



2. GO SANDHOGS!

Subway historian Joe Cunningham sums up the initial construction in homegrown Brooklynese: “This was a huge, stupendous engineering job. First you built the tunnels, but then you still had to make it all *work*. You had to design signals; cars that moved at close intervals, through dark tunnels, at very fast speeds; a new power supply, electricity—you had to bring all this together and make it work, in just two or three years.”

Chief engineer William Barclay Parsons had his work cut out for him. The first subway line started at City Hall, at the southeastern tip of Manhattan, and bisected the island diagonally to 145th Street in the Upper West Side. Along this route Manhattan’s geology and elevation changes dramatically. Parsons chose to tunnel close to the surface, but his crews still had to contend with Manhattan schist, a type of rock that combines extreme hardness with a tendency to decay, making tunneling through it both strenuous and unpredictable.

More than 12,000 men, mostly Irish-, Italian-, and African-Americans, worked at this murderously difficult task. The cut-and-cover method sounds simple but involved a nightmare of inconvenience and detail management. It began with digging a huge hole through a packed urban street, redirecting all kinds of underground utility pipes overhead, and then laying planks of wood over it for traffic. Workers shored up nearby buildings, but tressing their walls with wooden beams and driving steel spikes into their foundations as reinforcement. Then massive cranes rolled up and dropped 3,000-lb. steel I-beams into place as the tunnel’s skeleton. Workers sealed the framework with steel bolts, cement, and caulk, and then covered the entire tunnel with dirt.

As work moved uptown through higher elevations, the subway line had to stay roughly at the same depth. As Cunningham aptly remarks: “You wouldn’t want a subway to be an underground roller-coaster.” Deep tunneling through these areas called for a more delicate, dangerous set of steps. A steel tube, called the shield, was inched into bedrock, three feet at a time, using hydrau-

lic pumps. Excavators readied the rock for dynamite blasts, using steel mats and timber shaftways to absorb shock and prevent tunnel collapse. Drillers bored holes into the bedrock, an engineer dropped lit dynamite into each of them, and workers cleared the area. After the blasts, workers crushed any boulders with compressed-air drills, scooped up the crushed rock, or spoil, into buckets that were ferried out via tramway. As if dynamite, flying rock, and the threat of collapse weren’t enough on-the-job fun, gangs could also run across an underground lake by surprise and flood the tunnel. So workers dug drainage ditches along the way to funnel water into reservoirs called sumps.

If you had no special skills but liked crushing rock in the hot stench underground for \$1.50 a day, welcome to the “sandhog” crews, the muscle that moved the subway forward. Sandhogs moved a minimum of 50 wheelbarrows of spoil a day; all that spoil eventually expanded the landmass for both Ellis Island and Governor’s Island.

Deep tunneling underwater was even worse. Take all the usual dangers and add to them the river’s pressure, threatening floods and the bends, a crippling disease caused by rapid changes in air pressure. Engineers pumped compressed air into the tunnel to counterbalance the water pressure. Sandhogs waited in manlocks, sealed antechambers that were pressurized gradually to match the tunnel’s air pressure. Sandhogs could only work two stints of three hours each underwater with a two-hour break in between; in the deepest digs, those stints shortened to half an hour.

At the end of the game came electricity and track work. Wooden ties held the running rails, while the third rail pulled direct-current electricity from some of the world’s first electric-power plants. Cunningham finds the choice for electrical power a bold, prescient move for the times: much cleaner than coal, but still expensive for a profit-seeking venture like the IRT. “At the time, electricity cost 20 cents a kilowatt-hour,” he notes. “That’s the price of four good cigars, or dinner for one at a luncheonette.”

