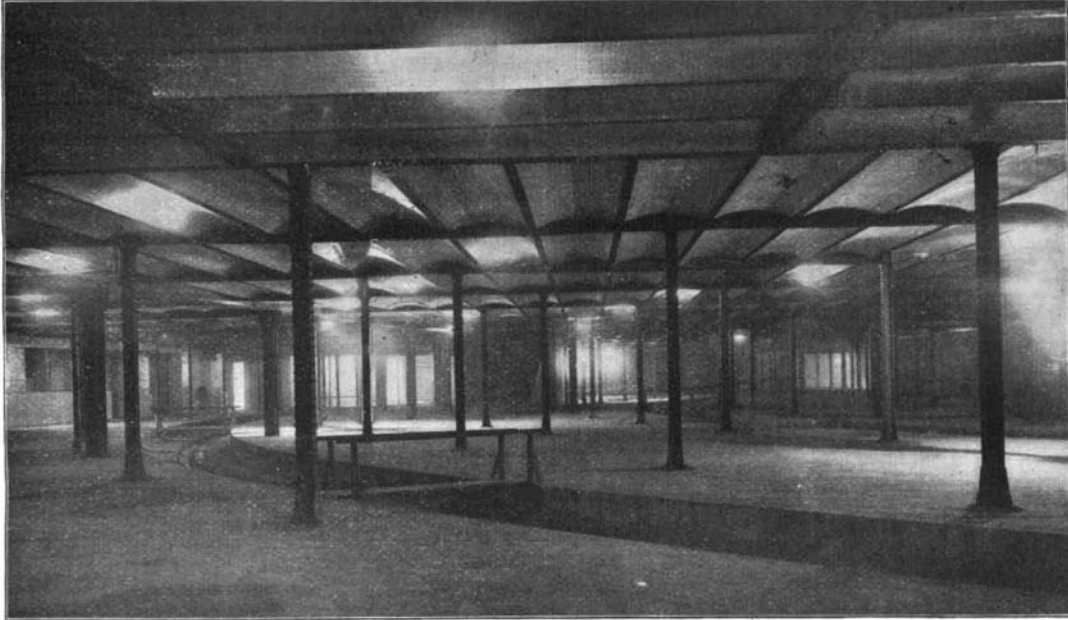


THE NEW BOSTON TERMINAL STATION.

With the commencement of the present year the huge terminal station which has been built to accommodate the many and important railroads which enter the city of Boston from the south was thrown open

Although the trainshed is 570 feet wide and capable of accommodating over thirty tracks, if they should be laid in the usual manner, the engineers foresaw that the estimated total of between two and three thousand trains a day could not be run into and out of the sta-

and the latter upon two loop lines which should be laid some 17 feet below the level of the main platform. This is the plan of the station as finally adopted and built. The long distance and express trains are handled upon 28 parallel tracks on the main floor, the trains being switched into and out of the station in the usual manner. The suburban traffic enters and leaves the station by an inclined subway (see illustration), which leads down beneath the main floor, where the tracks form a couple of separate loops, swinging around underneath the main platform and leaving by the same incline as that by which they enter. Two other important features are the use of separate platforms for baggage and express matter and the use of some other motive power than that of steam



THE SUB-STATION FOR DEPRESSED SUBURBAN TRACKS, BOSTON TERMINAL STATION.

Long distance tracks are on the main floor above.

for service, and the city can now boast of possessing a railroad station which is not only by far the largest structure of its kind in the world (its capacity being indeed fully double that of any other station), but which possesses many radical and improved features that are entirely novel in a building of this kind.

Upon the railroad routes within 50 miles of Boston, about 50,000,000 passengers are carried to and from the city every year, the total being about equally divided between the stations in the northern and the southern sections of the city. The approximate population within the suburban or 50-mile limit of the city is 2,392,000. Within the same limit around Philadelphia it is 2,289,000; around Chicago, 1,188,000; and around New York, 4,754,000; New York being the only city that exceeds Boston in this respect.

The express and suburban traffic that enters Boston on the south has hitherto been carried by four systems: The Providence division of the New York, New Haven and Hartford, the Old Colony, the New England, and the Boston and Albany. This traffic, which as we have stated amounts to one-half of the 50,000,000 passengers annually carried to and from Boston, has been handled in the four stations of the roads above mentioned.

