



# Past Hoboken:

## Automated Parking Facilities Enter Hopeful New Era

By Charlie Munn

Hoboken.

That one word may have delayed the takeoff of an entire industry. As one of the first installations of a totally automated parking garage in the U.S., Hoboken's effort was closely watched by the parking world.

It didn't go well ... until now.

"I think our garage was probably the single biggest hindrance to the growth of the automated parking garage industry in this country," says John Corea, director of the Hoboken Parking Utility, of a saga that began nearly 10 years ago.

After years of controversy, politics, allegations and finger-pointing, the troubled project finally re-opened

in January 2008. "It's been up and running for a full year now. It's been super-reliable," says Corea, who was monitoring the garage's performance on the Internet when contacted for comment. "We have a few issues now and then as you have with any mechanical system, but it's going so well we're getting ready to open it up to our transient base."

### As Hoboken Goes, There Goes North America?

Despite a track record of success abroad and a long, illustrious history here at home, the automated parking facility (APF) has struggled for widespread acceptance here in North America. With the turnaround in Hoboken, that may be changing.

"Everyone loves it," says Stan Perelman of Jani Real Estate. "It's super efficient and we've had no problems." Perelman's firm was watching the Hoboken example and now he exclaims, "I can't believe we waited so long. We're looking now at doing a couple more just like this one."

Perelman's new working installation at "One York" in Tribeca, downtown Manhattan, was completed in October 2008. This 32-unit condominium building houses what the system's provider, Park Plus, Inc., calls the "first fully automated parking system in the USA that uses sophisticated pallet-less technology for vehicle transfer." Residents of One York can view the mechanized, software-controlled parking process through a viewing window at grade level.

North American developers like Perelman are finally catching on to the qualities that have helped APFs establish a strong niche market around the world. “Customer convenience and security are the biggest advantages,” says Don Monahan, P.E., vice president for Walker Parking Consultants.

“It’s analogous to automated valet parking,” Monahan says. “Also the ability to achieve significant parking spaces in a small footprint. Many high-end condo projects are considering automated parking. On a condo project in Bellevue, Washington, 32 parking spaces were provided on four levels in a 32 by 60 foot area.”

### History Repeating Itself

The advantages of “stacking” type technologies have been evident since the birth of the parking industry in the early 20th century. “Mechanical” garages used elevators that, in those early days, were put into motion by pulleys and horses. Later, steel-framed “car stackers” were deployed to double or triple the number of cars that could be parked in the equivalent of one car space. These devices, while mechanically powered, still required human operators, however.

One of the first mechanical garages was developed in Paris, France, by Auguste Perret, according to author and practicing architect Shannon McDonald (See sidebar on page 26 on McDonald’s recent book on the history of parking garages). Perret, like many in the parking industry was a true “Renaissance” man, noted for his skills as an architect, builder and civil engineer. McDonald notes that it was this unique confluence of talents that enable him to conceive, design and build his facility, the Garage Rue dePonthieu, in 1905. Imitators followed.

While Europeans may have invented the mechanical garage, the forerunner of today’s automated parking facilities, “in the 1920’s, innovation

was simply phenomenal in the U.S.,” McDonald says. “Some of the facilities were as high as 25 stories and a number are now adaptively re-used as apartments and condominiums and historically designated for their beautiful contribution to the urban fabric.”

