Beneficial Use Case Study

York University Computer Science Building

Coal Combustion Product Type
Canadian Standard (CSA) Type CI Fly Ash

Project Name
York University Computer Science Building

Project Location
Toronto, Canada

Project Participants
Busby + Associates Architects, Lafarge Canada, Van Nostrand di Castri Architects, Yolles Partnership, Ellis Don Construction, Ontario Ready-Mix

Project Completion Date
2022

Project Summary
Facing growing enrollment and a firm commitment to environmental leadership, York University commissioned a new Computer Science Building designed to showcase sustainable construction in a northern climate. The facility was designed to integrate energy efficiency, natural ventilation, and durable materials into a cohesive whole. Because cement manufacturing is carbon-intensive, the project team focused on reducing its environmental impact by replacing a substantial portion of portland cement with fly ash—lowering emissions while producing durable, high-quality concrete.

Project Description
Central to the project team's sustainability strategy, most of the building's interior concrete—representing approximately 80 percent of the building's total concrete use—was produced using mixes in which 50 percent of the portland cement was replaced with CSA A23.5 Type CI fly ash. The design team also specified a 50 percent fly ash replacement for all cast-in-place concrete elements.

Using such a high proportion of fly ash required coordination between the supplier and the contractor. Prior to placement, the project team reviewed procedures for finishing and curing under both summer and winter conditions.

Despite early concerns that high fly ash mixes might delay strength development, the concrete performed exceptionally well in the field. One-day strengths of approximately 2,300 psi were achieved on many placements, and the specified 4,350 psi strength was typically reached within seven days, with 28-day requirements comfortably exceeded.

Crews found the concrete easy to pump, place, and compact. Even with reduced water content, the fly ash improved flow and workability, producing smooth, consistent finishes. In fact, the resulting surface quality was so high that the architects ultimately chose to leave more of the structural concrete exposed than originally planned, incorporating it into the building's architectural expression. Beyond aesthetics, the dense, fly ash-rich concrete also provides low permeability and enhanced long-term durability, helping protect the structure from moisture intrusion and environmental exposure.

Crews placed about 6,540 cubic yards of concrete, incorporating roughly 500 cubic yards of fly ash sourced from the

Atikokan and Thunder Bay generating stations in northern Ontario. By replacing half of the cement across the project's cast-in-place concrete, the building avoided approximately 940 tons of carbon dioxide emissions.

The building received the 2002 Governor General's Award (Canada) and the World Architecture International Green Building Award, underscoring how high-volume fly ash concrete can contribute to sustainable, high-quality commercial construction without compromising schedule or performance.