The Boston Terminal Station has been built for the purpose of bringing all of this traffic into the heart of the city over one set of tracks and handling it in one mammoth depot. The convenience and economies resulting from such an arrangement are too obvious to need recapitulation here.

It was realized at the outset, when the engineers were engaged upon the preliminary plans and estimates, that, large as was the section of land appropriated for the new station, it would be quite impossible to accommodate the heavy traffic which would have to be dealt with if the ordinary methods were adopted.

tion with the expedition that would be necessary to enable the trains to keep their schedule time. They accordingly hit upon the bold and original plan of

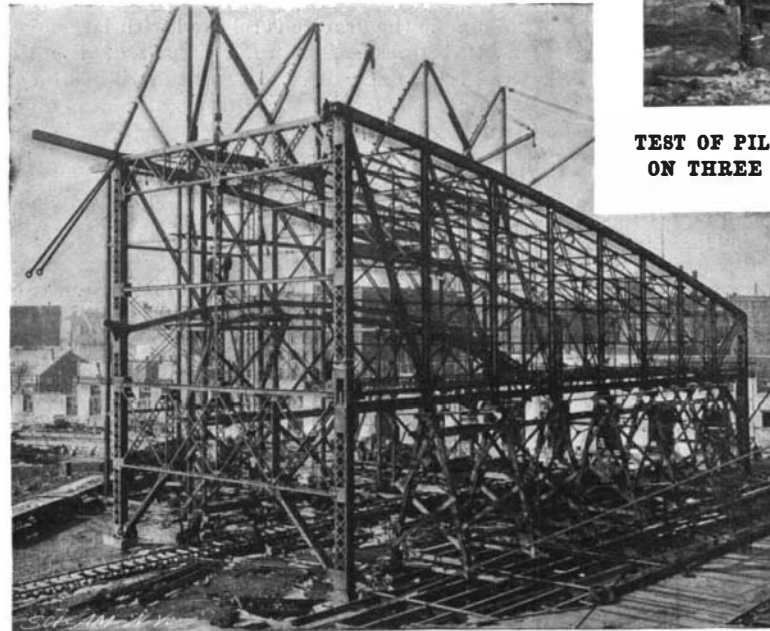
building a double-deck station, separating the trains broadly into two classes, express and suburban, and handling the former on the upper deck of the station

known Nantasket experiment, now of nearly five years' standing, which has been so far successful as to warrant an extension of the system to some of the other suburban lines. The incorporation of that motive power into the plan of the new station may justly be considered the most decisive advancement that electricity has ever made in steam railroading.