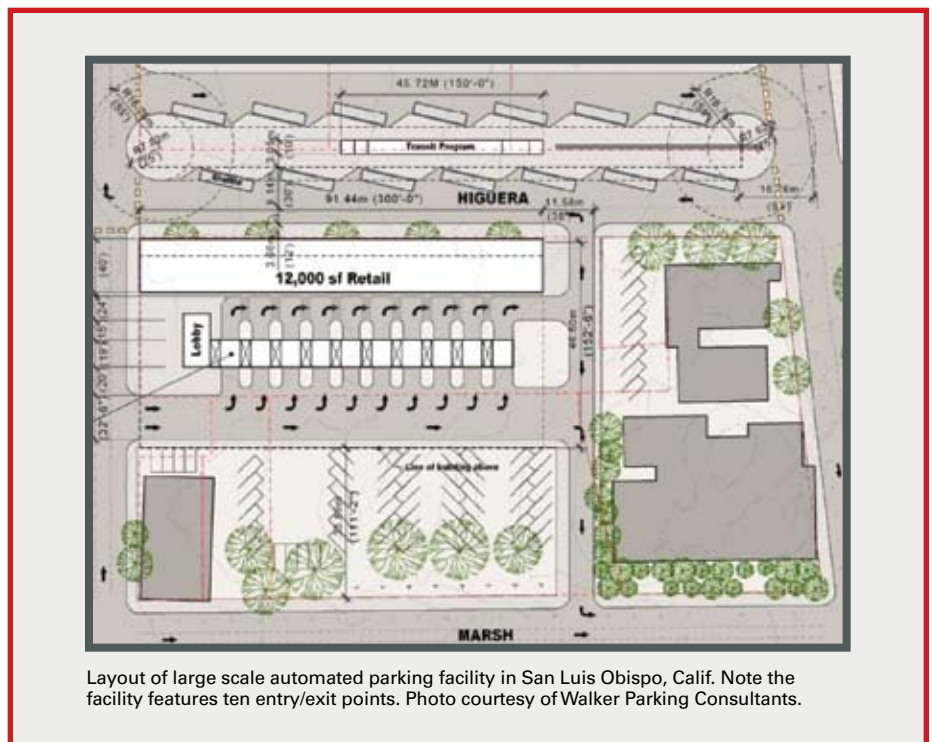
There was a resurgence in automated parking facilities in the 1950’s, McDonald’s research discovered. “There have been all kinds of horror stories but the truth is some of those automated garages from the 1950’s are still in use today,” McDonald states.

### How They Work

Automated, mechanical parking structures use computer-controlled vertical lifts and horizontal shuttles to transport vehicles from an arrival area to a remote compartment for storage without human assistance, explains Walker’s Monahan, who also serves as chairman of the NPA’s Automated Parking Facilities committee.

There are generally two types of designs, Monahan says. “One consists of horizontal shuttles at each level of parking with separate vertical lifts. The second system consists of a single transport device that moves horizontally on rails at the lowest level with the vertical lift mechanism within the same transport device. There are also pallet systems and non-pallet systems. Vehicles may be transported on a pallet or the transport device may pick up the vehicle by the wheels and deposit the vehicle on a rack in the storage space.”

“The significant...difference between manufacturers is whether the system functions with a crane or elevator/lift,” says Avner Barak, sales and marketing director for the Automated Parking Solutions System Division at Unitronics. Unitronics is credited by Hoboken’s Corea as being the savior of the city’s experiment with APFs, retrofitting its software and operating system into a previously constructed design.



Layout of large scale automated parking facility in San Luis Obispo, Calif. Note the facility features ten entry/exit points. Photo courtesy of Walker Parking Consultants.



*The Parking Garage: Design and Evolution of a Modern Urban Form*, by Shannon Sanders McDonald, AIA, and released in early 2008, traces the development of the parking deck as a design form in an urban landscape.

Examining the parking garage from an architect's perspective, McDonald, according to the ULI website, "chronicles the evolution and future of parking garage innovations from early elevator and ramp designs, through the modern, sustainable structures of today" and notes that is "vividly illustrated with hundreds of photographs throughout."

A review of the book by Will Van Dyke of Kimley-Horn and Associates can be found in the October 2008 issue of *Parking* magazine. Also, you can visit the Urban Land Institute's web page on the book at [www.uli.org/parkinggarage](http://www.uli.org/parkinggarage) for an interactive timeline.