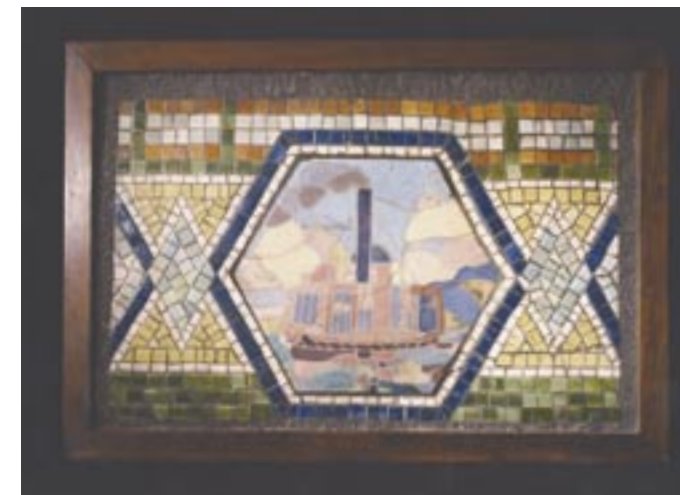
« SUBWAY STYLE

Millions of straphangers enter the maze of underground subway tunnels every day, riding more than 700 miles of track through 490 stations. Focused on their daily commute, riders may be surprised to learn that this enormous system was conceived in the 1890s with both beauty and efficiency in mind.

To celebrate the 100th anniversary of the New York City subway system, the New York Transit Museum presents *Subway Style: 100 Years of Architecture and Design in the New York City Subway*, an exhibition that explores the aesthetics of the subway as an integral part of city life (sponsored by Mastercard International). *Subway Style*, on view Oct. 12 – Nov. 5, at Vanderbilt Hall in Grand Central Terminal, features a broad range of historic artifacts, archival documents, drawings, and vintage and contemporary photographs from the collection of the museum. Illustrating the visual elements of the subway from station architecture and ornamentation to furnishings, subway cars, advertising, and map design, the exhibition reflects shifts in taste and technology over the past 100 years. NYTM is supplementing the exhibition with a book of the same title (Stewart, Tabori & Chang).

Subway Style explores designs of the past and illustrates the layers of history still visible in contemporary subway stations. Organized thematically, the exhibition traces design developments through four major periods with more than 200 objects from the museum’s collection. The exhibition features sections devoted to station architecture and design; ceramics and metalwork; furnishings, fare collection, and subway car design; and advertising, maps, and signage.

Photographer Andrew Garn was chosen to document the *Subway Style* series based on previous work he had done for a book for Princeton Architectural Press called *Bethlehem Steel* on the Bethlehem Steel Plant in Philadelphia and various documentary projects. His photographic aesthetic was the perfect match for capturing the beauty of something so many people think of as mundane and purely utilitarian.



TOP: CORTLANDT STREET IRT STATION “FERRY” CERAMIC PLAQUE, CIRCA 1918. BOTTOM: INDEPENDENT STATION VENT GRILLE, 1932, FROM THE 34TH STREET/8TH AVENUE IND STATION. ARCHITECT: SQUIRE J. VICKERS; PHOTOS: ANDREW GARN FROM THE COLLECTION OF THE NEW YORK TRANSIT MUSEUM



3. THE CRUSH OF SUCCESS

New Yorkers thronged to the subway from day one—and from day one, the subway strained to meet demand. Luckily, Parsons' four-track system allowed expresses and locals to run simultaneously. But no sooner had the subway opened than a public clamor rose for more routes, wider car doors, and more frequent service. Signaling changed almost immediately (in 1909), moving from the fixed-block system—spacing cars by equal distances regardless of speed—to the time approach system, allowing cars to follow each other closely on a timer system.

Lines snaked across four of the five boroughs over the next 30 years. In 1940 two private transit corporations—the IRT and the Brooklyn-Manhattan Transit Company (BMT)—united with the city-run Independent (IND) lines, unifying the system under city ownership. Building the subway was jaw-droppingly important to modern New York. Transit historians love to tick off all the New York classics made possible by the subway's development at that particular point in time.

No subway would mean no skyscrapers, no fair labor practices, no 24-hour everything, no myths of alligators underground, no teams of breakdancers ranging through the cars. No mad proximity of cultures and speed that define the city's vibe. No subway, no Times Square: Longacre Square got settled overnight when *The New York Times* moved its offices near a subway stop so they could hustle papers uptown before the competition. No subway, no Harlem: It's only because real estate speculators overbuilt along subway lines that Harlem's elegant high-rises stayed empty, until landlords reluctantly invited African-Americans uptown. In 1930, arguably the subway's finest year, two billion customers rode the rails in a year—the same number of people on the entire planet.

