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THE LINCOLN TUNNEL

50 YEARS OF SERVING THE REGION

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TUNNEL EDITION

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TUNNEL EDITION

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VOL. LXXI—NO. 197 JOURNAL SQUARE WEDNESDAY, DECEMBER 22, 1937 JERSEY CITY, N. J.

Lincoln Tunnel Is Opened Today Joining Weehawken and Manhattan

Colorful Ceremonies Mark Lincoln Tunnel Dedication

Military Review at Each Plaza of Army and National Guard Viewed by Governors of Both States.

The dedication ceremonies of the Lincoln Tunnel, held yesterday at 11 a. m. at the Manhattan Plaza; at noon at the Weehawken Plaza, and followed by a luncheon at the Hotel Astor, New York, were even more elaborate than those attending the opening of the Holland Tunnel, between Jersey City and New York, a little more than 10 years ago.

Frank C. Ferguson, chairman of the Port of New York Authority, presided at all of the ceremonies. The Hon. Harold H. Ickes, Federal Public Works Administrator, and Mayor Fiorello H. LaGuardia of New York, were speakers at the luncheon. Gov. Herbert H. Lehman was the principle speaker at the ceremony at the Manhattan Plaza and Gov. Harold G. Hoffman the speaker at the Weehawken plaza ceremonies.

A military escort included foot troops and scout cars of the U. S. Army, Navy, and Marine Corps, as well as units of the New York and New Jersey National Guard.

Before the Port Authority ceremonies at the Weehawken Plaza, Hudson County civic associations and municipal governments held a celebration.

This part of the program was in the hands of a special committee headed by Mayor John G. Meister of Weehawken, and including Mayor Lewis B. Eastmead of Union City and Mayor Paul F. Cullum of North Bergen.

The Port Authority's ceremonies at the New York Plaza lasted 30 minutes, after which invited guests and the military escort passed through the tunnel to the Weehawken Plaza, where the New Jersey ceremonies were from 12 noon until 12:30. Invited guests then departed for the luncheon at the Hotel Astor, returning to New York through the tunnel by special bus.

Arrangements were made so that several thousand persons witnessed the ceremonies at each side of the river.

BAN ON HEAVY, SLOW TRUCKS

Two-Way Single Tube Traffic Necessitates Limiting of Vehicles.

Because only one tube of the new Lincoln Tunnel will be in use for the next two or three years while the second tube is in the process of construction, the two-way traffic in the south tube makes necessary a restriction on trucks of over five-tons in weight or slower than 20-miles an hour on the upgrade of the tunnel exits. These restrictions, however, will come to an end with the open-

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First Autoist Pays Toll At 4:00 A. M. on N. J. Side

New York Man Wins Distinction of Being First Paying Customer to Pass Through Weehawken-New York Tube.

A new milestone in the history of trans-Hudson River transportation was passed at 4 a. m. today when an auto entered through the portals of the Lincoln Tunnel at Weehawken, the first toll-paying vehicle to use the tunnel. It was a New Yorker, Omero Catan, who drove the first auto through the south tube from Weehawken to Manhattan. Within the next year, it is estimated, he will be followed through the portals of the tunnel by some 7,000,000 other autoists.

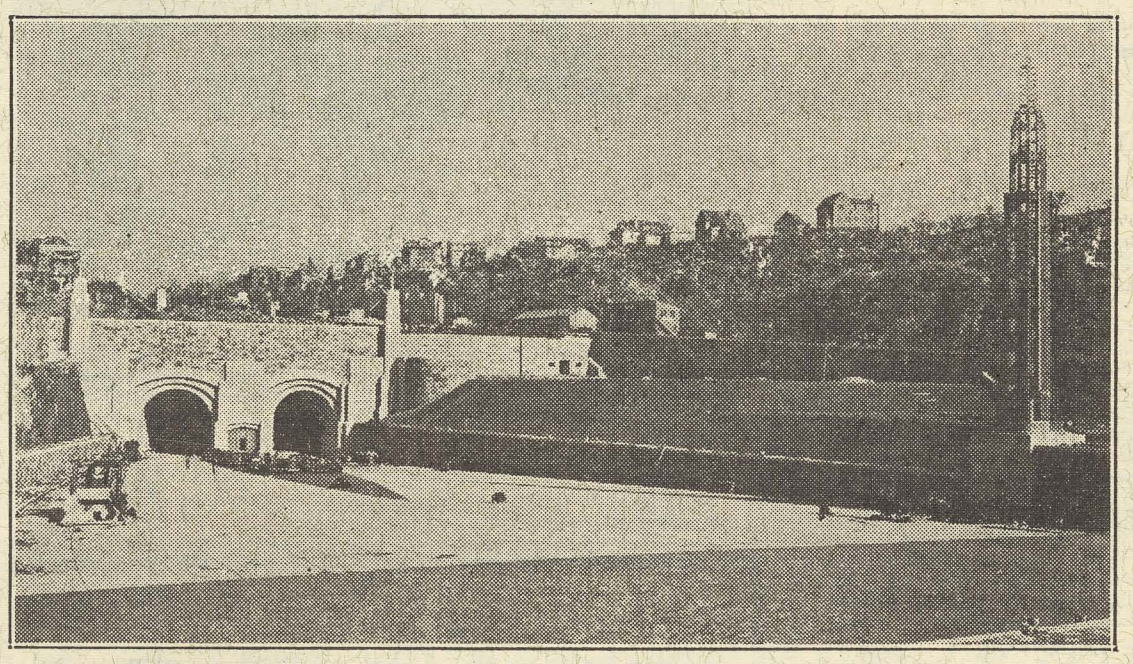
The tunnel, now permanently opened, will do business 24 hours a day, operated by three shifts of specially-trained men of the Port Authority Police Department under the direction of capable officials. At the present, with only the south tube completed, two-way traffic will be carried in the tube, with one lane for eastbound, and one lane for westbound traffic.

With the opening of the North tube, which was started almost a year ago, but will not be completed until late in 1940 or early in 1941, each tube will have two-lane, one-way traffic.

The tunnel, when completed, will represent an investment of approximately $85,000,000, as compared to approximately $50,000,000, which was the cost of the Holland Tunnel, and $57,000,000, which was the cost of the George Washington Bridge.

A boom in residential properties in North Hudson was predicted by speakers who addressed several thousands of persons yesterday at the official dedication services. The tunnel brings North Hudson ten minutes closer to Times Square and the Mid-Town section of Manhattan.

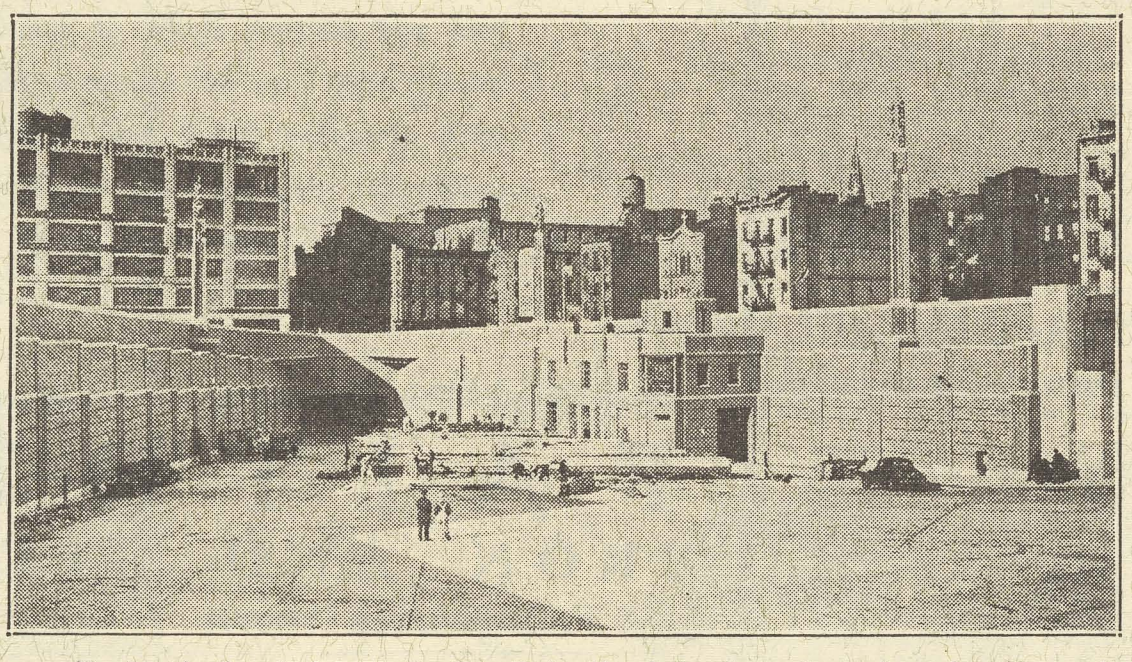
Portals and Weehawken Plaza of Lincoln Tunnel



Unlike the New York ends of the twin tubes, the Weehawken entrance and exit are both located on the same plaza. The photo shows the great twin portals of the Lincoln Tunnel. The portal of the South tube, shown at the right is ready for use, and beginning at 4 a. m. tomorrow steady streams of autos will pass into or emerge from this concrete and granite arch. The other arch, at the left, will not be ready for public use until late in 1940, or early in 1941, when the North tube is completed and opened. At present the North tube's steel shell has been constructed about 1,000 feet, or one-fifth of the way from the Weehawken shaft.

To the right of the photo can be seen the granite wall which borders on Boulevard East, and in the background can be seen the houses on Kings Bluff.

View of Completed New York Plaza



The Lincoln Tunnel plaza on the New York side of the river, shown above, is a depressed area, triangular in shape. The photo shows one point of the triangle, at which is located the actual mouth of the South or completed tube of the Tunnel. At the other two points of the triangle are the ramps leading, on the South to 36th, 35th and 34th Sts., and on the North to 40th, 41st and 42nd Sts. The platform, shown under construction in center foreground of the photo, was used yesterday as a grandstand during the official opening ceremonies, and was torn down before the Tunnel opened for public use at 4 a. m. today. It is hoped that in the future a cross-town vehicular tunnel will be built to connect this plaza with the Midtown-Queens Vehicular Tunnel, which is now under

AUTOISTS FROM ALL OVER U. S. TUNNEL USERS

Holland Tunnel Checkup Shows Licenses From All States Pass Through Tubes.

Passenger cars from all states in the Union, as well as many outside points, will use the Lincoln Tunnel just as they have been frequent users and therefore frequent contributors to the success of the Holland Tunnel, as indicated by checks made at intervals in the past year.

An average of forty states are represented by automobiles passing through the Holland Tunnel on days when traffic is running fairly heavy. In addition, the District of Columbia, several Canadian provinces and foreign countries are included in the daily procession.

The object of studies that have been made was to ascertain the extent to which the composition of tunnel traffic may be changing in state origin and destination, and also to assist in determining what may be expected during the World's Fair two years hence.

The percentage of automobiles from outside the States of New York and New Jersey showed practically no change since 1935, when a similar

(Continued on Page 23)

PORT POLICE FORCE NUMBERS 427 MEMBERS

Addition of 130 Men Makes Department One of Largest in the World.

At the dedication ceremonies today, 115 immaculately-attired Port Authority patrolmen started their first actual day as full-fledged traffic police. These men, and 15 others who have been assigned to other Port Authority stations, were appointed a little over two months ago, bringing the full strength of the Port Authority Police Department up to 427 officers and men. These 130 "rookies" were put through a two-months course of rigerous training following their selection through competitive examinations from more than 800 applicants. Of the 800, only 208 passed the tests for positions as traffic officers. The remaining 78 eligibles will be used to fill any vacancies which may occur provided they are under the required age limit of 30 years when the vacancy occurs. Patrolman James C. Western of Jersey City was high among the 800 who took the examinations.