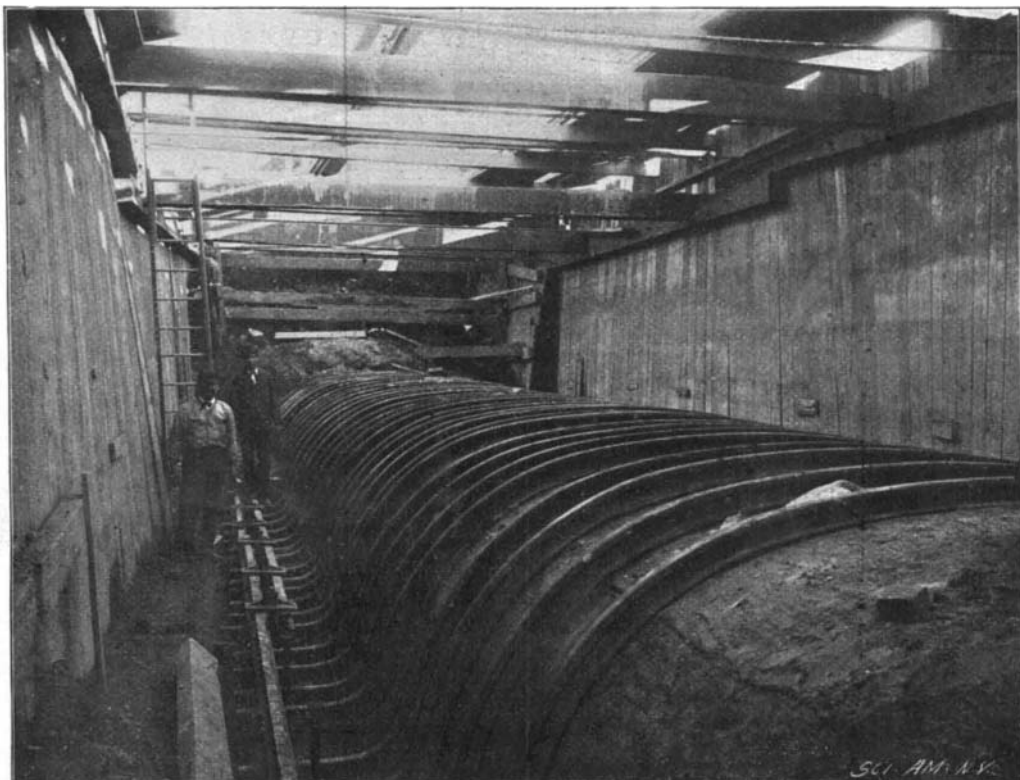
Although at first glance it would hardly seem possible that two looped tracks could take the place of the twenty-eight stub tracks on the main floor above, as a matter of fact the switching problem, which is really the element that determines the capacity of a stub track terminal station, is practically disposed of, and the platforms are made of sufficient length to accommodate at one time several three or four car trains. By using alternate tracks it will be possible to dispatch a train every minute—a headway which would enable upward of two thousand trains to be handled during each working day of eighteen hours on these two tracks alone. This is about five times as many trains as are at present running in suburban service. The suburban tracks enter the station at one side of the steam tracks, and, as they enter, they spread apart, so as to provide a large platform between the tracks. The central platform lies immediately below the midway on the main floor, and it is connected with it and with the main waiting room by stairs. This inner platform is the loading platform, and the unloading will take place on the two outer platforms. The total platform area on this floor will accommodate twenty-five thousand people at one time. As the platform is four feet above the tracks, it will only be thirteen feet by the stairway to the main floor above. Long distance traffic on the main floor is handled upon twenty-eight stub tracks. They are arranged in pairs, with a passenger platform to each pair, and between the pairs are seven platforms devoted exclusively to the trucking of baggage and ex-



TEST OF PILES—60 TONS OF PIG IRON ON THREE PILES; NO SETTLEMENT.



ERECTING THE OUTER SPANS OF THE 570-FOOT, CANTILEVER, ROOF TRUSSES.



FLATTENED PORTION OF SEWER BENEATH TRACKS OF BOSTON TERMINAL STATION.
This portion of sewer is below high tide level and subject to hydraulic pressure. Hence it is strengthened as shown by straps formed of railroad iron.

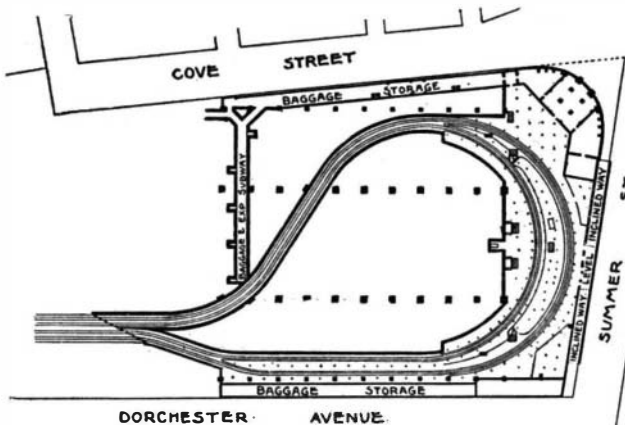
press matter. The trainshed, which is 602 feet long by 570 feet wide, is covered by a curved roof supported on huge cantilever trusses, the trusses being supported on two lines of columns which extend down the full length of the station. The extreme height of the trainshed is 112 feet. The middle span is 228 feet wide; the two side spans are 171 feet wide.

In order to exhibit the immensity of the undertaking, the engineers prepared a diagram (see illustration) showing how twenty-four of the prominent buildings of Boston could be founded within the area covered by the main structure. The study of this diagram, which is herewith reproduced, will be of considerable interest to the reader. The total area of the terminal site is about thirty-five acres, and thirteen acres of this is covered by the building itself. The maximum length of the main station is 850 feet; its maximum width, 725 feet; the area of the main station is 506,430 square feet; the area of the awnings outside of the building is 46,000 square feet.