Barak explains, "Typically, the smaller systems use cranes, while larger systems use lifts. Also relevant is whether the manufacturer can provide the fire and building and safety requirements to conform to governmental codes and restrictions. Significant differences in manufacturers design vary for throughput volume, average storage and retrieval time, design complexity, terrain and geometry constraints, advanced software and control techniques, and maintenance and manual intervention required."

Walker's Monahan points out that many manufacturers have experience in non-parking arenas and this base of business may help them ride out a slow acceptance period in North America. "Most manufacturers are divisions of larger steel conglomerates based overseas such as Westfalia, Wöhr, Krupp, Stolzer Parkhaus, Klaus, etc., or automated parking is an extension of their main business such as Boomerang Systems (amusement rides) and LTW (Doppelmeier ski lifts). The U.S. market is an extension of their overseas operation. Also, many of these firms also provide automated storage systems in warehouses such as Quad Graphics in Milwaukee (Westfalia). LTW provides automated storage of boats at marinas."

Likewise, publicly-traded Unitronics has dozens of working installations in the much more complex field of automated logistic systems (automated warehouses, distribution centers), from which it derived its ability to design, build and maintain automated parking systems. The firm has many projects in different phases of design or execution in the United States, Europe, Mexico and Israel.

In business since 1968, Park Plus established itself as a market leader in mechanical parking stackers and related technologies. Since its acquisition by storage and retrieval specialists in 1996, Park Plus has pursued development opportunities in high-density vehicle storage systems.

### Why Not Here?

"America is very different from Europe and Asia," McDonald opines. "We do not need to build these structures because of limited availability of land; we typically have other options. For Americans it's usually more about land use choices." McDonald describes herself as "an advocate of finding the best architectural solutions for the location, site and program and developing more long-term sustainable choices for people, our living places and the environment."

**"Automated parking facilities provide a potential solution to accommodating parking on constrained sites under the right circumstances. They are here to stay."**

*— Don Monahan, P.E., Walker Parking Consultants*





The One York residential condominium in New York City features a totally automated parking garage. Photo courtesy of Ryan Astrup, Park Plus, Inc.

Ryan Astrup, associate architect at Park Plus, agrees, noting the demand for high-density parking systems in Europe and Asia has been more profound than in North America “due to space limitations, building restrictions and the pure need that has forced a traditional garage to become an efficient and more sustainable structure.”

“Also,” Astrup says, “Europe and Asia have been on the forefront of storage and retrieval technologies, and applications of these technologies have been accepted widely as a normal advancement in parking thinking.”

Unitronic’s Barak also offers up a commonly heard refrain. “The main concern we encounter is the fear from new technology,” he says. “Technologies such as the cellular phone, the hybrid car, etc., have evolved faster in Europe and the Far East before flourishing in North America. Automated parking systems are not different in this aspect.”

## Considerations in Choosing a APF

In the opinion of some, another reason for slower acceptance of APF is the simple fact that it is a niche product that fulfills a specific need.

“They are most advantageous on sites that are too small to design and construct a ramp-access garage,” says Monahan. “If your site is adequate for a ramp access garage, then do it. If you have limitations on height or depth in the ground, then automated garages may be the solution as they can accommodate the same amount of parking spaces in half the volume of a ramp-access garage.”

However, automated parking does not meet demands of crowd events like theaters and stadiums due to the high volume requirements during a peak time, Barak of Unitronics notes.

Monahan concurs with this assessment. “They are not well suited for large capacities or for uses that generate high peak hour volumes,” he notes. “The number of entry/exit compartments required for large

garages presents a challenge for access design at the street level. An 800-car downtown garage in San Luis Obispo required 10 entry/exit compartments. Accommodating the access roads in and out of the structure consumed extensive site area at the street level.”

## Number of Transport Devices is Key to Customer Satisfaction

Larger systems that are designed for use during peak periods usually have more than one set of devices to cater for multiple, simultaneous storage/retrieval cycles, says Park Plus’ Astrup. “Entry/exit stations are also simply dual-directional, with the ability to serve as either... Additional vehicle shuttle devices will also provide the ability to handle multiple retrievals at the same time. Further, the software for the system can be programmed to allow earlier retrieval requests, and can place the vehicle in a storage area close to the exit station for faster retrieval.”