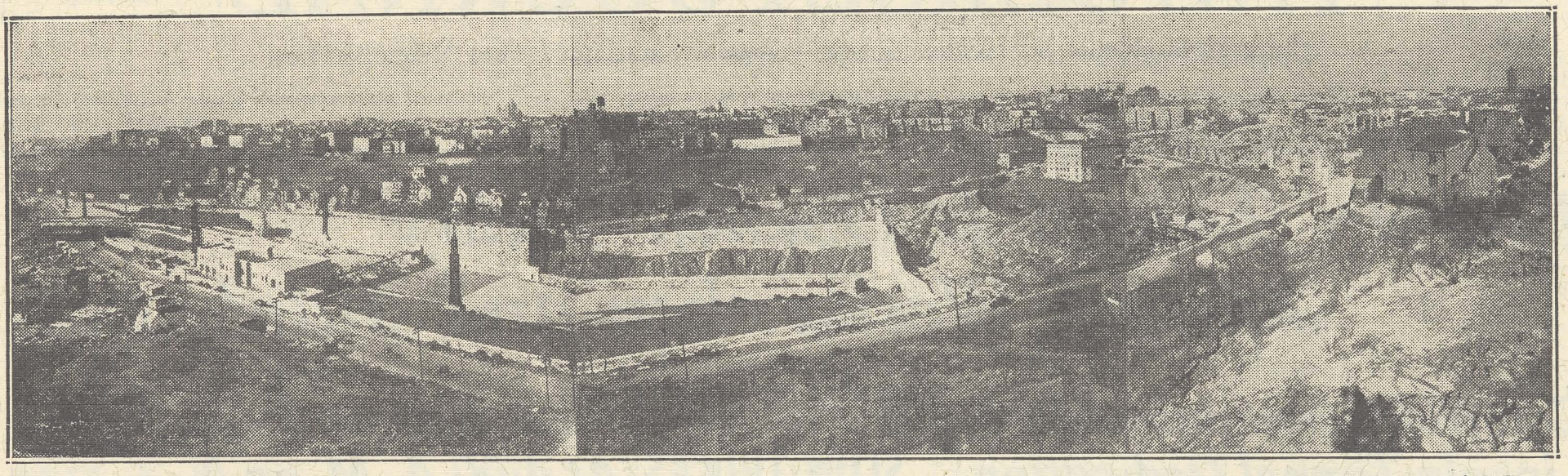
The men, during the two-months' training period, were given instruction on the procedure used in toll collection, how to operate the signal system, and on the use of fire-fighting equipment in case of a vehicle fire in the tunnel. These men will alternate during their daily tours of duty, serving two hours in the tunnel, two hours outside, then repeating the process.

As a part of the training, given them by Inspector Cornelius F. Cahalane, and his subordinates, the men instructed in the handling of

(Continued on Page 23)

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Weehawken Plaza as Seen From Kings Bluff



Looking down on the Weehawken Plaza of the Lincoln Tunnel from atop Kings Point, the above panorama presents itself. At the extreme left of the photograph is Willow Av., which is one of the two routes through Hoboken. The other Hoboken route is along Park Av., which is just out of the photograph to the left. The road in the foreground, sweeping from the end of Willow Av., past the the Plaza and then uphill, is Boulevard East. The road directly above and behind the Plaza is Park Av., Weehawken. Boulevard East will accommodate much of the Bergen County traffic. A super-highway is being cut out of the rock at the right of the photograph, just to the right of the Weehawken Town Hall, the building a little above and to the right of the tunnel portal. The Lincoln Tunnel Administration Building is shown to the left of the photograph, and behind it is the shed under which the toll booths are located. Directly in front of the Town Hall will be a large play field, to be constructed by the Port Authority to take the place of the playground which was formerly located on the site of the Plaza.

The elaborate approach system includes a sweeping elevated highway, part of which can be seen at the extreme left of the photograph, which will circle around the foreground, just to the east of Boulevard East, and will connect with the super-highway which will cross Boulevard East again and then pass through a depressed section to be cut through Union City and North Bergen, to connect with Route No. 1 along the Meadows.

North Hudson Ratables Cut $2,716,000 By Approaches

Condemnation of Land for Tunnel Highways Hits Union City, Weehawken, North Bergen—Benefits Compensate Loss.

The plans for the New Jersey approaches to the Weehawken Tunnel are still in a slight state of flux so that the eventual total cost to the municipalities through which it will pass is not yet known. However, approximations at present are that the loss in ratables to the municipalities of Union City, Weehawken and North Bergen will be in the neighborhood of $2,716,000. The exact figure is not yet known as it is not known whether the Port Authority will go through with all the condemnations of property that have been tentatively scheduled.

The ultimate loss in ratables as given by officials of the three municipalities is as follow:

For Union City $1,256,500
For Weehawken $1,000,000
For North Bergen .....$ 250,000

In addition, Weehawken has given up the use of its Valley Playground which is now a maze of steel and concrete. But the town will be recompensed eventually by the construction of a playground in back of the town hall which will be larger in acreage than the old playground.

Lands in Union City up to the value of $1,213,600 have already been condemned for the approaches. They number 169 properties. Of the total, 1937 taxes were paid on lands to the value of $997,220. These taxes will be lost in 1938, but taxes will be paid on the remaining $236,400 in ratables which were not condemned before Oct. 1. The eventual total of condemnations in Union City is expected to be $1,516,500 in ratables.

In Union City, however, the administration expects the return to the city's ratables of at least $500,000 in the eventual resale of lands. These lands will be odd-depth pieces along the marginal highways which will be sold to owners of adjoining pieces for large construction purposes. The city also expects the addition of large quantities of new ratables through large scale apartment house construction along the approaches.

In Weehawken, condemnation is almost completed. Computation of the total of ratables has not been entirely completed by the township officials but it is at present close to $1,000,000 for 78 properties. Weehawken is not expected to be so fortunate in the restoration of ratables because of two factors—the fact that most of the Weehawken lands will be used for the elevated highway portion of the approaches and the fact that rebuilding will be made difficult by the steep slope of the Kings Bluff section and the cliffs on Palisade Avenue.

At present, only 11 pieces of property have been condemned in North Bergen. The total ratables lost at present are $65,000. The eventual loss is expected to rise to $250,000. However, North Bergen may eventually be the greatest gainer in augmented ratables brought on by the tunnel. The tunnel approaches will end on Tonnele Avenue, in close proximity to the vast North Bergen meadowlands. It is thought that the ease with which these meadows can be reached from a large consuming center like New York will result in a big boom in factory building by industrialists desiring a quick exit into the city.

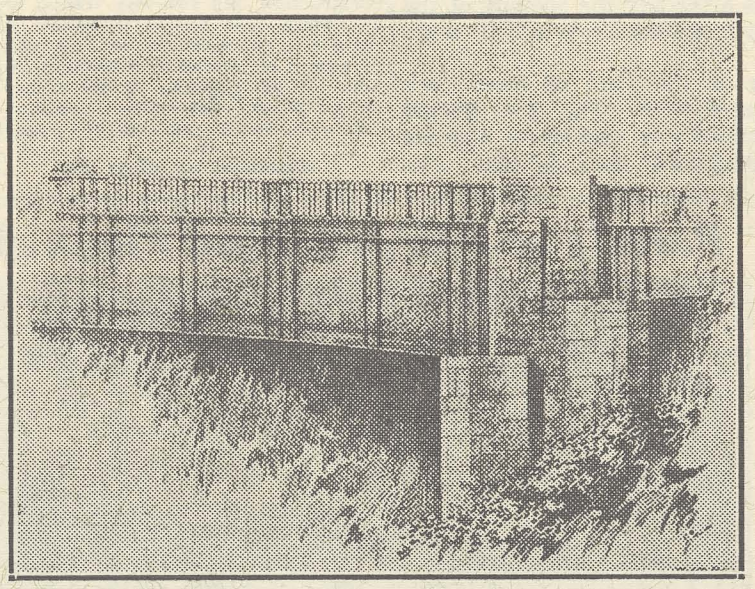
Holland Tunnel Mark For Year Set Oct. 17

Peak records for a single day's traffic through the Holland Tunnel for the year of 1937 were broken Sunday, Oct. 17 when 53,319 automobiles used the twin tubes. This figure was one of the highest since the opening of the twin-tube tunnel, ten years ago last month. The all-time high record of 58,708 cars in one day was established Sunday, April 12, 1931.

Average Tolls

Statistics show the average toll collected on the various Port Authority facilities varies. The George Washington Bridge has the highest average toll collection of $.54 per vehicle. The Holland Tunnel ranks next with an average of $.555 per vehicle. The Outerbridge Crossing is third with an average toll of $.479 per vehicle, with Bayonne Bridge fourth with $.465 and Goethals Bridge lowest with an average of $.460 per vehicle.

OVERPASS



Above is pictured an architect's conception of the overpass above Boulevard East on the Lincoln Tunnel Plaza approach. This section of the approach will not be completed for some time and will connect the plaza directly with the depressed superhighway.

Bridge Users Near 40-Million Mark

The George Washington Bridge, opened Oct. 25, 1931, showed a total traffic record of 38,735,000 vehicles on its sixth anniversary, Oct. 25, of this year. In the year ending on the sixth anniversary, the traffic count was 7,861,689 or an increase of 945,279 over a similar period during 1935-1936, or almost 14 percent. The traffic for the last 12-month period of the bridge's operation, up to Oct. 25 of this year, was greater by 2,230,000 vehicles than the traffic over the bridge during its first year of operation.

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"Hell's Kitchen" Slums Cleared For N. Y. Tunnel Approach

Ninety-one old-time tenements of the Hell's Kitchen section of the West Side of Manhattan were wiped out to make way for the New York approaches of the Lincoln Tunnel, doing much to aid the slum-clearance program of New York City. Many of the buildings torn down, after being purchased by the Port Authority, were the rear tenement type. In all the 91 tenement buildings contained 949 flats and 3,112 rooms. Many of the buildings demolished were more than 80 years old. A number of them had gone without repairs or improvements for at least 30 years.

The section in which the Lincoln Tunnel approach was located was known many years ago as the "Glass House Farm." The farm, distinguished by a large house of many windows, was subdivided into building lots more than 100 years ago, and at the time was one of the most desirable residential sections in Manhattan. Then the limestone-front, five-story tenements were built during the period between 1850 and 1870, and in time the section's name changed from the "Glass Farm House" to "Hell's Kitchen."

The properties taken over for the Manhattan approaches are located between 10th Av. and 11th and from 34th St. to 42nd.

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This improvement is destined to stimulate business and employment throughout New Jersey and in general contribute to the economic welfare of the entire state. It will result in greatly increased convenience for the army of New Jersey people who earn their daily living in New York. At the same time, by increasing New Jersey's accessibility to the intensely populated metropolitan area, it will even further enhance New Jersey's popularity as a site for happy prosperous homes.

The officers of the City of Jersey City and all its people take this means of expressing publicly their appreciation of the foresight of those who envisioned this splendid new under-river highway . . . and their courage in carrying their vision to concrete fulfillment.

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Parks and Public Property

Peter Woodland Hero of 1880 Tragedy in First Tunnel Try

Young Superintendent Saved 8 From Drowning

Tried to Save 19 Others by Wedging Self Behind Airlocked Door—Water Balked Rescue Attempts.

Because of the dangers involved in the construction of tunnels, more so m former years than at present, there have been deeds of heroism recorded in the history of tunnel-building which are outstanding.

In the history of the tunneling of the Hudson River, one name will always stand out above all others . . that of Peter Woodland.