The location of the site is at the confluence of Summer and Federal Streets and Atlantic Avenue, and it lies on the west bank of Fort Point Channel, covering the ground formerly occupied by the New England station. As the ground on which the building stands was originally overflowed by the ocean and was later covered with docks, wharves, and buildings founded on cribs, piles, and rubbish, it can be well understood that an enormous amount of work had to be done in preparing the foundations for such a large and important building. The whole of the structure necessarily stands on piles, of which there were driven about 26,000, and as the lower tracks were designed to lie 17 feet below the main floor and 7 feet below high tide, it was necessary to practically inclose the whole area with a huge cofferdam and introduce some system of waterproofing to keep the lower station dry. A large amount of work had to be done also by the engineers in readjusting the existing sewers, water pipes, and telephone and electric light wires to the new conditions. A continuous watertight cofferdam was driven around the site, at a cost of \$75,000, and a complete permanent waterproofing sheet, consisting of ten layers of tar paper, swabbed together with hot coal-tar pitch, was placed beneath the whole lower floor. This waterproofing, covering upward of ten acres, is laid, where horizontal, upon a smooth concrete base. Where it is on the vertical walls it is backed up with 8 inches of brick work.

The power plant is contained in a well designed and well lighted building 460 feet long by 40 feet wide, situated on the easterly side of the yard. The total horse power of the plant is at present about 2,000, and room has been provided for an increase of about 50 per cent. It is from this plant that all the light and heat and refrigeration and power are distributed. It contains ten large boilers, two economizers, and 1,500 horse power Westinghouse compound engine direct connected to four Westinghouse multipolar dynamos. The interesting features in the boiler room are the mechanical stokers and the forced draught, the latter being produced by a pair of large slow-running exhaust fans. In addition to providing for the exten-

The main entrance is opposite the end of Federal Street, at the intersection of Summer Street and Atlantic Avenue. The building extends from the entrance south along Atlantic Avenue for 798 feet and east on Summer Street 672 feet. The central portion of the building, as seen from Federal Street, is five stories in height; the first story is given to station uses, and the other four stories are used as offices. The central curved portion is 228 feet in length. Two stories form a strong base in which are three great entrance arches, and the upper three stories are treated as a colonnade, the columns of which are 4½ feet in diameter and 43 feet high. Above the colonnade the entablature and parapet carry the façade to a height of 105 feet above the sidewalk. All the curved portion of the building is of Stony Creek granite and nearly all of the remaining front is of this stone, except that on each side of the



PLAN OF DEPRESSED SUBURBAN TRACKS, BOSTON TERMINAL STATION.

colonnade the granite is relieved with large, dark buff, mottled bricks. The total length of the five-story front is 875 feet; of the two-story building on Atlantic Avenue, 356 feet; of the two-story building on Summer Street, 234 feet, while on Dorchester Avenue the building continues 725 feet; this portion being two stories in height. The total length of the front on three streets is 2,190 feet.

Entering the station by a broad passageway, 92 feet in width, which is lined with polished Stony Creek granite, and has its roof carried on four great columns of polished Milton granite, we reach the "midway," as the space between the waiting rooms and offices and the gates leading to the several tracks is called. On the left are the lavatories, telegraph and telephone offices, ticket office, with eleven sales windows opening toward the midway and sixteen opening on the opposite side into the waiting room. The main waiting room is 65 feet wide by 225 feet long. The floor is of marble mosaic, while the walls have a polished granite base and a high dado of enameled brick. Opening out of one corner of the waiting room is the women's room, 34 x 44 feet. Another notable room is the lunchroom, measuring 67 x 70 feet. The east side of the trainshed is flanked by a room for inward baggage 507 feet long by 26 feet wide. The building above the first story is used for officers and employees. The archi-

of tracks entering the station is thirty-two, and their total length amounts to about fifteen miles, of which four miles is contained under the great trainshed roof. The total weight of rail used is 25,000 tons; there are 37 double slip switches, 252 switches, 283 frogs, 150 semaphore signals, 200 signal lamps and 9 signal bridges. In connection with the station there are 235 arc lights, 6,000 incandescent lights, 25 electric elevators and 215 office rooms.

