 900,000 cubic yards of fill from the reconstruction of the adjacent freeway. The photo shows sunflowers growing in the new Menomonee Valley Park. (www.renewthevalley.org)

Wilkie D. Ferguson, Jr. United States Courthouse — This facility, located in Miami, FL, was designed by Arquitectonica International (ARQ) and Hellmuth Obata + Kassabaum, Inc. (HOK). The 546,000 square foot project includes 14 district courtrooms, two special proceedings courtrooms, and office space for the U.S. Clerk of Court, U.S. Marshal Service, U.S. Attorney, U.S. Probation and Federal Public Defender. The design mirrors the American Judicial System by incorporating three distinct elements: A pair of twin towers which represent the two opposing sides of each argument pierced by a singular and transparent glass volume which represents the overriding truth and justice. Specifications required that construction materials be recycled during the demolition of the existing building and construction of the new facility. This resulted in the diversion of an estimated 2,600 tons of material from Florida landfills. Facility materials included 25 percent maximum content fly ash concrete, which helped keep the structure as thin as possible and also resist hurricane and blast forces. In addition, this project incorporated numerous energy efficient and other environmental features. (www.arquitectonica.com *and* www.hok.com)

Photo by Frank Greenwell

Woodrow Wilson Bridge Replacement Project — Located on the Capital Beltway on the southern edge of Washington, D.C., this project focused its environmentally friendly practices on the recycling of construction and demolition materials from the pre-existing Woodrow Wilson Bridge (WWB). All of the asphalt (250,000 cf) on the old bridge deck was milled and recycled and all of the structural and bascule steel (8,000 tons) was recycled. An estimated 60,000 tons of concrete in the old WWB is being used to create artificial fish reefs in the Chesapeake Bay and an additional 12,500 tons of concrete piers and foundations were used on site for haul road construction, backfill, and erosion and sediment control. In addition, the wash water and concrete waste coming from multiple on-site batch plants, tens of thousands of concrete trucks, and large concrete hopper barges were collected and recycled. A large portion of the wash water settles out and hardens into concrete which is either reefed or used on site. The excess wash water is allowed to settle to avoid turbidity issues, mixed with CO_2 to balance the pH, and then sprayed on Project haul roads to allay dust. The project also instituted a multi-office recycling program to support the thousands of professionals working on the project daily. (www.wilsonbridge.com)

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