Peter Woodland, a young man of 32 years, with everything to live for, was killed in the worst tunnel disaster ever recorded in this section of the country. Twenty men, all tunnel workers, met their death at 4:30 on the morning of July 21, 1880, when a portion of the roof of a tunnel which had moved 1,800 feet from a shaft at the foot of 15th St., Jersey City, caved in at the shaft, flooding both the tunnel and the lower portion of the shaft leading to the tunnel.

The tragedy occurred without warning while 28 men of the night shift were bolting iron plates to the shaft. Woodland, a comparatively young man with a wife and two small children, was assistant superintendent of operations and was in charge of the night shift. He had entered the tunnel only a short time earlier, and was near the door of the airlock when a number of the roof plates outside the lock collapsed and water started pouring into the tunnel.

Used Body as Wedge

There were eight men working near Woodland, and he shouted to them as he saw the water pouring into the shaft outside the airlock. He told them to get into the lock and, after he shut the door from the inside of the tunnel, to open the outer door and get up the shaft while escape was still possible. As the eight men ran through the lock, they could hear the young assistant superintendent shouting instructions to them on how to go about rescuing the other men who remained in the tunnel.

Meanwhile, a foreman, outside the airlock, fought his way through the swirling water and opened the door to the lock, liberating the eight in the lock, but causing the water to rush into the lock with such force that Woodland's strength was not sufficient to keep the door at the other side of the lock shut against the pressure of the water. As the water forced the door open, it poured into the tunnel, drowning the 20 men inside. When Woodland's body was recovered, it was found wedged in a crouching position behind the door he had hoped to keep closed so that the others in the tunnel might also have a chance to live.

Small Headlines

Had the accident occurred in the present day the newspapers would have carried eight-column headlines of heavy, black type. As it was "The Evening Journal" of Wednesday, July 21, 1880, carried a one-column story under a one-column headline on the front page. The headline appeared as follows:

Burried Alive

A Terrible Accident

Caving In Of The Hudson River Tunnel

21 Men Buried

Statements Of The Engineers

Names of the Saved and Dead

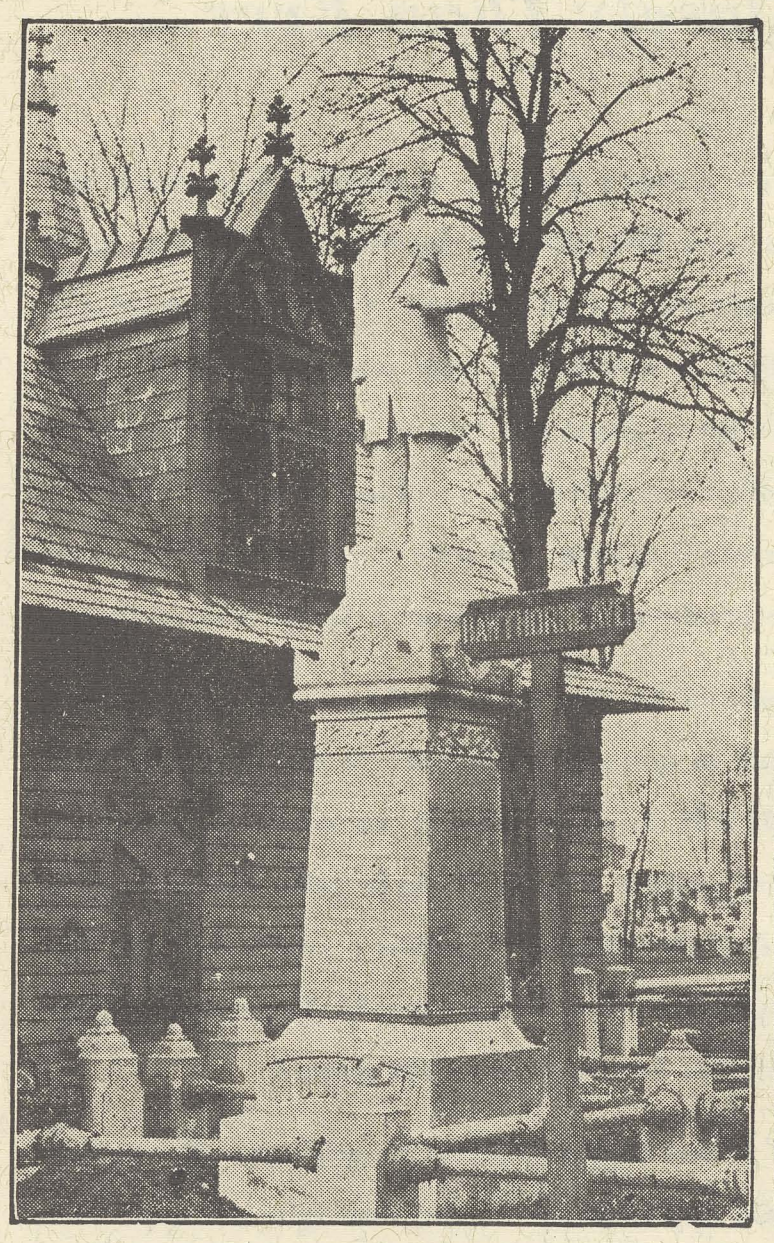
The account carried a statement from "Messrs. Spielman and Black," the engineers in charge, explaining how the accident had happened, and expressing the prediction that "the bodies would be recovered within three days, and the work held up three weeks."

After frantic digging by a crew of picked miners, the first body, that of Woodland, was recovered in, not three days, but 65 days, on Sept. 23, and the last of the bodies were removed from the tunnel Nov. 29, or 132 days after the tragedy happened. Families of each of the victims were given $500 each by the tunnel company as compensation for the death of their loved one.

Woodland's body was buried with ceremonies befitting a hero. Services were in charge of the Knights of Pythias, of which he had been a member. It was not long after his funeral that a fund was started by the Knights of Pythias to erect a monument which would be a likeness of the hero over his grave in New York Bay Cemetery. The monument was erected and unveiled within a year after his death, and stands today a sort distance from the cemetery office, facing Garfield Avenue, near Chapel.

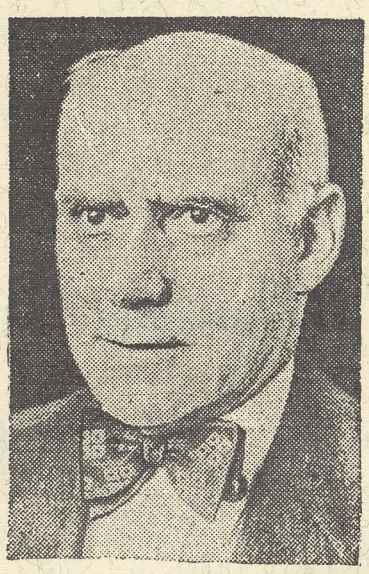
Although Peter Woodland died more than 57 years ago, his memory will live on for many years more, as the tunnel builder who gave his life that eight of his fellowmen might live.

PETER WOODLAND MONUMENT



The memory of Peter Woodland, who died in the Hudson River Tunnel cave-in, in 1880, is honored by this statue of him, which stands over his grave in New York Bay Cemetery. The monument was erected by the Knights of Pythias, of which the tunnel hero was a member.

Police Head



INSPECTOR C. F. CAHALANE

Cornelius F. Cahalane, Inspector in charge of the Port Authority Police Department, is recognized as one of the outstanding authorities in tunnel policing in the world. He has been connected with the Port of New York Authority since before the Holland Tunnel was opened, in 1927, and while the tunnel was still under the direction of the New York and New Jersey Tunnel Commissions

Formerly Deputy Chief Inspector of the New York Police Department, Inspector Cahalane took over the task of training the Holland Tunnel Police Department early in 1927, many moths before the actual opening of the tunnel. Under his direction the police force of the Port Authority has increased from less than a hundred men to its present strength of 427 officers and men.

Because of his broad knowledge of tunnel policing, he has been called to Antwerp, Belgium, Boston, Mass. and Detroit, Mich., to train tunnel police in those cities. He is a native of New York City.

Six Bus Companies Use Lincoln Tunnel

With the opening of the new tunnel today six bus companies started operating approximately 250 busses each way via the new tube between New Jersey municipalities and midtown Manhattan. The busses, formerly users of the ferry services, have obtained permission from the Interstate Commerce Commission to use the tunnel facilities, cutting at least ten minutes off the operating schedule of each bus. The Port Authority estimates a bus will pass through the tunnel every two or three minutes during rush hours.

Those granted the use of the tunnel by the Interstate Commerce Commission are the Manhattan Transit Co., Manhattan Coach Lines, Westwood Transportation Co., Westwood Transportation Lines, Intercity Transportation Co., and the New Jersey-New York Transit Co. Three other companies have applied for the change in route so that they may also use the tunnel. These include the Public Service Interstate Transportation Corp., the Jersey City and Lyndhurst Bus Co. and the North Boulevard Transit Co., all of which have not operated regular schedules through Weehawken into Manhattan previously.

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PWA Funds Helped Make Lincoln Tunnel Possible

Grants and Loans to Port Authority by Government Agency in Excess of $29,000,000 Aided in Financing Project.

When the dedicatory party of Municipal, State and Federal officials whizzed a mile and a half through the Lincoln Tunnel under the Hudson to Weehawken, New Jersey, from New York today it marked the formal opening of one of the first giant permanent improvements for which a Public Works Administration allotment was made.

Although the general public will not be permitted to drive their vehicles through the tube until 4 o'clock tomorrow morning, completion of the project will make it possible for them to drive from the New Jersey side to the Mid-town district of New York in only a fraction of the time it previously required to travel by either the Holland Tunnel, the George Washington Bridge, or the ferries, across the Hudson on the crowded waterway.

The Public Works Administration has already made a second allotment which will permit the Port of New York Authority to double the traffic facilities of the Lincoln Tunnel. The tube dedicated today is the south tube—which will be used for both the East and West traffic until the second or north tube is completed in 1941.

The Port of New York Authority obtained a PWA grant of $4,780,000 to finance the $40,000,000 south tube in 1933, only a few weeks after Congress established the PWA. It has since obtained commitments for a Public Works Administration loan and grant of $29,100,000 to complete the north tube. In the latter case, however, the grant is conditional upon the Authority's ability to use certified relief labor.

Material Used From 40 States

The Bureau of Labor Statistics of the Department of Labor, which has conducted a detailed analysis in the construction on the south tube, has estimated that 6,318,805 man-hours of direct labor have been created at the south tube construction site, while 14,950,000 man-hours of labor have been created away from the site in the mining, manufacturing, and transportation of materials from at least 40 States of the Union to the site of construction.

The Bureau has also found that $6,898,846 has been disbursed at the construction site as pay for a weekly average of 1,300 workmen throughout the period of construction. Employment reached a peak of 2,800 in November of 1936. The average hourly earning was $1.09. Work was carried forward under contract as in normal private construction practice with awards to the lowest bidder.

For every two men working at the site of construction, approximately five others were working in distant sections of the country producing raw materials, fabricating them, and in transporting them to the scene of construction.

Approximately $5,307,000 was spent for iron and steel and their products; $2,129,000 for stone, clay, and glass products; $1,572,000 for machinery; and about $1,000,000 for chemicals, allied products and miscellaneous materials.

The total of 21,000,000 man-hours of direct and indirect labor does not take into consideration the consumers' goods demand which was created by these direct and indirect pay rolls.

Plans Started In 1930

Plans were started for the Lincoln Tunnel in 1930, when the Port of New York Authority, a bi-state organization, decided that the Holland Tunnel, which was opened in 1927, and the George Washington Bridge, opened in 1931, would be unable to accommodate the trans-Hudson traffic, which was increasing at a rate of 8.7 per cent per year. The area is in one of the heaviest traffic sections in the world. Between 1926 and 1936, trans-Hudson vehicular traffic increased from 13,680,000 to 31,573,000 despite the fact that the depression of 1930, 1931 and 1932 retarded vehicular traffic expansion to some extent.

