

# SAVING SHOPPERS GARAGE

## THE HISTORY OF ONE OF BOSTON'S EARLY PARKING GARAGES AND THE PROJECT THAT RESTORED IT

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In the early 1920s, parking was becoming a significant problem in city centers. Automobile ownership had increased dramatically in the previous 10 years—from about 469,000 registered cars on the road in 1910 to about 9,241,000 in 1920.<sup>1</sup> By 1923, “traffic congestion in some cities was already so bad there was talk of barring cars from downtown streets.”<sup>2</sup> In older cities like Boston, MA, managing parking was increasingly challenging. When the Shoppers Garage on Boston’s Beach Street opened amid much fanfare in 1926, it helped alleviate a parking problem in the southern end of Boston’s congested commercial district. In a new concept for urban retailers, the garage was associated with Boston’s Jordan Marsh & Company. As the neighborhood around the garage declined and the garage changed ownership, the garage gradually became a victim of an aggressive environment and a series of inadequate repairs and improvements. By 2011, 85 years after its opening, the garage needed substantial rehabilitation to its interior structure and façades to continue to serve a Boston neighborhood undergoing a renaissance. This article traces the garage’s history and the project that restored it.

### HISTORY AND SIGNIFICANCE

With the tremendous growth in car ownership and traffic came the need to store cars when they were not on the road. This was especially true in Boston around the turn of the twentieth century. The need for parking was so acute that Boston’s famous Cyclorama, which displayed a 360-degree mural of Civil War battle scenes, was converted to a parking garage for electric taxi cabs around 1899.<sup>3</sup> Although private automobile clubs, such as the Massachusetts Automobile Club, offered full-service garages for their members,<sup>4</sup> public parking garages were relatively rare. Shannon Sanders McDonald, who has written extensively on the history of parking garages, believes the first garage in the United States open to the general public was likely W. T. McCullough’s Back Bay Cycle and Motor Company at 121 Massachusetts Ave. in Boston, which opened in May 1899 as “a stable for renting, sale, storage, and repair of motor vehicles.”<sup>5</sup>

The architecture of parking garages developed gradually over time. The first garages were ice rinks, converted stables, bicycle shops, and industrial

buildings. Initially, packing cars tightly into garages was the primary design objective. Because it was mechanics, chauffeurs, and garage valets, and not individual car owners, who parked the cars in a garage, easy public access to vehicles “was not considered a major disadvantage [in garage design], as it was rarely necessary to move many cars simultaneously.”<sup>4</sup> As a consequence, the earliest multi-story garages had flat floors and were either built into a hillside or had elevators and turntables, because elevators allowed for more space for parked cars than ramps.<sup>4</sup> Through the efforts of magazines such as *The Horseless Age* and the mass production of relatively inexpensive vehicles, the notion of cars providing freedom of movement inevitably led to the concept of self-parking, a phenomenon that first appeared in the 1920s.<sup>4</sup> Elevators were simply too slow and inefficient for large public garages. “By 1925, garages served by elevators alone had begun to disappear, as the ramp gained acceptance in parking garage design.”<sup>4</sup> Ramps proved to be “a sales talking point for garage operators advertising speedy service via the latest equipment.”<sup>5</sup>

The Shoppers Garage, designed between 1924 and 1925 by H. M. Haven and A. T. Hopkins Engineers, was on the cutting edge of modern parking garage design. When it opened in 1926, it was among the largest and most modern parking garages in the city and, at eight stories above grade, the tallest. The highest roof level is approximately 96 ft (29 m) above the sidewalk. The garage includes three half-levels of parking below grade and 16 half-levels of parking above grade, including the roof levels. It has a footprint of approximately 190 ft (58 m) parallel to the drive aisles by 106 ft (32 m) perpendicular to the drive aisles, and its total parking capacity is approximately 500 cars.

Haven and Hopkins’ 1925 structural drawings (which are now archived at the Boston Public Library) indicate that the garage would have a 6 in. (150 mm) thick one-way slab supported by beams spanning in the east-west direction and deeper girders in the north-south direction.

