Salem State (Mass.) North Campus Transportation Center was the first newly constructed garage to earn Parksmart Bronze.

CERTIFIABLY PARKED

Sustainable parking structures join the built community

EVERYTHING CAN EVOLVE, EVEN THE HUMBLE PARKING GARAGE. Today, pioneering garages are accommodating electric cars, using wireless power and operating sustainably. Parking structures in the 21st century could soon be a link between optimized buildings and smart cities.

Parking plays a role

Parksmart (formerly Green Garage Certification) is the world's only rating system recognizing high-performance, sustainable garages. The nascent voluntary certification program was initially conceived in 2014 by the International Parking Institute, the world's largest parking association, and the Green Parking Council. Parksmart today is affiliated with the U.S. Green Building Council and administered by Green Business Certification Inc. (GBCI).

"The parking industry is discovering how to leverage garages so they play a more sustainable role in a community's mobility and transportation," said Paul Wessel, director, Parksmart. "An infrastructure that promotes increased use of mass transit, is pedestrian-friendly and supports alternative energy vehicles and ridesharing, are planning goals that can intersect with green parking structures."

As of March 2018, 95 new and existing Parksmart projects (registered or certified) exist in 22 U.S. states and five countries, totaling nearly 132,000 parking spaces. Of the certified projects, Wessel estimated one quarter are new construction.

Parksmart was designed, in part, to highlight methods for lowering garage energy usage through lighting, ventilation, controls and requisite commissioning. Certified garages have averaged up to a 25 percent reduction in their operational costs compared to the national average. Parksmart structures can feature thoughtful siting and design that conserves energy and water. A Parksmart garage might also use fewer and greener construction materials.

"In new construction, we've also found Parksmart gets the architect, engineer and the design team together early in the project, including an owner's sustainability teams, to engage in a more thoughtful, holistic discussion of the structure near term and into the future," Wessel said.

MASSACHUSETTS STATE COLLEGE BUILDING AUTHORITY

Parksmart offers new construction certification levels of Bronze (110–134 points), Silver (135–159 points) and Gold (160-plus points). Existing structure retrofits must earn 90-plus points for Pioneer certification. Forward-thinking and sustainable practices are distributed among three categories: management, programs, and technology and structure design. The GBCI is discussing adding a recertification component to the program. Parking lots are not eligible.

ECs step in

An important share of sustainable practices falls to the electrical contractor, who may serve as the installer, electrical designer and adviser.

"The major source of energy use in a parking garage are the lighting and ventilation systems," Wessel said. "Electrical contractors understand energy-efficiency and power needs. They know new technologies—be they sensors, energy-efficient lighting, or electric vehicle [EV] charging stations. We are seeing a switch to LED lighting and high-efficiency fluorescent. Developers want to work with lighting technologies that could last 10 years or more. More garages are also integrating lighting controls. Video sensors may be next—over the next five years—for added security."

Garage owners are building their structures to accommodate future needs. For instance, conduit might be laid for EV charging stations to be installed when needed.

A campus opportunity

The Massachusetts State College Building Authority (MSCBA) dons many hats. Three of its responsibilities are designing, constructing and overseeing the management of residence halls, and student activity facilities on the nine state university campuses. Financing is another.

Edward H. Adelman, the MSCBA's executive director, said discovering Parksmart allowed him to pursue green bond investment to construct a four-story garage called the Transportation Center for the Salem State North Campus outside Boston. Earning Bronze, the center was the first new construction garage recognized with Parksmart certification. At 237,269 square feet, the garage provides 799 parking spaces and eliminates three asphalt surface parking lots—it was built atop an old lot. An interactive, smart garage was an important goal.

The seven-level underground garage at Boston's Post Office Square earned Parksmart Pioneer certification through such features as efficient variable-speed drive fans for garage ventilation, LEDs, a lighting control system and EV charging. The garage offsets 100 percent of its energy use through a solar purchase power agreement. The garage roof was developed as a 1.7-acre public park.

"We sought electrical contractors comfortable with controls that could read time of day and provide light level activation in the presence of vehicles or pedestrians," Adelman said. "This was a challenge. The controls required a break-in period. Through trial and error, we discovered the control system needed to be resilient to outdoor weather conditions (thermal and moisture control). The lighting controls are internet-enabled with an IP address. We retrofitted shielding on some of the light fixtures to remedy unwanted glare and light spill. Contractors also wired for a fire alarm system and power for a pair of elevators."