The Authority estimates that the south tube of Lincoln Tunnel will handle more than 6,000,000 vehicles during the coming year and take but little trafic from the Holland Tunnel and the George Washington Bridge. The present trans-Hudson bridge and tunnel of the Port of New York Authority has detracted hardly any business from the ferries and the Authority estimates that the flow of traffic by ferry will be decreased only slightly during the next year. After that officials of the Authority estimate that the normal ferry traffic of approximately 13,000,000 vehicles per year will return to normal.

Although there has been a demand for years for a tunnel which would carry Metropolitan traffic from the wide region surrounding Weehawken to the shadows of New York's skyscrapers surrounding 39th Street in Manhattan, the Port Authority thought it best to first accommodate traffic across the Hudson from 179th Street, where the George Washington Bridge spans, and from Canal Street, where the Holland Tunnel goes under the river.

By 1930, when it became evident that immediate steps should be taken to alleviate the trans-Hudson traffic condition from Mid-Town Manhattan, plans were made to float a bond issue for $40,000,000. New York bankers loaned the Authority $2,500,000 for preliminary work, but by the time that actual construction work was to be started, investment funds were frozen by the depression, and plans to float the remaining $37,500,000 bonds were suspended.

One of First PWA Loans

Commissioners of the Port Authority applied to the Reconstruction Finance Corporation, which had not completed negotiations for the loan when the Public Works Administration was created in June 1933. The Authority then transferred its application to the Public Works Administration. It did not ask for a grant. Inasmuch as plans were already under way, the project obviously qualified under PWA's engineering, examining and social measurements and the value of the bonds had been established, PWA did not hestitate to make the loan.

By June 6, 1935, the Port Authority had negotiated amendments to its contract whereby it repurchased all of the bonds which had been accepted to that date by PWA. Administrator Harold L. Ickes then granted the Commission $4,780,000 so that it might make extensive changes in its approach plans.

In 1937, the Port Authority was given an allotment of $29,100,000 so that it might economically continue its construction of the north tube. Work has already started on this PWA project.

The Lincoln Tunnel is but one of the three large PWA trans-river traffic-ways either completed or under construction in New York City.

Two Other PWA Crossings

PWA allotted $44,200,000 for the Tri-Borough Bridge which is now in operation over the East River. Traffic over it has exceeded expectations. During the first year's operation, 9,500,000 vehicles crossed the bridge. It had been orginally estimated that not more than nine million would pay tolls across.

PWA also allotted a total of $58,365,000 for the construction of the East River or Quens Mid-town Tunnel. Construction on this twin tube structure, which will connect Manhattan and Queens, is under way.

Plans have already been discussed concerning the possibility of constructing a linking tunnel under Manhattan which would link the Lincoln Tunnel with the Queens Mid-Town Tunnel, making it possible for persons to drive over an express underground highway from Weehawken to Queens and avoid all Manhattan traffic.

The estimated capacity or the Holland Tunnel traffic per year is 15,000,000 vehicles. That of the Lincoln Tunnel, when completed, will be the same. The ultimate vehicular capacity of the George Washington Bridge, when complete with center lanes and added approach facilities, is approximately 30,000,000 vehicles per year.

BAILEY'S

HOWARD S. KENNEDY—Pres.

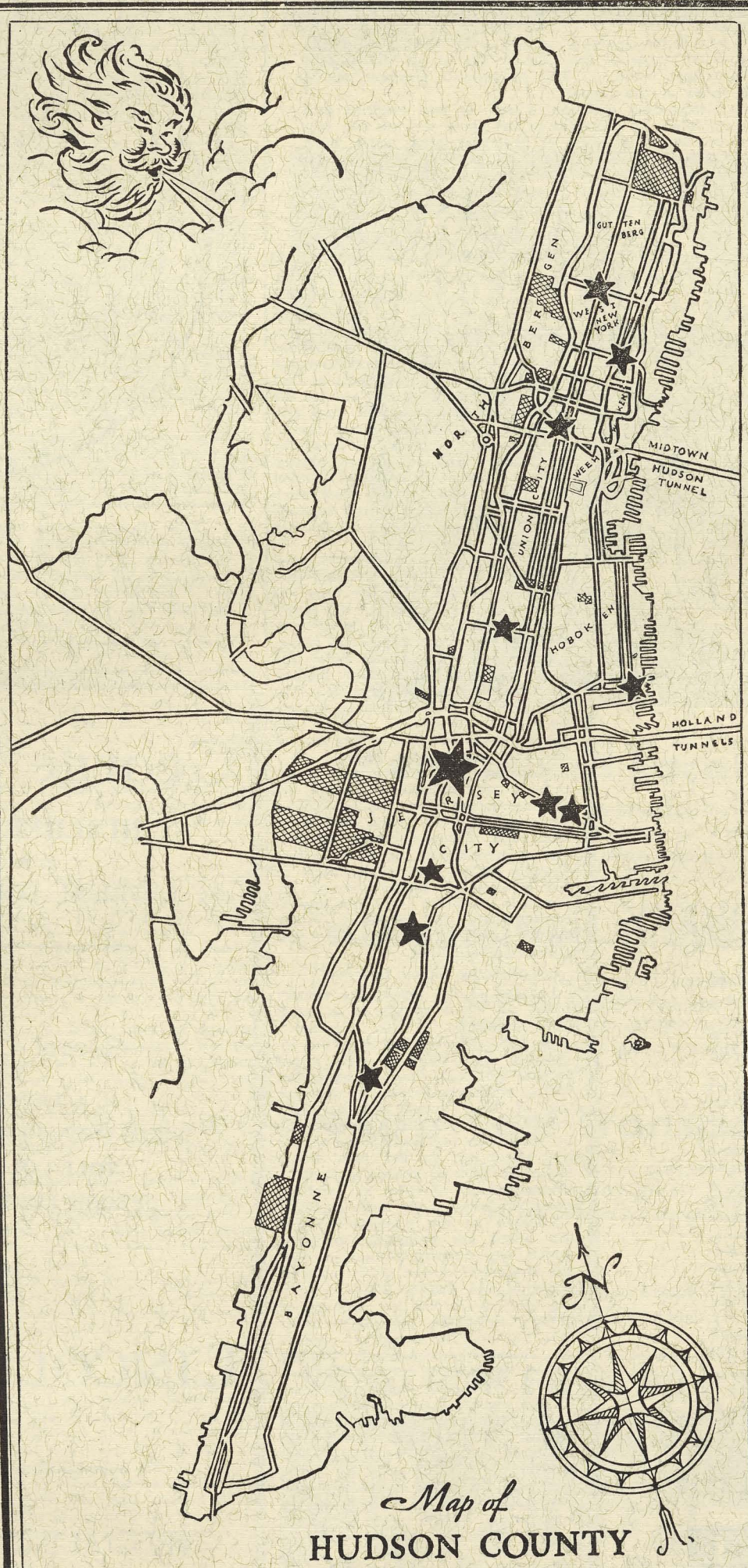
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Map of
HUDSON COUNTY

The New
TUNNEL

ON Tuesday, today, at the Weehawken Plaza, the dedication ceremonies of the newly completed Lincoln Tunnel take place, at 12 o'clock noon. The river bed again becomes a boulevard. Again the river becomes dry land and time and space are annihilated.

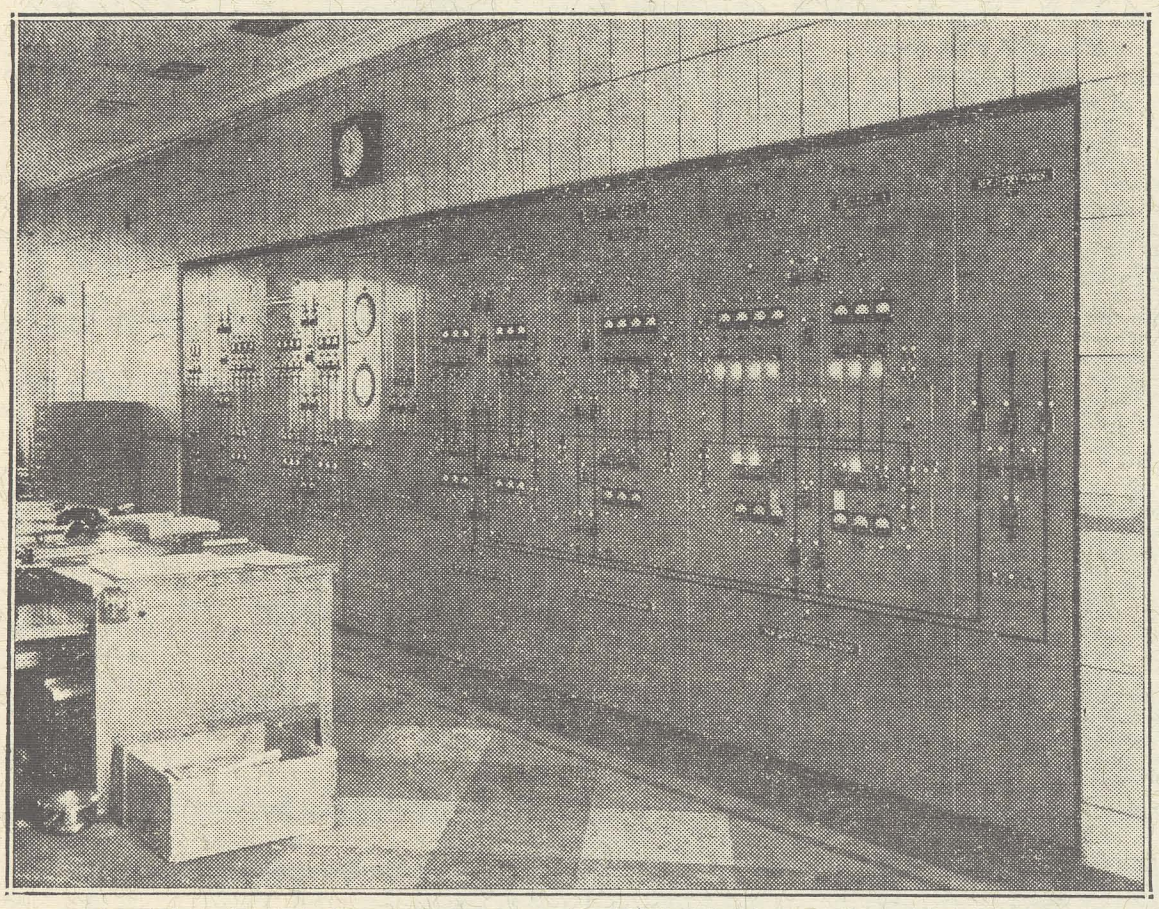
Hudson County is brought nearer to Midtown New York than parts of New York itself. One of its offices, as indicated by a star, is near the plaza. The Trust Company serves not only Hudson County but is increasingly favored with New York business.

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Central Control Board "Nerve Center" of Tunnel



Located on the sixth floor of the Weehawken ventilation building is the control board for the entire ventilating system of both the South and North tubes of the Lincoln Tunnel. At the present time, of course, only the south tube's controls have been installed. This photograph, however, shows the control board for ventilation systems of both tubes of the tunnel.

To the left of the photo are the four sections designating and controlling the four sections into which the North tube's ventilation system will be divided. To the right of the photo are the five sections of the control board hooked up to the five ventilation sections of the completed South tube. Located also in this room, in which the supervisory operator of the tunnel has his office, is located an indicator board showing all the traffic signals in the tunnel, as operated by the policemen on duty. There are also recording machines keeping accurate readingh on the amount of carbon monoxide contained in the vitiated air as it passes through the exhaust ports at the top of the roadway.