The garage’s main façade, along Beach Street, is 11 bays wide and approximately 190 ft (58 m) long. The ground and second stories featured red clay brick-wrapped concrete columns and brick-clad spandrels at the second floor level emblazoned

with “Jordan Marsh Company Garage” (Fig. 1). At the third-floor level, a decorative cast-stone cornice with an inset band of brick veneer stretched across the façade. Above the third floor, the upturned spandrels featured exposed concrete slab edges and cast-stone windowsills with brick veneer between the two. The columns at the east and west ends of the façade had concrete wings with stack-bond brick veneer and Art Deco-style cast-stone inlay elements between the wings. At the roof level, the brick parapet also featured cast-stone inlay elements. Cast-iron light poles and flag poles on top of the parapet accentuated the height of the building.

The Shoppers Garage’s reliance on only ramps to access the parking levels set it apart from other early garages in Boston. The now-demolished Portland Street and Eliot Street garages, which were contemporaries of the Shoppers Garage, had both internal ramps and elevators.<sup>4</sup> The North Terminal Garage on Commercial Street, which opened in 1925, was built into a hill and relies on an adjacent side street to access the upper floors of the garage. In comparison, the Shoppers Garage’s ramp system was new. A glowing article on the first page of the *Boston Daily Globe* from June 14, 1924, extols the garage’s “double system of d’Humy motor ramps from one floor to another, with separate ramps for the up as well as the down traffic. The installation of these motor ramps will be a novel departure in garage construction in the East.”<sup>6</sup> An illustration included in the *Boston Daily Globe* article shows the simplicity of the design (Fig. 2): cars enter at grade and travel up half a story at a time on ramps to reach flat parking levels. Traffic is one-way throughout the garage because the design uses separate ramps for ascending and descending.

The Shoppers Garage was the first public garage in the city associated with a major retailer: Jordan Marsh & Company, Boston’s most prominent department store. The *Boston Daily Globe* article exclaims that “this is believed to be the first time that this idea—a free parking station for department store patrons—has been tried out in any American city.”<sup>6</sup> In fact, at least four U.S. cities from Baltimore to San Francisco already had department stores with purpose-built parking garages at their downtown locations by the time the garage was announced in 1924.<sup>7</sup> What seems more likely is that the Shoppers Garage was the first department store garage in New England, and it is among the earliest of such garages still standing.

Unlike earlier garages, in which attendants or chauffeurs parked cars, the Shoppers Garage was a self-parking facility that catered to female shoppers. The *Boston Daily Globe* proclaimed: “It is planned that customers, especially women who drive their own cars, may drive directly to the garage and park their cars, thus avoiding the necessity of driving through



Fig. 1: Beach Street elevation of the Shoppers Garage, as published in the *Boston Daily Globe*<sup>6</sup> (Used with permission of *The Boston Globe*)

## SLOPING INCLINES TO SPEED HANDLING OF AUTO PARKING

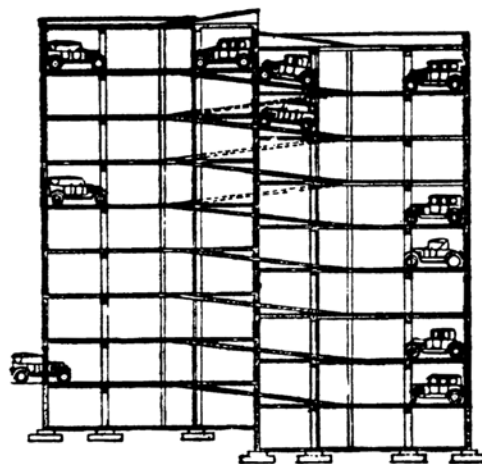


Fig. 2: Section of garage showing d’Humy Ramp System, as published in the *Boston Daily Globe*<sup>6</sup> (Used with permission of *The Boston Globe*)

congested traffic to the store. By this arrangement, customers will have the satisfaction of knowing that their cars are parked in a safe place and will be relieved of the anxiety caused by leaving cars unattended on the street.”<sup>6</sup> Although the garage was only two blocks from the Jordan Marsh flagship store, the store operated a shuttle bus to deliver patrons directly to the store.<sup>8</sup> The garage featured a women’s waiting room on the ground floor with a separate waiting room for men and chauffeurs on the second floor (Fig. 3). Initially, the garage did not offer repair services, but gasoline and oil were available on each floor. Because cars of the era were temperamental, the garage was fully enclosed and heated. The steel-framed windows had “factory-ribbed glass” with operable lites for natural ventilation.

