Beneficial Use Case Study

ASU Interdisciplinary Science and Technology Building

Coal Combustion Product Type
Class F Fly Ash

Project Name
ASU Interdisciplinary Science and Technology Building

Project Location
Tempe, Arizona

Project Participants
McCarthy Building Companies, Hanson Aggregates LLC, Thornton Tomasetti, Salt River Materials Group, GCP Applied Technologies, Architekton/Grimshaw, Buro Happold

Project Completion Date
December 2021 (projected)

Project Summary
The Interdisciplinary Science and Technology Building 7 (ISTB7) at Arizona State University (ASU) is intended to serve as a new gateway to the school's Tempe campus. The 281,000-square-foot building will house research facilities focusing on the sustainability of food, water, and energy. Consistent with the goals of the research that will be carried out within the complex, the building's designers strove to reduce ISTB7's carbon footprint by substituting cement with high volumes of Class F fly ash in all of its concrete elements.

Project Description
From the outset, the design of ISTB7 aimed to minimize the environmental impact of the materials and processes related both to the building's construction and over its life-cycle. To that end, developers of the project—which will house ASU's School of Sustainability, the Rob and Melani Walton Sustainability Solutions Service, and the Julie Ann Wrigley Global Futures Laboratory—are targeting Platinum LEED certification; zero net use of energy and water; and zero net generation of landfill waste.

Because the five-story building incorporates roughly 20,000 cubic yards of concrete, use of recycled and lower-carbon construction materials is a critical element in attaining LEED certification. Contractor McCarthy Building Companies worked with Hanson Aggregates, structural engineer Buro Happold, and fly ash supplier Salt River Materials Group to develop concrete mixes that employed a 40 percent substitution of Class F fly ash for portland cement.


Photo: ASU

High fly ash mixes were used for structural concrete required to achieve a range of strength requirements for elements including slabs on grade, caissons, decks, walls, and columns. Beyond the concrete mix's strength and sustainability requirements, its use in exposed applications—including stairs, soffits, and flooring—meant it needed to be aesthetically pleasing as well.

In a construction first for Arizona, Buro Happold engineers embedded hollow plastic balls in the concrete—its proprietary "BubbleDeck" system—to reduce both the amount of concrete needed for placement and the weight of each slab. The lower weight of these structural slabs, in turn, allowed for reductions in the weight and size of other weight-bearing elements.

In addition to its advanced concrete technologies, ISTB7 will incorporate a range of other sustainable processes and features designed to minimize its environmental footprint, including treatment and recycling of sewage for use as gray-water, use of photovoltaics and sunshades, and incorporation of a five-story atrium biome to filter waste air.