Ground-level parking was designed in part for rideshare and alternative or low-fuel vehicles, which required installing half a dozen EV stations that offer free charging. The garage is tailored to serve commuter students, campus residents and staff with drop-off spots for those using public transportation. A gated entry system can recognize parking passes.

"We think the name, the Salem State North Campus Transportation Center, really captures what we designed and built," Adelman said. "It is the principal stop on campus. In all, we built a garage that reduces car idling, uses little energy, conserves water (filtered retention tanks), land and resources (including storm water management)."

Like Salem State, garage owners are evaluating the value of wireless.

"The internet of things (IoT) provides connectivity and is increasingly being seen as a parking asset for operation efficiency and customer satisfaction" Wessel said. "IoT can allow for gateless vehicle entry and exit, [enable] prepay or mobile payment, reduce idling and emissions, and save time. Its low energy draw can help power LED lighting."

The West Village in Chengdu, China, is the first certified Parksmart Bronze project outside the United States.

The Cypress parking garage at Fort Lauderdale-Hollywood International Airport was the first facility to earn Parksmart's Pioneer certification. An advanced, efficient HVAC system, valet EV charging, and tire-inflation stations are a few features of the parking structure.

Accommodating air travelers

The Cypress parking garage at the Fort Lauderdale-Hollywood International Airport (FLL) in Fort Lauderdale, Fla., is the first existing airport parking facility to earn Parksmart's Pioneer certification. The green retrofit of the 2005 structure was embraced by the airport, parking operator SP+, and Broward County.

Daniel Ciarcia, LEED Green Associate and general manager of Two Willows Consulting LLC, served as sustainability consultant. His background in electrical engineering helped to advance the energy efficiency of Cypress, the largest of the airport's three parking garages. Having been with the former Green Parking Council, Ciarcia was a developer of Parksmart.

"Cypress already had a lot of initiatives in place that were sustainable in nature," Ciarcia said. "I looked at what was done and then identified what high-value efforts we could pursue to earn additional certification points. SP+ and I introduced the Parksmart program to the other partners to show how sustainability could be taken to a higher level in the parking structure. That included the addition of EV charging stations. We located them in a valet area so vehicles could be moved after they were charged for later driver reclaim."

Tire-inflation stations were installed near a common driveway for customers needing tire assistance. Prior to Parksmart, the garage already featured an advanced building management system to monitor and control HVAC, fire suppression, air quality, elevators and lighting. The airport's Palm and Hibiscus garages are currently undergoing further sustainability upgrades for Parksmart submission. Ciarcia serves as adviser.

This three-garage effort is part of a Parksmart campus pilot to certify multiple garages under single ownership. All will be installed with Park Assist, a smart-sensor system for parking guidance that uses color-coded LED signals to indicate open parking spaces, which helps alleviate parking congestion and engine idling. Terminal parking kiosks were installed to help drivers find their car.

All the FLL parking garages will undergo a lighting overhaul with the installation of high-efficiency fluorescents, and LEDs that will provide deeper lighting control and future management system capabilities. Exterior lights were already controlled through photo sensors.

The garages were built to both aesthetically complement the Florida landscape and provide better stormwater management, point-earners in Parksmart. A recycling program for paper, plastic, aluminum and other trash recyclables also was instituted, winning certification points.

The nine-level Cypress garage stands at 4.5 million square feet and features 6,337 parking spaces, retail, a dozen fleet operators and three floors of rental car operations including an entire level dedicated to rental car refueling, servicing and detailing. Though rental companies did not participate in Parksmart certification, they were already committed to sustainable practices including reclaiming and processing water used in cleaning and using minimum amounts of soaps and cleaners.

"The upper floors of the garage are open, so mechanicals are only needed for the ground level," Ciarcia said.

Future thinking

It is conceivable that sustainable garages could serve as smart grid players.

"There is a huge opportunity for parking structures to engage in the electrical grid through smart grid participation," Ciarcia said. "You could conceivably feed power from EV stations and charged electric vehicles into the grid during peak energy periods or use it as backup power. Garages could host solar or wind power, or energy-storage battery units placed in unused corners of the garage."

Solar and energy storage are key points for Parksmart. Salem State had planned to add a solar array to the roof of its Transportation Center but faced public resistance due to the added height. MSCBA staff plan to revisit the idea in the future.

"If you look at how LEED entered the market, it worked to deepen the whole concept of a high-performing, sustainable building among builders, vendors, code organizations, and so forth," Ciarcia said. "I very much see and expect the same to happen with the parking industry. It is a neglected industry in terms of sustainability and [decision-makers] are playing catchup."

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