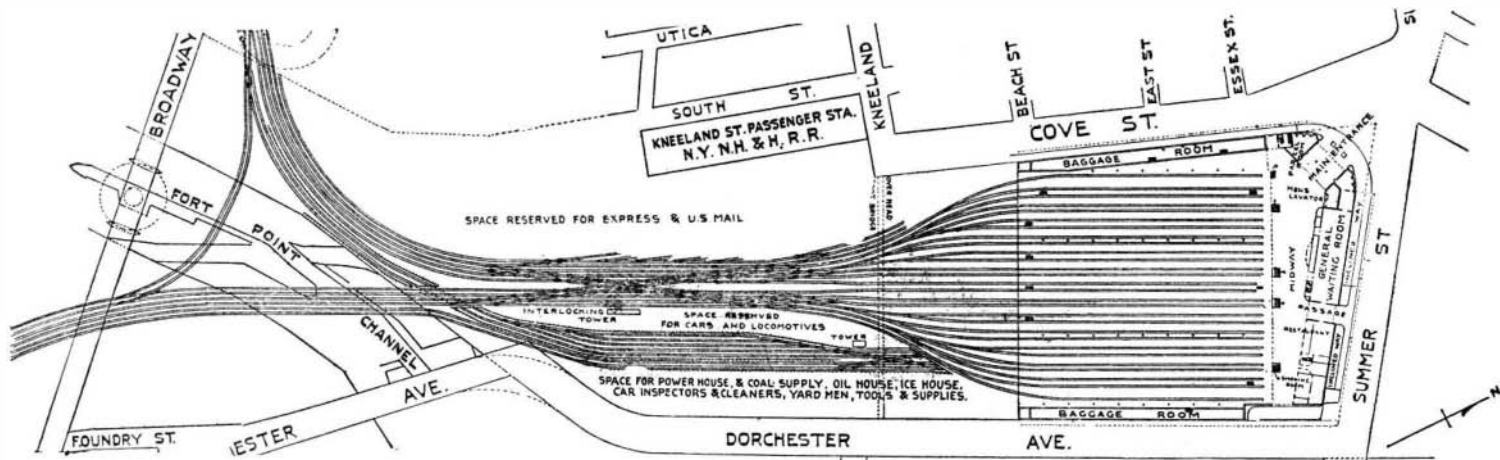
The materials of construction include 43,000 spruce piles, 16,000,000 bricks, 15,000 tons of steel, 200,000 cubic feet of cut stone, 75,000 barrels of Portland cement and 20,000 barrels of Rosendale cement, 5,000,000 cubic feet of yellow pine timber, 10 acres of gravel roofing, 150,000 square feet of wire glass, and 20,000 tons of putty wherewith to set the same. Finally it should be mentioned that to paint the building required 200 acres of painting estimated as a single coat.

For the particulars and many of the illustrations we are indebted to the courtesy of Mr. George B. Francis, the resident engineer of the Boston Terminal Company.

Mortality Statistics of the Prisons During the Civil War.

Surgeon-General C. M. Tebault, of the United Confederate Veterans, issued a circular to the survivors of the medical corps of the army and navy of the Confederate States, calling on them to attend the eighth annual reunion of the United Confederate Veterans, at Atlanta, Ga., which met July 20 to 23. In it he said:

"The destruction by fire of the medical and surgical records of the Confederate States, deposited in the Surgeon-General's office in Richmond, Va., in April, 1865, renders the roster of the medical corps somewhat imperfect, hence the need of concerted action on the part of the survivors to bridge this hiatus. The official list of the paroled officers and men of the Army of Northern Virginia, surrendered by General R. E. Lee, April 9, 1865, furnished 310 surgeons and assistant surgeons. In the first report, presented at the Richmond reunion, I showed that the medical roster for the Army of Tennessee has been preserved in duplicate. I shall offer in a more detailed report data to prove indisputably important facts relating to the prisoners of war upon both sides, with the purpose of establishing the death-rate responsibility in the premises. It will suffice to mention here that the report of Mr. Stanton, as Secretary of War, on the 19th of July, 1866, exhibits the fact that of the Federal prisoners in Confederate hands during the war only 22,570 died; while of the Confederate prisoners in Federal hands 26,436 died. This report does not set forth the exact number of prisoners held by each side respectively. These facts were given more in detail in a subsequent report by Surgeon-General Barnes, of the United States Army. That the whole number of Federal prisoners captured by the Confederates and held in Southern prisons from first to last during the war was in round numbers 270,000, while the whole number of Confederates captured and held in prisons by the Federals was in like round numbers only 220,000. From these two reports it appears that with 50,000 more prisoners in