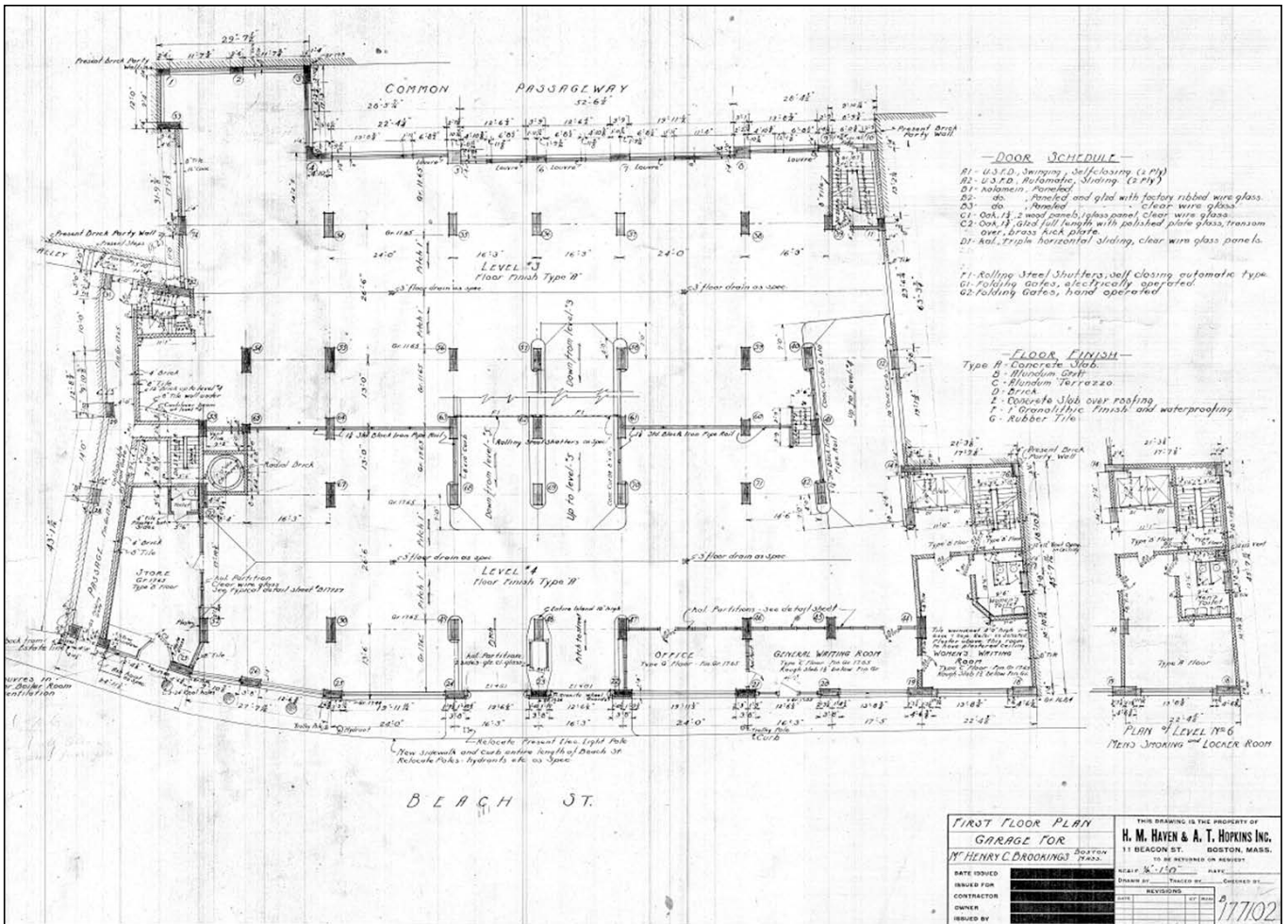


Fig. 3: Ground floor plan by H. M. Haven and A. T. Hopkins Engineers, archived at the Boston Public Library

