If best practices in structural engineering are exemplified by projects that ideally suit the client's needs while increasing efficiency and reducing cost, the York University Life Sciences Building meets that test. To help achieve those goals, designers used a reinforced concrete structural system, including reinforced concrete shear walls around the building cores and an innovative reinforced concrete floor system.

Best Practices Exemplified Objectives

The laboratory building required intensive mechanical services, leading to one of the project's primary concerns: the coordination of mechanical and electrical services. To help meet those needs efficiently, designers specified a flat plate voided concrete slab system by BubbleDeck® for the floors, its first use in the province.

**FLAT PLATE VOIDED CONCRETE SLABS**

Reinforced concrete was determined to offer the best structural option for this facility due to its ability to provide a robust and economical structure. It also provided strong aesthetic options, including the use of architectural concrete columns and slab soffits around the day-lit perimeter of the building.

The initial plan of using traditional reinforced concrete slab systems would have worked well for the 9,600-square-foot bay, but the long spans required beams, which would have increased floor-to-floor heights as well as effecting coordination of mechanical services. As a result, designers value-engineered the plan to take advantage of the benefits of the BubbleDeck® system.

The BubbleDeck® system utilizes hollow, plastic balls made of high-density, recycled polyethylene (HDPE) that are spaced regularly within the overall thickness of the concrete slab. These are commonly referred to as void formers. The void formers reduce the overall weight of the floor system, which results in smaller foundations and columns; larger allowable superimposed loads for given span lengths; economical longer spans without beams; reduced floor-to-floor heights; accelerated construction schedules; and inherent fire resistance.

**ASSEMBLED ON-SITE**

A semi-precast BubbleDeck® system was used in this project. Void formers are positioned within wire support cages to create modular grids (cage modules), which are locked between the upper and lower reinforcement layers in the concrete slab. These precast units were delivered in 3-meter by 9-meter plates and were assembled on site, supported on temporary shoring. Mild reinforcing bars are commonly used as the main flexural reinforcement in the slab. Top reinforcing bars were placed in the field, and a layer of concrete was cast to the required overall thickness. Once the top layer of concrete is cast over the cage modules, a two-way slab system of uniform thickness is created.

The resulting slab provided a fully continuous, lightweight, two-way reinforced concrete flat plate. The BubbleDeck® system decreased slab weight by approximately 30%, reducing both seismic forces and foundation requirements. It also eliminated the need for drop panels and beams, maximizing floor-to-floor heights. Due to its factory-controlled production, the slabs were cast with such high architectural quality that concrete soffits were left exposed in key locations.