Central Switchboard for Air and Power Control

Tunnel Ventilation System Under Constant Check by Supervisor—Indicators Show Carbon Monoxide Content of Air.

From a room high above the Lincoln Tunnel on the sixth floor of Weehawken ventilation building is located the "nerve center" of the great ventilation system which makes the tunnel usable to motor vehicles. Were it not for this system of blowers, exhausters, and huge air ducts, capable of supplying close to 4,000,000 cubic feet of fresh air per minute into the combined tubes, it would be impossible to have a vehicular tunnel of such a length.

The ventilation system for the south tube is divided up into five units. One unit provides ventilation for the rock tunnel from the Weehawken portal, under Kings' Bluff to the ventilation building. Sections two and three provide ventilation for the portion of the tube which extends from the Weehawken ventilation building to the ventilation building located at the bulkhead line on the New York side. Sections four and five provide fresh air to the land tunnel from the New York river ventilation building to the portal. The first two sections are cared for by blowers and exhausters located in the Weehawken building. Section No. 3 is handled by the New York river ventilation tower, and sections No. 4 and 5 by the New York land building.

On the central control board, seen in an accompanying photograph, switches for the fresh air fans are located at the bottom of the board and the exhauster fans' switches at the top, each with indicators showing the amount of power being fed to the motors. Power lines, feeding each building, are so arranged that the throwing of a switch in the supervisory operator's office can throw the power load to any one of the four main power lines.

There are six power lines in all, three of the sources of supply being from the Consolidated Edison Company of New York, and three from the Public Service Electric and Gas Company of New Jersey. Trouble on any one, or as many of five of these six feeder lines can be instantly detected on the central control board, and the entire system can be supplied from any one of the six major feed lines.

Warning Signal In Panel

Located at the top of the control panel for each section is a small light marked "C. O. Content." This light normally burns dimly, indicating that there is only slight carbon monoxide content registered in the analysers located in the ceiling of the tunnel. If the light should burn brightly, it would be an indication that more power should be turned on, so the fans would move at greater speed; provide a greater supply of fresh air, and remove the vitiated air more rapidly.

Located on the opposite wall of the office are recording machines which are directly connected with the analysers located in the exhaust ports of the tunnel. These recording devises record the amount of carbon monoxide per 10,000 cubic feet of air. The analysers consist of chemical compounds, through which the carbon monoxide passes. The action of the carbon monoxide on the chemical generates heat energy which is turned into electrical energy, which in turn, operates the indicator of the recording machines.

Also in the office of the supervisory operator is a reproduction of the tunnel traffic lighting system, as controlled by the patrolmen on duty in the tunnel. Normally, all the green lights on the board are lighted. Should a patrolman at any point of the tunnel find it necessary to turn on a red light thereby halting traffic, one of the green lights on the signal board would go out and a red light take its place, indicating a stoppage of traffic in the tunnel. This knowledge is highly important to the men operating the ventilation equipment, as a stoppage of traffic creates a need for a speeding up of the ventilation system to cope with the increase of carbon monoxide and other fumes and gasses given off by the exhaust of motor vehicles, motionless in the tunnel as long as the red signal light was showing.

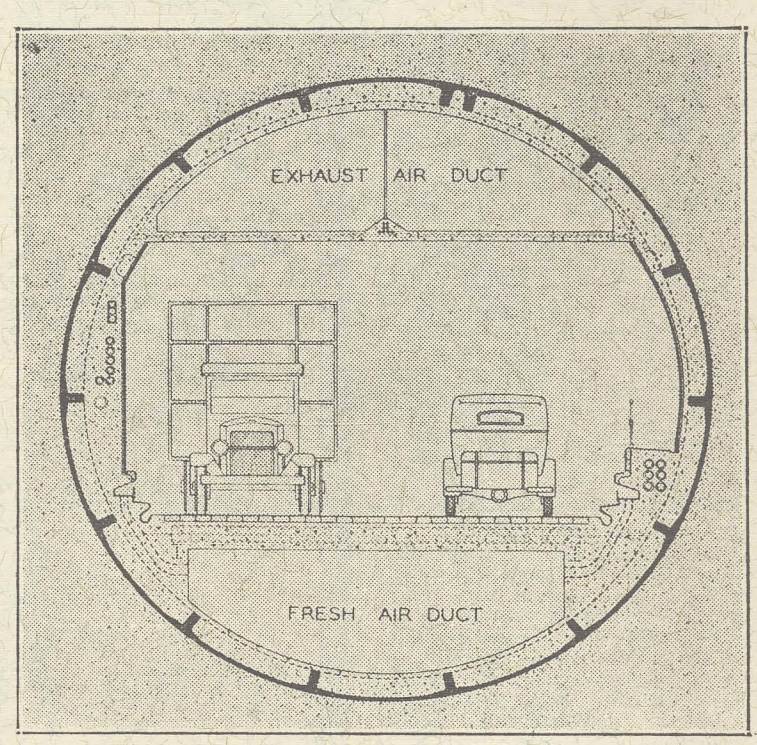
Dual Controls For Emergencies

The central control board, which contains more than 400 lights, directly and solely controls all of the power feeding the ventilating equipment in the Weehawken building. In each of the other two ventilation buildings, however, there are duplicate control boards for the particular sections supplied by the equipment in each building, so that in case of a breakdown in the electrical system of the supervisory board, the systems in each of the other buildings could be operated directly in the building by the operators in each, who would be directed by phone by the supervisory operator.

Fresh air is drawn into the blower fans from vents in the side of the building. The vitiated air, sucked out of the top of the tunnel through the exhauster fans, is forced out of the top of the ventilation building. The building itself has seven floors above ground and three below the surface, although it is much taller than the average ten-story building because each floor is almost twice the height of that of a normal building. The entrance to the Weehawken ventilation building is gained from the top of Kings' Bluff, a flight of stairs coming down the face of the cliff to the same level of the top of the building and connected with the building by a steel and concrete bridge.

A second ventilation building will be built directly adjoining the present structure to contain fresh air blowers and exhausters for the north tube of the tunnel. The excavation, blasted out of solid rock, is now nearing completion, and the foundation of the ventilation building will be just below the floor of the north tube of the tunnel. A twin of the New York river ventilation building will rise beside the present structure. The building will be erected over the steel casson which has been sunk under the river, and from which the New York side of the tunnel is extending out to the New York portal.

CROSS-SECTION VIEW OF TUNNEL



This drawing shows how a cross-section of the tunnel would appear if it was possible to take such a picture. The outer rim of the tunnel is composed of a steel ring, made of 14 plates, each weighing 3,330 pounds, and a 700-pound key plate. Above and below are shown the air ducts, the one beneath the roadway for the fresh air, and the one above the ceiling for the vitiated air. The drawing of car and truck show the approximate size of those vehicles as compared with the size of the tunnel.



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No Fatalities From 'Bends' On Port Tunnel Projects

Careful Check on Health of Tunnel Workers —Strict Regulation of Working Hours Reduce Air-Pressure Sickness.

Man's greatest difficulty in tunnelling under water has been the threats of leaks resulting in the flooding of the workings and the death, through drowning, of the tunnel workers. Two of the greatest developments in the methods of tunnel building were the invention and perfection of the shield, and the use of compressed air.

The shield was invented by Sir Marc Brunel in 1825, but has since been steadily improved on until now little remains of the original device but the idea. The first suggestions on the use of compressed air, and the first patents on air locks were made by Lord Cochrane in England in 1830. The first shield to remotely resemble the one used at the present time was devised by J. H. Greathead in 1887.



Dr. Edward Levy

Today the combination of the shield, compressed air, and steel ring plates, have eliminated many of the dangers associated with the earlier attempts to build tunnels.

Compressed air, however, has proven to be one of the tunnel workers' greatest dangers at the same time it was being used to save their lives. While it protected the men as they worked in the tunnel, it would cause them to be stricken with painful, and in some cases fatal seizures, known as the "bends."

The method of going into a compressed-air tunnel is to enter an air lock located in a concrete bulkhead at the "head" of the tunnel, where the pressure is raised from the normal pressure of the outside atmosphere, to anywhere from 10 to 50 pounds per square inch, until the pressure in the air-lock equals the pressure of the tunnel. The pressure maintained in the tunnel varies according to the type of material the shield is being forced through. It is raised or lowered, depending on whether the shield is being forced through silt, clay, sand, or whether rock is being cut away from the front of the shield.

Sandhogs in the early tunnels would work eight or ten hours under compressed air, then leave the tunnel, via the air-lock in which decompression would take place without particular regard to the length of time it took. Statistics show that in the early tunnels the number of cases of "bends" were exceedingly high.

Dr. Edward Levy, medical director of the Port of New York Authority, who has been connected with the Port Authority since 1921, has made a thorough study of the "bends," its causes, and how best to eliminate it. From the time the Port Authority first started the Holland Tunnel, no one could go under compressed air until they had undergone a physical examination of the heart, lungs and ears by a staff physician.

20 Deaths on 1906 Tunnel Job

Records show that in the Pennsylvania Railroad Tunnel, started in 1906, there were 3,692 cases of bends and 20 deaths recorded by the late Dr. F. L. Keays out of the 10,000 men who used the air locks. This was the tunnel under the East River, built between March, 1906 and July, 1908.

No compressed-air records are available for the early Hudson Tunnel, which failed after two attempts, between 1874 and 1892. The records on the Hudson & Manhattan Tunnels, started in 1903 and completed, as far as the compressed-air work was concerned, in 1907, show 1,573 cases of "bends" with three deaths resulting. The number of decompressions was not recorded.

In contrast to these figures, the Holland Tunnel sandhogs and other compressed-air employes, according to records on file at the Port Authority, piled up a total of 756,565 decompressions with only 528 cases of the "bends" and no fatalities resulting. In the construction of the south tube of the Lincoln Tunnel there were 120,652 decompressions, with only 39 cases of the bends, none of which were serious.

A study of all cases of the bends, of which records were kept, show that 64 per cent. of the attacks of "bends" occurred within the first hour after emerging from the air lock. Some attacks, however, have occurred as long as 18 hours after emergence. Ninety per cent. of all cases on record are joint cases, causing the partial paralysis of a member, such as an arm or leg. Some of the cases on record show that the "bends" effected the brain or spine of the tunnel worker, causing him to appear to be intoxicated, and in a number of instances an attack of "bends" were mistaken for intoxication.

A speedy and effective remedy, in fact the only remedy, for a case of "bends" is to place the victim into an air lock, gradually increase the pressure, then, after the victim has been relieved, reduce the pressure very gradually to normal again.

Badges Identify Sandhogs

Every compressed-air worker employed by the Port of New York Authority carried a badge identifying him as a compressed-air worker, and instructing anyone, should he be seized with an attack of "bends" to rush him to the air locks at either Pier K, in Weehawken, or at the foot of 39th St., in New York City. The recompression of a "bends" victim forces the air bubble, which has been created in his body through decompression, to be eliminated, and gradual decompression brings the victim back to the normal air pressure without a recurrance of the attack.

A schedule has been arranged by the Port Authority medical director so that none of the tunnel workers will be under compressed air for too great a period. Those working in compressed air up to 26 pounds per square inch pressure work two three-hour shifts with a one hour rest period between the two work shifts.

Those working in from 26 to 33 pounds pressure work two two-hour shifts with a four-hour rest period between shifts. Those employed in from 33 to 38 pounds pressure work 90 minutes, rest five hours, then work another 90-minute shift.