Drawings in the Boston Public Library’s archive show that the garage underwent renovations in 1936 to include an automobile dealership, with the basement levels for storage of new cars and “cars taken in trade” as well as a repair shop. The ground-floor parking area was converted to a new service station with the addition of a third garage door, and the waiting rooms were converted into offices for the dealership.

### A CHANGING NEIGHBORHOOD

As suburban shopping malls took hold and Jordan Marsh moved its flagship store several blocks further north in about 1950, the downtown shopping district faded. What was once a vibrant part of Boston’s downtown evolved into Chinatown and an adult entertainment district. As its neighborhood declined and its ownership changed hands, the garage fell victim to deferred maintenance. A photograph of the building in the City of Boston’s Landmarks Commission’s collection from about 1975 reveals that the façade was in poor condition (Fig. 4).

Between 1977 and 1978, the garage’s owner converted the auto repair bay and office spaces along the Beach Street façade to four retail stores.

About this time, the steel-framed windows above the second floor were removed and replaced with concrete masonry units (CMUs) to create an open screen effect. While this change allowed for more natural ventilation, the garage, with a coat of tan-gray paint on the brick veneer, was less than attractive (Fig. 5). To improve the aesthetics inside the garage, the garage’s maintenance staff painted the undersides of the floors and the columns white. Although the garage was brighter, the paint contributed to a number of structural problems.

By the late 2000s, the garage’s neighborhood was on the upswing. Nearby, Washington Street was undergoing a renaissance with plans for several new high-rise apartment buildings, and in 2010, a Boston investment group purchased the garage.

### THE REPAIR PROJECT

Over the 50 years prior to the Boston investment group’s ownership, the garage suffered from deferred maintenance and poorly executed repairs. The previous owner’s decision to paint the undersides of the floors proved to be problematic for two reasons. First, because the paint was impermeable, it trapped chloride-laden water in the concrete slabs.



Second, it made the full extent of the deterioration on the undersides of the concrete slabs and beams difficult to detect by visual means. In addition, improperly maintained floor drain pipes packed with sediment exacerbated the problem—the floors flooded regularly. Without a traffic membrane to protect the concrete, the often-saturated concrete was subject to both chloride-induced corrosion of the reinforcing steel and freezing-and-thawing damage.

With the help of Capobianco Consulting Engineers (CCE) and Contracting Specialists Incorporated (CSI), the owner began planning a repair program. CCE subsequently merged with Simpson Gumpertz & Heger (SGH), and SGH assumed CCE's role as the designer of record during construction. Initially, the scope of the project included repairs to the floors and two of the three stair towers, permanent closure of one of the stair towers, application of a traffic-bearing membrane on the parking floors, and repointing small areas of the brick veneer on the Beach Street façade.

Work began in late September 2011. On Saturday, October 8, 2011, a panel of the brick veneer fell from the easternmost column into Beach Street below (Fig. 6). Although no one was injured in the collapse, the falling brick caused minor damage to several cars and a window in the building across the street. The team now faced two projects: repairing the Beach Street façade while continuing the interior repairs to the floors and stairs.

## BEACH STREET FAÇADE REPAIR

SGH was called to the site immediately after the collapse to evaluate the stability of the brick veneer. Working with CSI from aerial lifts, we identified areas of the brick veneer on the columns that required immediate stabilization, and we recommended that the façade be fully scaffolded to contain any additional brick that might fall. We removed several bricks from selected columns and spandrel beams to determine how the bricks were anchored to the concrete structure. Our investigation revealed that most of the brick ties had completely corroded or were never installed.