4. DECLINE AND REBOUND

World War II came as a blow to the subway. Cars and highway-building captured the nation's imagination and drew much of the government funding. In the 1950s and early '60s New York embarked on a series of subway upgrades: lengthening platforms to accommodate bigger crowds and longer trains, and turning over the original fleet of train cars, or rolling stock.

A classic case of too-little, too-late. The original 5-cent subway fare lingered on for political reasons until 1948, driving the system into debt with no recourse to the highway-loving government. "The city ran into financial straits that slammed everything in the '70s," says Cunningham, "so from the late '60s to the '80s they just did routine maintenance with skeleton crews." Smearred in graffiti, plagued by car breakdowns and uncertain track work, perhaps the subway's lowest moment came in 1984, when rider Bernie Goetz snapped and shot at four boys inside a car, an expression of pure, mad frustration at the hassling conditions of the subway.

Through the '80s and '90s, the city cracked down on graffiti and turnstile-hopping, small infractions that paved the way for greater lawlessness. The city also rebuilt tracks, refreshed tile mosaics and installed other artworks, and turned over the old '50s Redbird fleet (these became fodder for artificial reefs). The latest generation of cars, the R142 series, features automated announcements and more efficient, alternating-current electricity. The kicker for the future: The much-bruited Second Avenue line breaks ground by the end of 2004, after 75 years of debate.

The best utilities are always invisible. New York's subway isn't that—ask any native about weekend track-work and mystifying line switches—but mostly it's 24 hours of pure bullet riding even through wild weather, fainting passengers, and packed Yankees games. At the end of our talk, Cunningham thanks me for paying attention to the engineering side of the subway's design. "I like to hear that people care about this," he offers, in that way New Yorkers can squeeze a little complaint into every compliment. "Usually people are all excited about the tiles. The tiles are nice, the tiles are very pretty, *but*—do they get my train there on time?" **S**



(LEFT) CHEWING GUM VENDING MACHINE, CIRCA 1940; (TOP RIGHT) BRT TURNSTILE, CIRCA 1915, MADE BY PEREY MANUFACTURING COMPANY; (BOTTOM RIGHT) DETAIL OF CONTROL TOWER AT 4TH AVENUE IND STATION, BROOKLYN. ARCHITECT: SQUIRE J. VICKERS; PHOTOS: ANDREW GARN FROM THE COLLECTION OF THE NEW YORK TRANSIT MUSEUM

Garn is also a native New Yorker who has been riding the rails his entire life, so shooting the series was a personal journey for him. "The subway was my school bus," he says.

Working with NYTM's associate curator and *Subway Style* project manager Carissa Amash and assistant project manager Dana Zullo, Garn photographed nearly 50 subway stations in a relatively short period of time. "Because of various planning delays, we had to cram four months of shooting into two and a half months, which meant shooting nine days in a row at some point," the photographer explains.

"Working in the subway created very unique challenges, especially because it runs 24 hours a day. Running cables and setting up lights with trains moving and people scurrying around proved to be somewhat dangerous," Garn adds.

Garn's images range from intricate details like weepholes to large architectural structures, such as the massive substations and power houses located throughout the city. All are beautiful in their own way. The photographer captured slices of different eras, and gave a fresh perspective to things taken for granted. "It was most fun shooting from track level as we did at Dyckman Street and seeing how truly massive the subways are," Garn relates.

Gabrielle Shubert, NYTM director, says of the exhibition, "We're presenting our gritty New York subway system as a work of art. It's a revelation for people who use the subway every day to see the things they miss in their rush getting from point A to point B. We all take it for granted." The exhibition was first on display at the UBS Art Gallery in midtown Manhattan. UBS Financial Services supports the arts by letting various museums around the region display their collections at its office tower, which has a spacious gallery on its first floor.

To view the *Subway Style* online gallery featuring Garn's photographs with commentary from Garn, Amash, and Zullo visit www.transitmuseumeducation.org/subwaystyle/projector.html. *Subway Style: 100 Years of Architecture and Design in the New York City Subway* is available at www.abramsbooks.com.