Men working in from 38 to 43 pounds pressure work one-hour shifts with six-hour rest periods in between. Those working under from 43 to 48 pounds of air pressure are employed 45 minutes, rest six and a half hours, then work another 45-minute shift. In extreme cases where from 48 to 50 pounds pressure is necessary, the sandhogs work a half-hour, rest seven hours, then work another half-hour period.

It is by following out this schedule, as well as by keeping a constant medical check on all compressed air employes, that the Port Authority medical staff has maintained the unusually low rate of sickness, through the "bends," once the dread of every compressed-air worker.

Cut Rates for Users Of Tunnels, Bridges

Every day will be bargain day to the motorist, truck driver or motorcyclist who uses a combination of the Port Authorities' facilities. In a recent announcement the Port Authority made known an arrangement whereby a person using both the Holland Tunnel or Midtown Tunnel, and the Bayonne Bridge or either of the other two Staten Island-New Jersey crossings, will only have to pay one-and-one-half fares for the use of the two facilities, rather than two fares.

Passenger cars from Manhattan may use the George Washington Bridge, the Lincoln Tunnel or the Holland Tunnel, then either the Bayonne Bridge, Goethals Bridge or Outerbridge Crossing, for a combined tariff of 75 cents, the use of the two facilities in the past costing them $1.00. The prices on trucks range, in the combination fare schedule from $1 up to $2.50, depending on the size and type of truck.

The fare for the new Lincoln Tunnel will be the same as the other Hudson River crossings, with a flat rate of 50 cents for passenger cars, and a sliding scale on trucks from 50 cents upward on trucks.

General Manager



John E. Ramsey

John E. Ramsey, general manager of the Port of New York Authority, has been connected with the organization since its inception in 1921. A graduate of Indiana University and Indianapolis Law School, he became assistant yardmaster of the Illinois Central Railroad in 1907. In 1908 he became assistant chief clerk, and later chief clerk to the superintendent of the C. C. C. and St. L. Railway. From 1912 to 1915 he served as chief clerk to superintendent and division accountant of the Missouri Pacific Railroad. In 1916 he went to the Delaware and Hudson Railroad as joint facilities accountant and chief clerk to comptroller. He first became connected with a port improvement group in 1918, when he became chief statistician of the New York and New Jersey Port and Harbor Development Commission, serving until 1921, when the Port of New York Authority was founded.

Publicity Director



L. J. Keefe

Lawrence J. Keefe, secretary to the Port of New York Authority Commission and director of the Port Authority's Public Information Bureau, has been associated with the Port Authority for the past 15 years. He had previously been engaged in newspaper reporting for 18 years. During that time he was reporter, legislative correspondent, political writer and associate editor of the Newark Star-Eagle.

Engineer



Col. C. S. Geim

Col. Charles S. Gleim, engineer of construction, first served with the Port of New York Authority as resident engineer and assistant construction engineer on the Holland Tunnel project. His home is in Westfield, N. J. He has been engineer in charge of construction for the Lincoln Tunnel. Col. Gleim is commanding officer of the New York National Guard Heavy Artillery Regiment, located in Brooklyn.

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CITY OF Bayonne NEW JERSEY.

Arthur Kill Bridges Honor Goethals and Outerbridge

New Jersey-Staten Island Crossings Given Names of Army General and First Port Authority Chairman.

Since before the Revolutionary War, when horse-drawn stages first started making the trip between Manhattan and Philadelphia, via Staten Island, the Arthur Kill, a narrow strip of water between Staten Island and New Jersey, has formed a barrier to highway transportation. In earlier days, long before highway traffic became so universally motorized, crossing facilities were satisfactorily supplied by means of ferries, one toward the north end of the Kill, another in the center portion, and a third toward the southerly end. As was the case of other crossings in and near the Port of New York, the rapid growth of motor traffic made these ferries inadequate and agitation for bridges came into existance.

This problem was somewhat complicated because the importance of the channel precluded construction of an inexpensive low-level bridge with short spans carried by a series of piers. This waterway forms one of the two entrances to Newark Bay as well as providing the only access to industrial plants along the adjacent shores of New Jersey and Staten Island. Already the channel was crossed by one bridge, a structure of the swing type, carrying tracks of the Baltimore and Ohio Railroad.

Plans Started In 1924

The outcome of these developments resulted in action by the New York and New Jersey legislatures directing the Port Authority in 1924 to proceed with the construction of two bridges over the Arthur Kill. One was to be located toward the southerly end, the other toward the northerly end. Acting upon this mandate, the Port Authority made investigations of sites and the two states agreed to advance $2,000,000 each, or a total of $4,000,000 toward the construction costs. The balance of $14,000,000 was raised by the sale of Port Authority bonds. Engineering studies showed the cantilever type of bridge was the most suitable for each structure. The award of first construction contracts was made in July, 1926. Ground-breaking ceremonies were held Sept. 15, 1926, and construction on the two bridges was carried on simultaneously. Both were opened to traffic on the same date, June 29, 1928.

The bridge connecting Elizabeth, N. J., with Howland Hook, Staten Island, toward the northerly end of Arthur Kill was named "Goethals Bridge" in honor of Gen. George W. Goethals, who was the Port Authority's first consulting engineer. It has a main span of 672 feet and the total length of its trusses, including the end or "anchor" spans is 1,152 feet.

Outerbridge Honored

The other bridge, connecting Tottenville, Staten Island, with Perth Amboy, N. J., was named the "Outerbridge Crossing" in honor of Eugenius H. Outerbridge, first chairman of the Port Authority. It has a main span of 750 feet and, including anchor and end spans, a total truss length of 2,100 feet. Each bridge has a clearance of 135 feet, or approximately the same as that

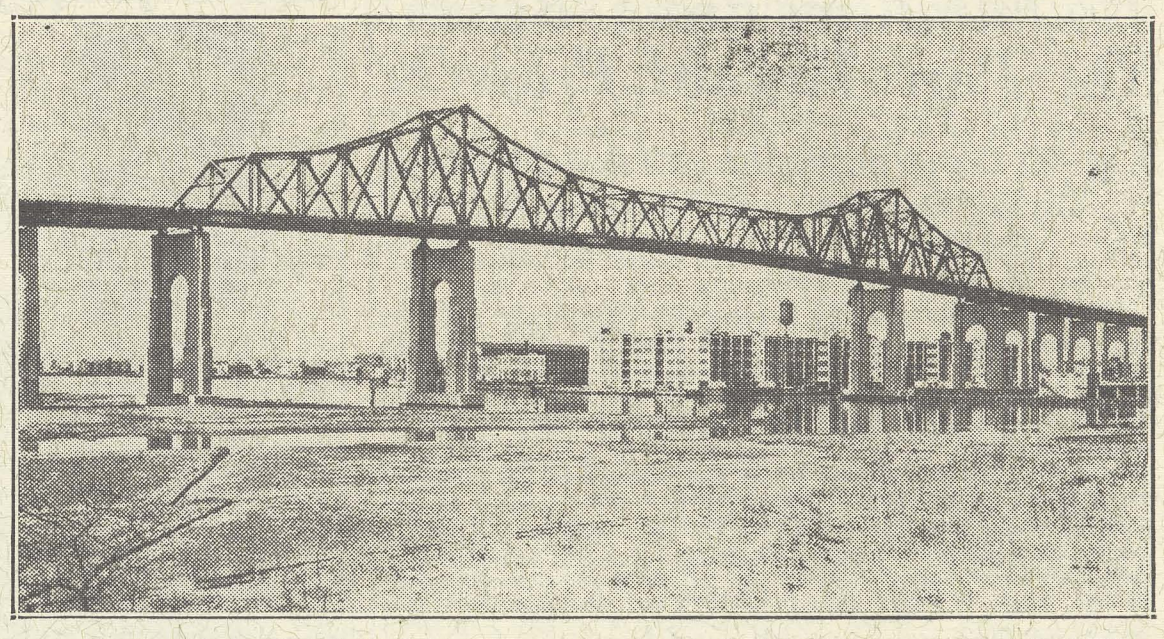
(Continued Page 16)

Development of two complicated operations, involving the cutting of nerves near the spinal column, offered a degree of relief to many sufferers of high blood pressure.

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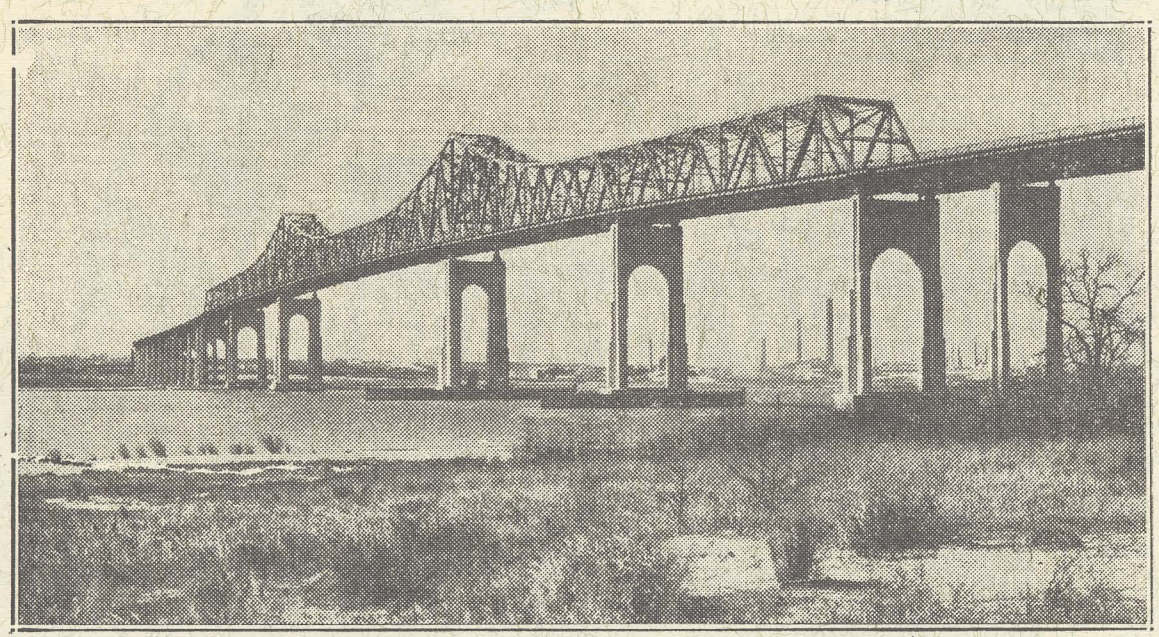
All construction for this country is up nineteen per cent for the first seven months of the year.

Goethals Bridge Named for Panama Canal Engineer



Another of the Port Authority's great crossings is the Goethals Bridge over the Arthur Kill between Howland Hook, Staten Island and Elizabeth. The bridge was named in honor of the memory of the late Gen. George W. Goethals, who first gained fame as the builder of the Panama Canal. Gen. Goethals was the first consulting engineer for the Port Authority. Situated at the northern end of the Arthur Kill, the bridge, like the Outerbridge Crossing, is of cantilever construction, with 135-foot clearance between the center span and the high water level. It was opened for traffic June 29, 1928.

Outerbridge Crossing Joins Amboy With Island



Sweeping majestically over the Southern end of Arthur Kill, the Outerbridge Crossing connects Tottenville, Staten Island, with Perth Amboy. Of cantilever construction, the bridge is 135 feet above the high water mark. It was named in honor of the late Eugenius H. Outerbridge, first Chairman of the Port Authority Commission. It was first opened for traffic June 19, 1928, a little less than two years following the ground-breaking ceremonies.