PLAN SHOWING ARRANGEMENT OF TRACKS IN YARD AND SHED OF THE BOSTON TERMINAL STATION.

sive electric arc and incandescent lighting, the electric current is used for operating all the elevators and baggage lifts. There are in all nineteen of these electric elevators, five of which are for passenger service, two for freight, and twelve for the handling of baggage between the upper and lower levels. Provision has also to be made for heating and ventilating the 5,000,000 cubic feet of space included in the headhouse and baggage rooms. This is carried out by several different methods. One of the most interesting features is the ice making and the refrigerating plant, in which twenty tons of diamond ice will be made each day. An extensive system of steam and compressed air piping has been distributed through the yard and trainshed for warming the cars while standing on the track in cold weather and to supply compressed air for the air brakes prior to the departure of the train.

jects of the headhouse are Messrs. Shepley, Rutan & Coolidge.

It should be mentioned that the switching and signaling system, which for a station of this unprecedented size is necessarily very extensive and complex, includes an elaborate installation of Westinghouse electro-pneumatic interlocking apparatus for handling all the trains of the four tenant railroads to and from the main trainshed, and for handling the frequent trains of the suburban service, which are to use the track in the depressed suburban loop. We hope to give full details and illustrations of this plant in a later issue.

In concluding a notice of this, in some respects, the most remarkable building in the world, it will be of interest to give some further statistics of its size and the materials used in its erection. The total number

Southern stockades or other modes of confinement, the deaths were nearly 4,000 less. According to these figures, the percentum of Federal deaths in Southern prisons was under nine; while the percentum of Confederate deaths in Northern prisons was over twelve. These mortuary statistics are of no small weight in determining on which side there was the most neglect, cruelty and inhumanity, proclaiming as they do a loss by death of more than three per cent of Confederates over Federals in prisons, while the Federals had an unstinted command of everything."

BICYCLERS will have a new toe clip which is hinged to the side of the pedal and has extensions on the front and rear which spring the clip into place when touched by the foot, the pedal always being balanced for use either side up.