We recommended that the brick be stripped from the columns as soon as the scaffolding was in place. Although some of the columns on the Beach Street façade did show some deterioration on the interior, previous repairs and paint concealed the deteriorated condition of these columns. Once CSI had removed all of the brick from the columns, we sounded and documented the conditions of the interior and exterior surfaces of the exposed concrete columns. We found that the reinforcing bars in the columns, particularly the ties, were very close to the surface, and corrosion caused the faces of many of the columns to delaminate and spall, and in many cases, caused the brick veneer to bulge (Fig. 7).



Fig. 4: Shoppers Garage (undated, ca. 1975) showing façade deterioration (Photo courtesy of the City of Boston Landmarks/ Archaeology Photostream on www.flickr.com)



Fig. 5: Shoppers Garage, May 2008, showing concrete masonry screens and storefronts (Photo courtesy of CCE)



Fig. 6: A panel of brick veneer fell from the façade on October 8, 2011

Based on the amount of concrete we estimated would remain in the columns after demolition, we analyzed the capacity of each column and developed a shoring scheme. Our shoring scheme used clusters



*Fig. 7: Concrete deterioration at some columns required full-depth replacement. Red arrows identify approximately the same location*

of conventional post shores in the upper floors of the garage that transitioned to structural steel wide-flange sections lower in the building, with temporary spread footings in the basement.

Our repair design required removing the existing deteriorated concrete up to 3 in. (75 mm) deep using electric chipping hammers, cleaning and supplementing the existing vertical reinforcing bar and ties, and forming and pumping concrete repair mortar. CSI executed the repairs from the top of the garage working down. This technique allowed CSI to gain experience with the process on columns at the top of the building that are more lightly loaded and, therefore, less critical.

Unfortunately, the columns were constructed with a joint that aligned with the tops of the adjacent spandrel beams. The concrete above the construction joints was typically poorly consolidated and honeycombed. Water collected in the voids in the concrete, corroding the vertical bars in the column below that were bent inward to avoid the vertical bars in the column above. As a result of the corrosion, several columns lost 5 to 6 in. (125 to 150 mm)

of concrete from their exterior face—nearly half the column thickness—and several columns were completely severed. We had anticipated that we might need to replace the full cross section of one column at the seventh floor, and we developed a shoring system that used hydraulic jacks to preload the shoring at this location.

Initially, we felt that the brick on the spandrel beams could remain, and we specified masonry restoration anchors to supplement the few remaining brick ties. During the column repairs, however, it became apparent that the longitudinal reinforcing bars and stirrups in the spandrel beams were severely corroded, particularly the top longitudinal bars. We determined that the spandrels did not have sufficient bottom reinforcement to behave as simply supported beams and that they required shear reinforcement. Repairing the spandrels required removing the CMU screens from the window openings and the remaining brick veneer from the spandrels. Our repair design removed as little of the spandrel beams as possible, supplementing them with a new 8 in. (200 mm) wide, continuous spandrel beam anchored to the interior faces of the now-repaired columns. The design maintained the original 33 in. (840 mm) height of the spandrel beams above the floor level and included a galvanized steel guardrail on top of the spandrel beams to provide pedestrian fall protection.

Once the structural concrete repairs on the Beach Street façade's columns and spandrels were complete, we turned our attention to restoring the façade's appearance. The owner selected a red clay brick veneer for the columns to replicate the original appearance of the columns. We anchored the brick to the columns using stainless steel brick ties. To offset the increased costs of the project, the owner elected not to replace the brick on the spandrels. Instead, we specified a buff-colored elastomeric coating for the exposed concrete spandrels with a darker accent band at the top of the spandrels that



*Fig. 8: Beach Street façade after renovation in late 2013*



mimics the original windowsills. We replaced the 1970s single-pane storefront windows in the retail spaces with new, thermally broken, insulated glazing and provided a new flashing system to prevent leakage. Two red grilles at the second floor above the entry and exit lanes evoke the appearance of the original steel-framed windows (Fig. 8).