Tunnel Preview Given 6,200 Students as Safety Measure

Although the official opening of the Lincoln Tunnel is being held today, some 5,200 school children in New York City, and about 1,000 in Weehawken, have already had their first inspection of this great masterpiece of engineering. During the past three weeks the Lincoln Tunnel division of the Port of New York Authority Police Department has played host to groups of school children from the schools in the neighborhood of the New York and New Jersey approaches of the tunnel.

Police Inspector Cornelius F. Cahalane, head of the Port Authority Police Department, was responsible for the issuance of the invitations to the school children and their teachers. Those invited to inspect the tunnel included the students of both public and parochial schools in the west side section of Manhattan between 50th St. and 30th St., and the public school children of Weehawken. In issuing the invitations, Inspector Cahalane was motivated by more than merely generous impulse.

Realizing the attraction of the public ceremony attending the opening of the tunnel, Inspector Cahalane thought hundreds of school children would gather at the overhead bridges of the New York tunnel approaches, or scale the hills and cliffs on the Weehawken side, at the risk of their lives, to watch the ceremony, and to try to get a peek at the new tunnel. It was to avoid the children taking such risks that Inspector Cahalane arranged for them to have a private "preview" of the tunnel's interior and approaches.

Police Are Guides

Groups of anywhere from one to five hundred at a time were taken into the tunnel, under the competant guidance of the tunnel police force. The children were told of the tunnel's construction while en route to the center of the bore. The visitors are halted at the New York-New Jersey line, and given a brief talk by Inspector Cahalane on just how far below the water level and the river-bed they are; how far from New York and New Jersey shore-lines, and how far from each tunnel exit. Then each of the school children are given a "Lincoln Tunnel Inspection," badge and a pamphlet giving pertinent facts about the tunnel and its construction.

The pamphlet's information is written so that even primary school students can understand it. It tells briefly why the tunnel was built, what it is made of; how it was built; the safety factors involved; its ventilation syntem; how it is paid for, and to whom it belongs.

In each case of a class or group of classes visiting the tunnel, the students have been accompanied by their teachers and other members of the school's faculty.

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Kill van Kull Crossing Has 113-Year Old History

First Regular Ferry Service, Started in 1824, Important Link in New York-Philadelphia Stage Route.

New Jersey ends of three of the great Port Authority projects are in Hudson County. Two of these are the Lincoln Tunnel and the Holland Tunnel. The third is the Bayonne Bridge. This bridge represents a continuation of facilities for crossing the Kill van Kull which began in 1824 with a ferry service consisting of a flat-bottomed scow. The original ferry once formed an important link in the transportation system of the Atlantic Seaboard, for it served to transport from Bayonne to Staten Island the coaches of the New York to Philadelphia stage-coach route. During its more than a century of operation, the ferry service was improved and augmented from time to time with new equipment as the growth of traffic demanded, and served its purpose satisfactorily until the development of motor vehicles and their increasing use brought about the need for a highway bridge.

This need gradually increased and in 1925 the legislatures of New York and New Jersey passed acts giving the Port Authority the duty of investigating bridge projects and construction of a crossing of this type.

Preliminary studies began in April, 1925, and the two states agreed to advance a total of $4,000,000. The balance of $12,000,000 necessary to carry out the project was then raised through the sale of Port Authority bonds. The purchase of the necessary real estate for approaches began in 1927 and the first construction contract was awarded in July, 1928.

Angle Crossing Necessary

The legislative acts left the exact location of the bridge to be fixed by the Port Authority, and studies were made of several sites within a wide area. The one finally selected required a bridge crossing Kill van Kull channel at a considerable angle and thus necessitating a longer span than would be required by a right-angle crossing of the channel. The greater cost of this increased span was offset by the economies possible through lesser destruction of property and some advantage in improved street connections at each end. Several types of structure were considered and a steel arch was finally selected, the arrangement making it a span of record-breaking size for an arch bridge.

As measured from center to center the supporting hinge pins, the Bayonne Bridge arch measures 1,625 feet and one inch.

The bridge now has a 40-foot roadway and a six-foot sidewalk. The design provides for an ultimate 65-foot roadway or an alternative consisting of the present 40-foot roadway flanked by rapid-transit railroad tracks on either side. Clearance above the water at the center of the bridge is 150 feet above mean high-water level.

Started In 1928

The first major construction contract was awarded July, 1928, and the ground-breaking ceremonies were held Sept 18 of the same year. By October, 1930 the closing members of the arch were placed and the erection of the steel flooring had been started. Dedication ceremonies were held Nov. 14, 1931, and the bridge was opened for general traffic on the next morning. During 1932 the American Institute of Steel Construction selected this bridge as the most beautiful large steel bridge to be completed in 1931, and presented the Port Authority with its award of merit.

Some of the physical features of the Bayonne Bridge are set forth below:

Length of arch span, 1,675 feet.

Total length of bridge, including approaches, 8,100 feet.

Width of arch, 74 feet.

Channel clearance at mid-span, 150 feet.

Rise, lower chord, 274 feet.

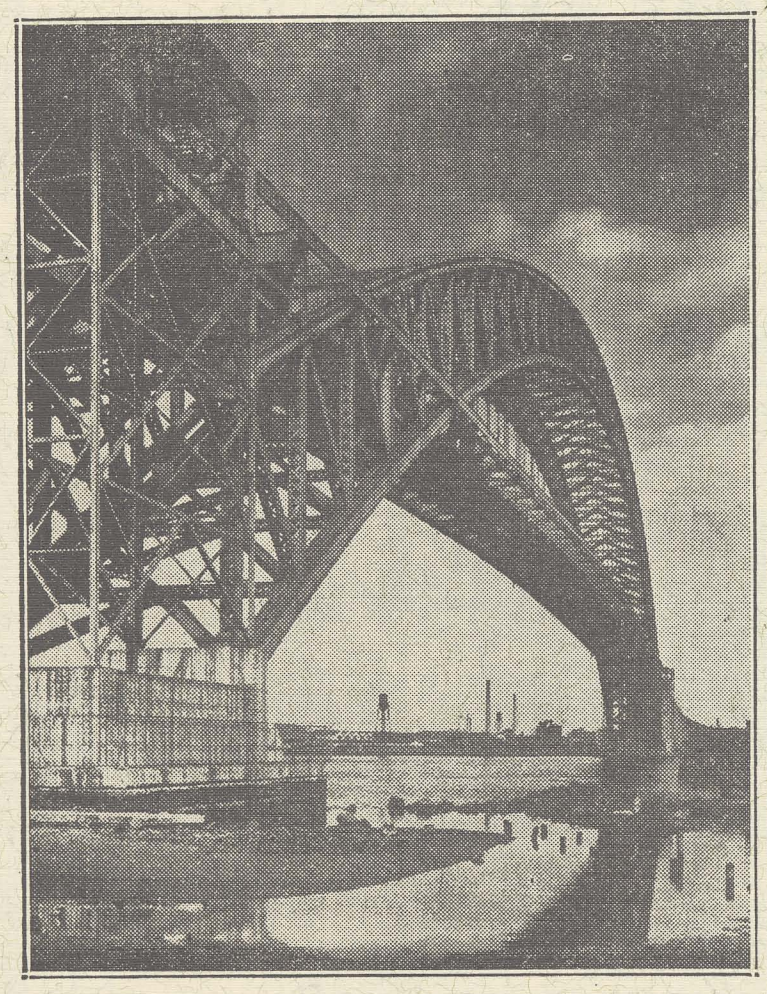
Height of upper chord, above water at crown, 327 feet.

Steel work in arch and approaches, 30,000 tons.

Arch abutments, concrete and granite, 34,000 cubic yards.

Approach piers, reinforced concrete, 39,000 cubic yards.

BAYONNE BRIDGE, HIGHWAY LINK

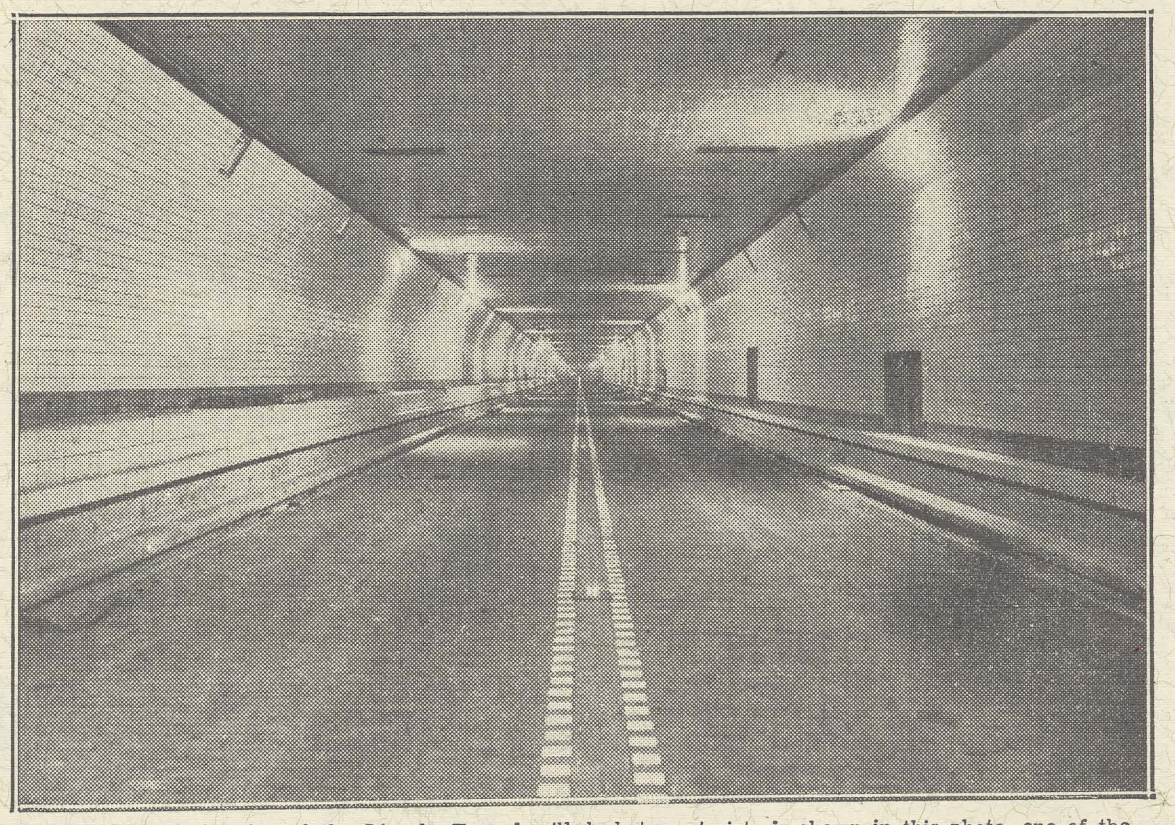


Curving in a graceful arch over the Kill van Kull is the Port Authority's Bayonne Bridge, regarded by many as one of the most beautiful bridges ever built. It connects Port Richmond, Staten Island with Bayonne, completing the highway link between Manhattan and the New Jersey shore and points South via Staten Island. Opened to traffic Nov. 15, 1931, after the expenditure of approximately $13,000,000, it completed the first direct highway connection between Staten Island and Manhattan Island, via Hudson County and the Holland Tunnel.

200 Ships in Port Daily, Report Shows

A survey by the Port Authority shows there are about 200 ships docked in New York Harbor every day. No single waterfront can accommodate them. The majority of them dock in Brooklyn, with Manhattan ranking second, the New Jersey shore of the Hudson River third, etc. The distribution of ships on a typical day is as follows: Edgewater, Hoboken, Jersey City and Bayonne, 33; Newark Bay, 17; Arthur Kill and Raritan Bay, 7; Staten Island, 19; Manhattan, 48; Brooklyn, 74; The Bronx, 2, and Yonkers, 4.