Retrieval times will vary upon these factors. Hoboken’s Corea says his facility experiences a range of two to

## “Sustainable” Advantages of Automated Parking Systems

“Sustainability currently drives the building industry,” says Ryan Astrup, AIA, of Park Plus, Inc. an APF provider. “Automated Parking Systems provide tools that benefit projects in their goals in achieving these critical elements of sustainable design.” When considering the benefits of automated parking garages, Astrup urges consideration of the three basic categories of sustainable design as it applies to APFs:

### Environmental:

- minimized spatial requirements: smaller building footprint
- efficient land-use application
- less building materials
- reduced or no ventilation required (no running vehicles in system)
- reduced or no lighting (only required for maintenance)
- energy efficient architecture
- no ramps, elevators or stairs required
- modular design allows custom fitting of garage for site constraints
- no running engines in garage

### Economic:

- more cost/space effective than traditional garages
- increased capacity, therefore increased revenue potential
- minimized maintenance costs for HVAC
- minimized construction time

### Social:

- localized collection stations (no need to “hunt” for parked vehicles)
- increased service aspect for vehicle delivery.
- safety: no dark, quiet and intimidating areas to walk through
- theft, vandalism or accidental damage eliminated (no people in storage area)
- parking operator can manage garage in real-time

five minutes on average, not much different from the time a parker would experience in retrieving his/her own vehicle in a self-park garage. This is within the norm, says Monahan.

“The industry standard is that the system should be designed for a maximum storage or retrieval time of two minutes from the farthest parking space,” he says. “The number of lifts and transfer devices must be designed to achieve this criteria.”

Monahan also notes the impact of “dwell time” in the service rate of the entry/exit compartment. “Dwell time is the time for patrons to collect their pets, children and belongings and vacate the entry/exit compartment... dwell time averages approximately 40 seconds. This must be added to the storage/retrieval time to determine the total time to store or retrieve a vehicle. Repeat users will have a shorter dwell time than unfamiliar users.”

### Construction and Cost

Most manufacturers of APFs say that the construction time averages 10 – 12 months. Other factors affect this, as Walker’s Monahan reveals. “Because automated garages are generally much smaller on average than ramp access garages, the time is somewhat longer than a ramp access garage due to the time to manufacture the machinery,” he says. “Oftentimes, the automated garage is in the basement of a much larger building. The shell of the building must be completed before the automated machinery can be installed. This factor could extend the completion time.”

Manufacturers claim cost equivalence with concrete garages. “Unitronics’ technology makes it possible to provide automated parking systems at similar or less cost per parking space than conventional parking,” Avner Barak states, “Our client can choose between dramatically reducing the total volume of space required for parking spaces or double/triple or more the number of cars in the same space. This provides the option to add more income producing space for condos, offices, retail and other uses.”

Monahan qualifies that point, stating, “The cost is a function of the size of the automated parking facility. A small facility (less than 100 spaces) will cost on the order of \$30,000 to \$40,000 per space as the machinery is amortized over a relatively small number of spaces. The cost of a large automated parking facility (300 stalls or more) could be as low as \$20,000 per space.”

## Maintenance and Reliability

Most manufacturers, consultants and end users seem to agree that reliability of APFs is the same or better than that experienced for elevators. Therefore, preventive maintenance is vital to prevent breakdowns. Monahan’s experience has been that many failures are the result of a dirty sensor that disables the ability to transfer a car into a space.

“This type of failure is quickly and easily fixed,” he says. “Also, one can override the computer system to manually deliver a vehicle. However, this fix requires human intervention which defeats the purpose of the automated system.”

Similar to passenger elevators, APFs require experienced technicians to carry out routine service and maintenance on all equipment to extend the durability of the system. Regular lubrication of parts, cable ware, cable extensions, and rollers mandate routine inspection.

