Promoting Underground Athletic Activities

National Cathedral School builds down, not up, to create a state-of-the-art athletic facility.

"Going underground" doesn't mean what it used to. In the turbulent sixties, it was the mythical place where fugitives escaped the long arm of the law. It was also the place where journalists felt free to espouse views perceived as subversive by conservative policymakers and the press. Today "going underground" is a proactive design strategy used by a creative cadre of architects and engineers to address ever-evolving site requirements and their impact on facility design and construction.

Site requirements were an initial cause of concern for the Washington, D.C.-based National Cathedral School (NCS). A needs assessment revealed that the private, all-girls school, located on the stately grounds of the Washington National Cathedral, required a larger gymnasium, in addition to other facility renovations. "It was clear to us if we wanted to meet the needs of our students, we needed to build a large facility," notes former board member Llewellyn Bensfield. "The challenge was how to build such a facility on the existing grounds, which were designed to provide open views of the Cathedral." Given limited space to build above ground, school officials opted to create the new facility beneath the girl's practice field. "If we built below ground," Bensfield notes, "not only would we improve and enlarge the practice field, we'd also maximize existing green space."

School officials recognized that selecting the right design and construction team to lead the school's efforts was critical. "At the time," Bensfield cites, "we knew this was going to be an engineering feat. We also knew we didn't have many examples to study."

Architectural responsibilities were awarded to Cannon Design. Heery International was charged with project management. "We were offered several design options," noted Dueane Dodson, Heery's project manager. "Finding the one that maximized green space and Cathedral views - while protecting the groves of 100-year-old trees proved challenging and required extensive study and review."

A lengthy approval process followed, involving Cathedral officials, historic preservation review board members, historic society members, parents and the surrounding community. "One of the lessons we learned early on," Bensfield offers, "is that no facility is without neighborhood groups that have a vested interest in how a facility is built. Compromise is an integral part of the building process," Bensfield adds. Adapting plans to make the building face a certain direction, moving cooling and heating equipment farther from the neighborhood, and signing a facility usage agreement to limit access were just three of approximately 80 concessions NCS made to gain community buy-in.

Bensfield and Dodson believe that four of the key issues that any owner or facility manager "going underground" must address are waterproofing, drainage, lighting, and HVAC. "We spent a lot of time discussing and exploring options for building and waterproofing what we called "the bathtub," notes Dodson. "Before putting on the roof structure, it literally looked like we were building a bathtub. In our project, however, we were trying to keep the water out."

Rather than a conventional roof, most of the building is topped by one of the school's two fields that were constructed as part of the project. "We used a continuous waterproofing membrane over the roof, down the sides and under the slab-on-grade," Dodson says. Insulation, gravel, soil, an irrigation system, and finally grass, cover the initial waterproofing materials on the roof.

Groundwater issues dictated the design of a special drainage system. "This building is 14 feet below the water table," Dodson says. "With this much finished space below the water table, we were very concerned with the potential for water migrating into the building. To relieve the hydrostatic pressure of the groundwater, we installed a perimeter drainage system around the entire foundation wall. An extensive maze of under-slab drainage pipe routes the groundwater to a sump pit where it is pumped into the storm water collection system."

Massive windows mark the above-ground front entrance to the building, allowing ample light to flow inside. "We really had to overcome concerns that walking into this building would be like entering a cave," Bensfield notes. "If anything, we went overboard on the lighting." While a decision to place glass walls against the fitness and weight rooms met with initial resistance for fear of flung book-bags shattering glass walls, Bensfield held firm, knowing the light from above would bounce off the glass wall, providing an even greater sense of light. Soft-colored walls also add to the sense of light felt throughout the facility.

Visitors who wonder how air flows in and out only have to wander into the adjacent garden to view the air shaft hidden amongst the blossoming flora. "The greatest challenge we faced with the HVAC system wasn't as much about intake and exhaust, but how to site the HVAC equipment that normally goes on the roof," Dodson cites. "Rather than place them onsite, the decision was made to put these systems in a separate central plant located away from the neighborhood. The challenge then became how to gain access to the utilities from across the Close without adversely affecting a number of 100-year-old trees adjacent to the new building."

Another requirement of going underground is the sanitary sewer ejector pumps located in the pump room. "Most school buildings," Dodson notes, "do not need these because their toilets aren't typically located below the sewer systems. Here, they are. We've even got backup pumps just in case."

Although it took four years to design and construct the facility, Bensfield knows it was worth the wait. "Our vision was to create a cutting edge facility that would serve future generations of students," Bensfield said. "People who come to visit are just blown away. This facility, with its one-of-a-kind standalone climbing wall, state-of-the-art fitness and weight centers and dance room, has really lifted girl's athletics to a new level. It has had and will continue to have a great impact on both our athletes and non-athletes."

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