SCIENTIFIC AMERICAN

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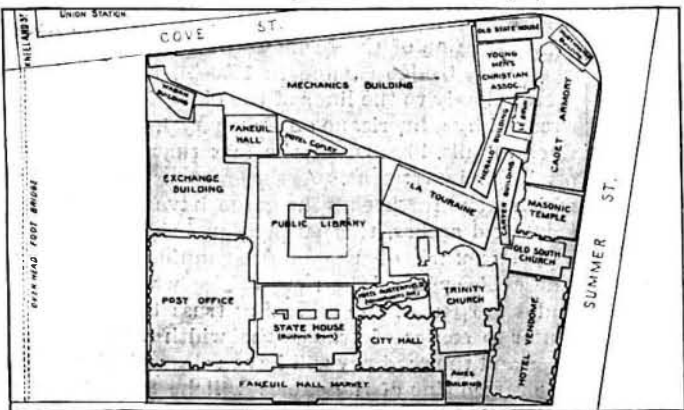
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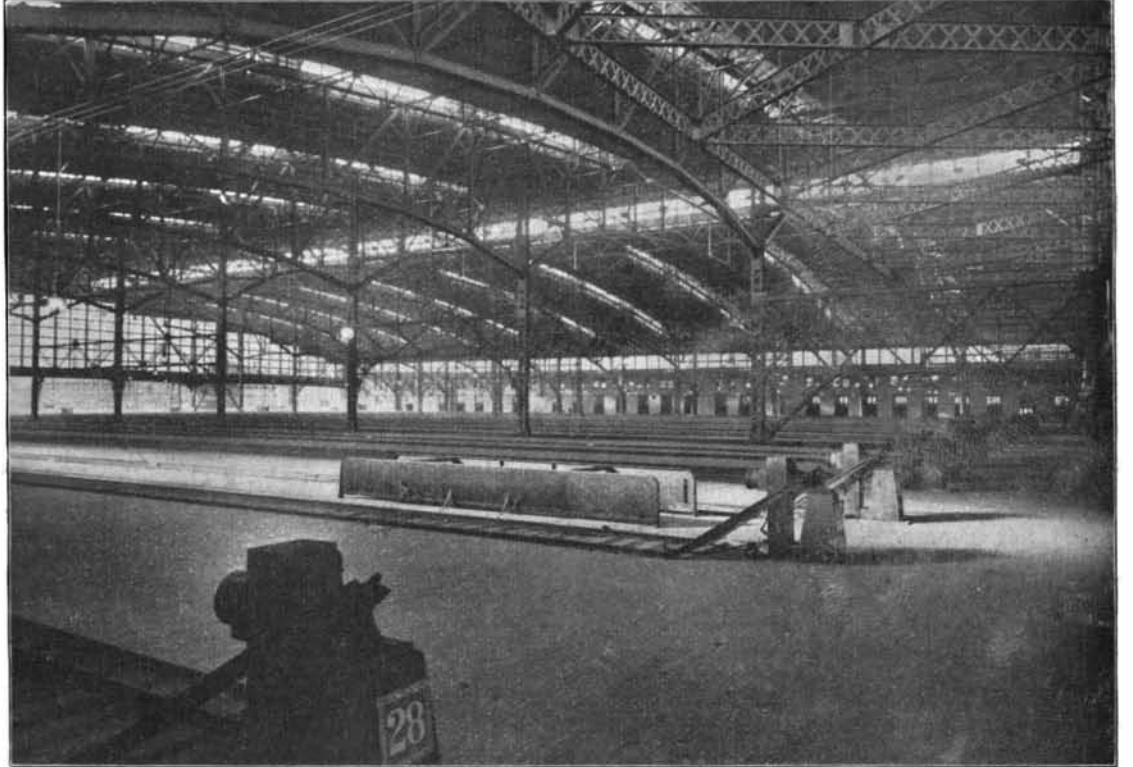
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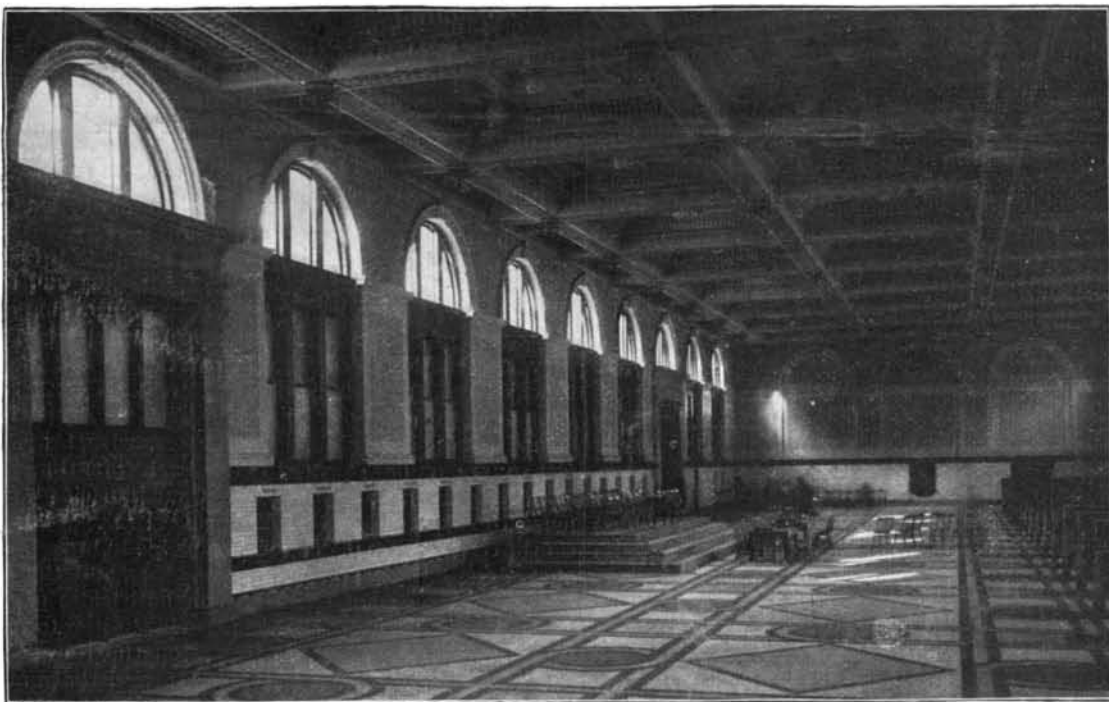
The Facade—Total Length of Station Front, 2,190 Feet.