Failures can be significant; therefore, manufacturers emphasize redundancy in their designs, with backup vehicle transport mechanisms. Astrup says back-up generators and battery back-up supply units can be incorporated to provide additional energy in the event of a power failure. Should

the software of the Park Plus system experience a problem, trouble-shooting and reprogramming are instantaneous through a permanent Ethernet connection directly linked to the firm’s central control center.

Monahan suggests that if a patron’s vehicle cannot be retrieved, the manufacturer, as part of the operational contract, should provide an alternate means of transportation.

## The Future of Automated Parking Facilities?

After a slow start, APFs may finally be catching on. “I estimate that there are over 50 automated parking projects contemplated at the current time,” says Monahan. “In the next two to five years, there will be several new facilities constructed mostly for residential projects, rental car facilities, retail vehicle sales facilities or other uses with low turnover and low peak hour traffic.”

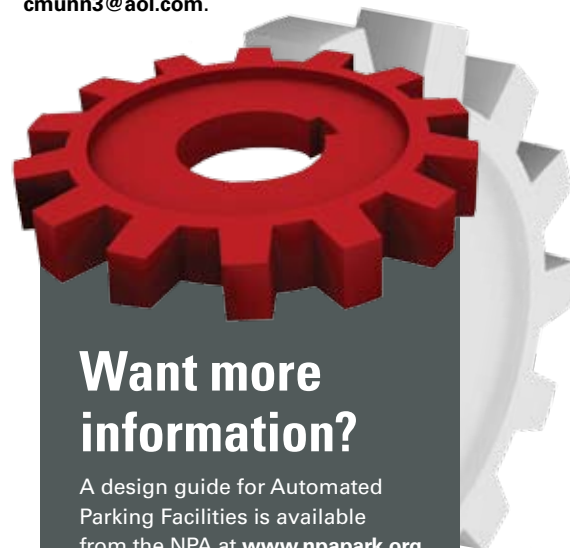
Park Plus’ Astrup feels there’s a sea change due to a variety of factors. “Automated garages are presently changing the building industry’s approach to conventional parking,” he says, “offering economic, environmental and social benefits that far out way traditional approaches to resolving the needs of the garage.”

Monahan points out rarely heard “good news” about APFs, like the 72-space automated garage at Summit Grand Parc in Washington, D.C. “It’s completely automated with no on-site personnel,” he says. “Maintenance is provided by Mid-America Elevator on an as-needed basis. There are very few service calls.”

The industry also banded together several years ago to promote the use of APFs, forming the Automated and Mechanical Parking Association.

As success stories like Summit Grand Parc, One York, and Hoboken become showplaces for the APF industry, the parking world may begin to warm up to the concept and technology. In spite of his city’s past experience, Hoboken’s Corea enthusiastically reports the city is planning several more APFs. “I believe in this industry,” he says unequivocally. ↗

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## Want more information?

A design guide for Automated Parking Facilities is available from the NPA at [www.npapark.org](http://www.npapark.org). Contact John Corea of Hoboken at [johncorea@msn.com](mailto:johncorea@msn.com); learn more about the One York project at [www.oneyorkny.com](http://www.oneyorkny.com); Shannon McDonald’s email is [s1027arch@aol.com](mailto:s1027arch@aol.com); Ryan Astrup can be reached at [ryan.astrup@parkplusinc.com](mailto:ryan.astrup@parkplusinc.com) and 973.574.8020; Avner Barak is at [avner.barak@unitronics.com](mailto:avner.barak@unitronics.com) and +972 3 9778854; Don Monahan’s email is [don.monahan@walkerparking.com](mailto:don.monahan@walkerparking.com). The Automated and Mechanical Parking Association has numerous resources on its website at [www.ampapark.org](http://www.ampapark.org).

**“I believe in this industry.”**

– John Corea, Director, Hoboken Parking Utility