## INTERIOR REPAIR

While the façade was being repaired, the team was simultaneously repairing the interior of the garage. Keeping the garage open to the public throughout the duration of the project was essential to the garage's ownership. The rehabilitation phasing plan called for closing half of each of several floors of the garage at a time, working downward from the top. The garage's system of d'Humi ramps made it possible to keep the garage in operation during the interior repairs: while half of one floor was closed for repairs, the other half remained open, and the ramps in that half handled two-way traffic instead of the usual one-way traffic.

CCE based the contract documents and bid quantities for the repairs on chain-drag surveys of the top sides of the floor slabs and visual assessments of the beams and undersides of the slabs. As the demolition process began, however, SGH found that the floors were in much worse condition than originally anticipated. The previously repaired areas were in particularly poor condition. The paint on the beams and undersides of the floors concealed severely delaminated concrete throughout the garage, and we determined that the most reliable way to assess the true extent of the deterioration was to sound and mark the beams and the undersides of the slabs. We mapped the areas of underside and topside deterioration to determine the likely areas of full-depth slab replacement. Working with the owner and contractor, we determined that, for most overhead repair areas, it was more cost-effective to replace the full thickness of the slab (Fig. 9). In addition, the full-depth repairs are considered to be better quality than partial-depth underside repairs because the procedure removes chloride-laden concrete on the topside of the floor and does not rely on the bond between the repair material and the original substrate.

We also found that both the longitudinal and stirrup reinforcement in the beams was in poor condition and needed to be replaced or supplemented with new epoxy-coated reinforcement. The original reinforcement in the beams consisted of a combination of twisted and deformed square bars. A typical beam had two straight bottom bars and two bent bars that were located at the top of the beam at the supports and sloped to become bottom bars at the beam's midspan. These bent bars were typically severely deteriorated at the supports, and



*Fig. 9: Demolition in preparation for full-depth slab and beam replacement*

the expansive corrosion product separated the slabs from the beams. Similarly, the beam stirrups were severely deteriorated due to a combination of poor detailing and insufficient concrete cover. Many of the original beams had been encased in several inches of unreinforced, poorly bonded concrete that appeared intact but, in fact, concealed severe corrosion within the original reinforcement. The encasement was particularly problematic in the ceilings of the retail spaces at the ground level.

To slow the rate of the garage's deterioration after the floors had been repaired, we specified a three-layer traffic-bearing waterproofing system for the garage's floors. Through a series of mockup tests, the project team established a surface preparation and primer combination that would provide an adhesive bond strength in excess of 200 psi (1.4 MPa). After shotblasting and routing and sealing the cracks in the floors, CSI applied a 100% solids epoxy primer followed by a urethane base coat. CSI then applied an epoxy wear coat with encapsulated silica aggregate in the parking stalls and heavy-duty flint aggregate in the drive lanes and ramps, followed by an epoxy topcoat.

Coating the floors was important, but it was not the only critical post-construction measure to protect the floors from being saturated. The existing floor and roof drain lines were clogged with debris, and some lines had failed. The work included replacing most floor drains and much of the piping. The oil-water separator, which had been paved over in the sidewalk, was uncovered and cleaned to prevent storm water from backing up in the drain risers and flooding the garage.

## LOOKING TOWARD THE FUTURE

Although it was once a modern garage with many amenities, the Shoppers Garage suffered from decades of deferred maintenance as the neighborhood around it declined. In the last decade, the neighborhood has undergone a rebirth as the once-shuttered theaters on Washington Street have been restored, and several new luxury apartment towers

have attracted a younger mix of residents. With only a limited number of new off-street parking spaces and a reduction in the number of on-street parking spaces, the garage's owner understood the value of restoring and preserving the structure. Thanks to the owner's commitment and the skilled craftsmen who undertook the repairs, the restored garage continues to play an important role in the day-to-day life of the neighborhood. Now renamed the Beach Street Garage, it is positioned to serve its neighborhood for years to come.

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