Twenty-four Boston Buildings Included within Station Site.



The Great Train Shed, 602 Feet Long by 570 Feet Wide—Twenty-eight Tracks.
Total Area of Train Shed and Headhouse Site, 13 Acres.



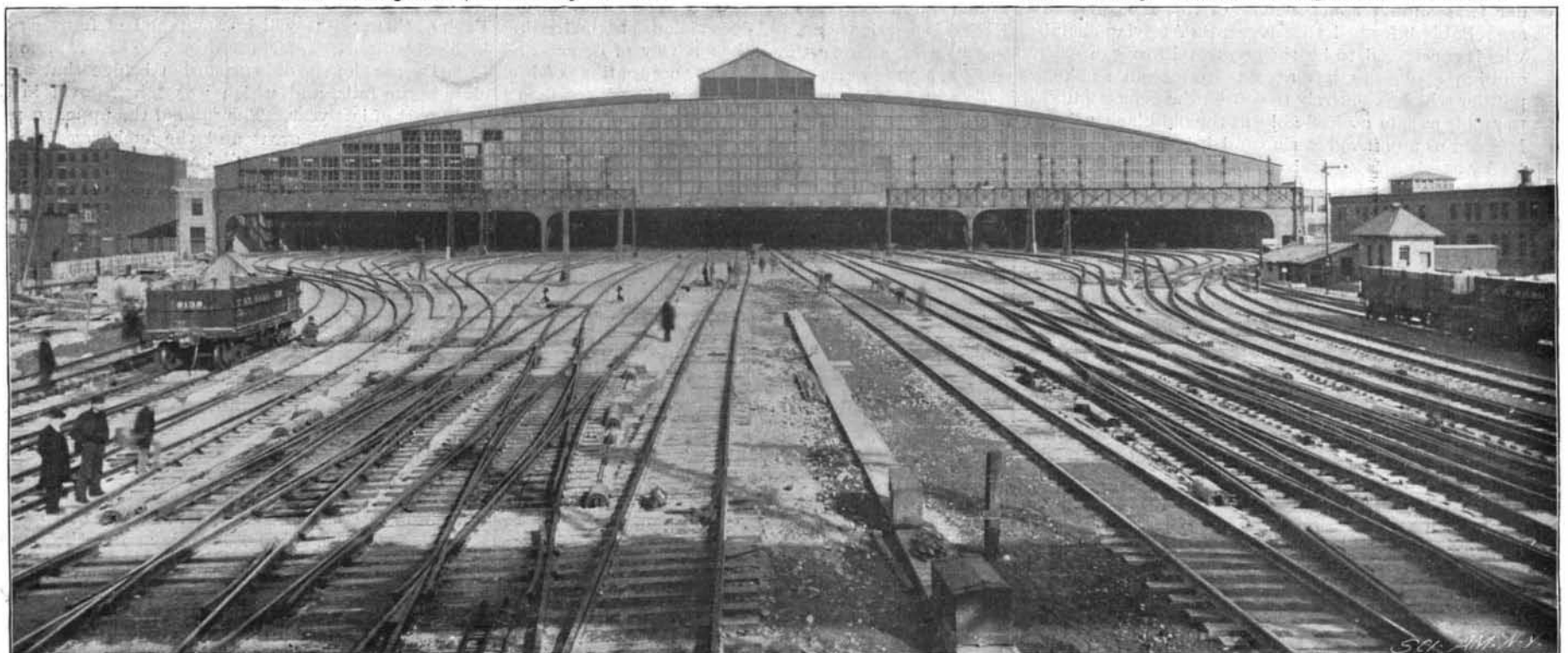
Main Waiting Room, 65 Feet by 225 Feet.



Subway for Suburban Tracks, and the Power Buildings.



The "Midway" between Waiting Rooms and Tracks.



View of the Tracks, Signal Bridges, and Train Shed from the Yard.

THE NEW BOSTON TERMINAL STATION.—[See page 21.]