Interior View of Finished Tube of Lincoln Tunnel



How the interior of the Lincoln Tunnel will look to motorists is shown in this photo, one of the most recent taken of the roadway, far under the river. Plainly seen in the photo are the white blocks set in the roadway to mark the center and the marker-lights, raised two inches off the roadway and protected with heavy metal frames. The above photograph was made looking East toward the New York side from a spot approximately under the Weehawken shoreline. The roadway shown in the photo is nine feet above the actual floor of the tunnel. The space between the roadway and the floor of the tunnel is used for a fresh-air duct. The dark lines on each side of the roadway, just under the "bench" are the fresh air inlets. The regularly-spaced dark portions of the ceiling are the exhaust ports for vitiated air. The ceiling of the tunnel is eight feet below the actual roof, the space between being used as a duct to carry off the vitiated air. The lights, only a few of which were on when the photograph was made, are 25 feet apart. The flooring of the roadway is constructed of a hard, non-skid brick.

The walls and ceiling are made of glassine tile and are colored white with a band of deep blue at top and bottom of each sidewall. The lighting and general appearance is improved in the Lincoln Tunnel by making the ceiling also tiled, whereas the Holland Tunnel's ceilings were just finished concrete. Sides of the "benches" are also tiled in the Lincoln Tunnel, while those of the Holland Tunnel are of concrete.

Since the above photo was taken a railing was installed along the rim of the "bench" along the left side of the tunnel.

Cold Shrinks Bridge

Cold causes metal to contract and heat causes it to expand. A graphic illustration of this had been found by Port Authority engineers who find the expansion and contraction in the cables supporting the George Washington Bridge causes the deck in the middle of the main span of the bridge to hang six feet lower in Summer than it does in Winter.

A new hammock-like operating bed was recently shown. It makes it possible for a surgeon to work around the patient with more freedom.

A spitting cobra can project poison far beyond its striking distance.

British Columbia keeps its status as the "Canada Reno."

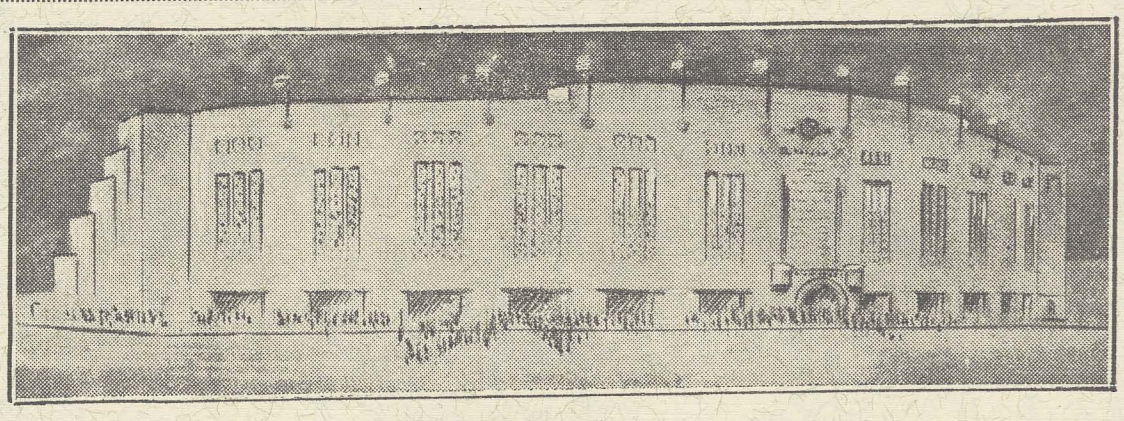
Lincoln Tunnel

Built and Owned by the Port of New York Authority

HISTORY IS MADE TODAY

EZRA L. NOLAN

89 Monticello Avenue
JERSEY CITY



The

JERSEY GIANTS

Extend Their CONGRATULATIONS

To the Hudson County and New Jersey officials. Through their foresight and keen planning, they have brought to the people of this section another outstanding public asset with the opening of ...

The New LINCOLN TUNNEL

The Jersey Giants call attention to another of Hudson County's fine projects — their home grounds, the Roosevelt Stadium, Jersey City— recognized as the finest minor league baseball plant in the entire country.

The following Hudson County municipalities invite your consideration when seeking to locate your home, your factory or your mercantile establishment within the metropolitan area...

Welcoming

the Opening of the

LINCOLN TUNNEL

Which places these enterprising and thriving communities in a most favorable position.

WEEHAWKEN
Mayor
JOHN G. MEISTER

UNION CITY
Mayor
LEWIS B. EASTMEAD

NORTH BERGEN
Mayor
PAUL F. CULLUM

WEST NEW YORK
Mayor
JOSEPH STILZ

HARRISON
Mayor
FREDERICK J. GASSERT

History of Hudson River Crossings
Saga of Engineering Achievements

Tunnels Now Assure Swift, Safe Travel By Train, Auto

Canoes and Rowboats Later Replaced by Sail and Steam Craft on River—Tunnels and Bridges Follow.

(The Jersey Journal is indebted to Mr. Edmund W. Miller, president of the Jersey City Free Library, for much of the data found in this article. Mr. Miller compiled much of the history of Hudson River crossings in 1909 in his paper "From Canoe To Tunnel," from which exerpts have been made with Mr. Miller's kind permission—Ed.)

When the Hudson and Manhattan Railroad tubes from Jersey City to New York were officially opened in 1909 the slogan for Hudson County was "Three Minutes to Broadway." That tunnel, with what a writer of that day described as "its luxurious coaches," marked the start of a new era in Hudson River crossings. Prior to the opening of Hudson and Manhattan Railroad, the only means of crossing the Hudson River was by ferryboat. Today the slogan for Hudson County may be: "Three Minutes to Times Square in Your Auto."

In those days the idea of a vehicular tunnel would appear ridiculous. The auto was in its infancy and was, at best, slow, cumbersome, and unreliable. Mass production was unheard of, and the paved highways were few and far between. Had an engineer suggested a vehicular tunnel he would have been the laughing-stock of his associates.

Today the scene has entirely changed. Instead of one tunnel under the river there are five tunnels, including the Downtown and Uptown divisions of the Hudson and Manhattan tubes, the Pennsylvania Railroad tunnel connecting the main line of the railroad with its New York terminal, and the two great vehicular tunnels of the Port Authority: the Holland and the Lincoln tunnels. The latter two are in reality four tubes extending under the river, three of which are complete, and the fourth, of which is being pushed rapidly along, to be completed late in 1940 or early in 1941.

But what of the trans-Hudson travel of other years? What was the picture during the days of the early Dutch settlers; during the Revolution; the Civil War, and, going back farther still, to the time when only Indians were in this vicinity?

The Indians navigated the broad Hudson in their frail canoes, the deficiencies of their craft being made up by the expertness with which they handled them. These in turn were replaced by the rowboats of the early settlers, which, though slower than the canoes, were capable of carrying greater loads and with greater assurances of safety to the occupants.

"Periaugers" First Sail Craft

The first type of craft in which manpower was not used was the queer sailing boats of the early Dutch inhabitants of "Niew Amsterdam" and "Pavonia," as New York and Jersey City were known in those days. These boats, called "periaugers," were in use until the early part of the Nineteenth Century, when they were replaced by the steam ferryboats, first introduced by Robert Fulton and his rival, John Stevens. For years, however, these steam craft were little better than the old sailing boats, but they gradually improved, first to the side-wheeled steamers and, within the past half century, to the screw-propelled craft steam or Diesel-powered which now ply the waters of the Hudson River.

The first ferry between the present cities of Jersey City and New York, of which there is no record, was established near what is now the foot of Communipaw Av., in 1661, and William Jansen was licensed to take charge of it. The boats used in these early ferries were rowboats and small-decked sail boats, known as "periaugers." These were pointed at both ends and carried two masts and boom sails. When horses and carriages were to be taken across they were detached and lifted into the boat. Jansen was the ferryman for eight years, but there seems to have been considerable trouble between him and the inhabitants. He claimed the exclusive right to ferry people over the river and insisted they had no legal right even to use their own boats in which to cross over. The settlers resisted this claim and also complained that the ferryman did not do his duty. Jansen, on the other hand, claimed that the people refused to pay. The matter was laid before the authorities at New Amsterdam, and judgment was rendered "that the sheriff must assist the ferryman in getting his pay and that he must do his duty or be dismissed."

Ferry Ran Three Days a Week

What became of Jansen is not known, but in June, 1669, Gov. Carteret appointed Pieter Hetfelsen to succeed him. This license gave Hetfelsen the exclusive privilege to transport passengers and goods, but permitted the inhabitants to use their own boats for ferrying their families or their possessions. The ferryman was required to attend the ferry on Mondays, Wednesdays and Fridays, so that it was only on three days in the week that settlers were sure of means of transportation across the river. This document also fixed the rates to be charged. The fare for passengers was six stuivers; for a horse four guilders; for a cow three guilders, and so on. The Governor and his family and "any person, letter or packet, or message of public business" was to be carried free. The fares were to be paid in "Wampum." This was the Indian name for the beads made by the Indians from shells. These were highly prized by the Indians and were used by them, and consequently by the Colonists, as a medium of exchange.

Hetfelsen acted as ferryman until 1672, when John Tymensen was commissioned to take his place. It is probable that this ferry continued in operation until the opening of the Paulus Hook ferry drove it out of business, but there is no mention of it until 1783, in which year an advertisement appeared stating that "Aaron Longstreet would take passengers to Communipaw to connect with the stage running to Newark and Philadelphia." Soon after the British evacuated Paulus Hook in 1783 the Communipaw ferry seems to have fallen into disuse until the Central Railroad of New Jersey was extended to Jersey City about 1864, when the ferry was revived and has been running ever since.

Paulus Hook Ferry Founded in 1764

The Jersey City ferry was established June 18, 1764, and was part of a new route to Philadelphia by way of Bergen Point and Staten Island. It was founded by Abraham Mesier and Michael Cornelissen. The landing place at New York was at Mesier's Dock at the foot of Cortlandt St. By arrangement with Cornelius Van Vorst the landing on the Jersey side was at Paulus Hook at the foot of Grand St. Passengers en route to Philadelphia stopped at Maj. Hunt's tavern at the landing place and took the stage the next morning. The trip between New York and Philadelphia took three days. It will be noted that these early ferries were principally for the conveniences of persons travelling between New York and Philadelphia and other points. It is evident that Jersey City was considered in those days, as, unfortunately, it was for long afterward, not as a place to go to, but only as a place to pass through when going somewhere else.

From the very first the owners of the ferry found it difficult to make it pay. The ferry changed hands several times and was leased to different persons, and the amount of rent to be paid was readjusted again and again.

In March, 1799, the Common Council of New York established the rates of ferriage, which, in view of the present fares, seem decidedly high. For example, an ordinary foot passenger was charged nine pence; a coach or covered wagon eight shillings; a horse one shilling nine pence. Almost everything that can be thought of is specified; thus a feather bed was rated at six pence; a common chair one penny; a mahogany chair two pence; a chest of tea two shillings.

Until 1804 the ferry and the adjoining land was owned by Cornelius Van Vorst. In 1804 the "Associates of the Jersey Company" were incorporated and the ferry conveyed to them. In the same year Joseph Lyon of Elizabethport leased the ferry, and the landing place was moved to a point lying between York St. and Grand.

Up to this time the ferry accommodations consisted of a few rowboats with two oarsmen to each and a few extra oars which the passengers were expected to use if they were in a hurry to cross. There were also two periaugers which were used when the wind was good, or when it was necessary to take a horse and carriage. With a favorable wind the passage could be made in half an hour, but sometimes it took three hours to cross.

$50,000 Raised for Steam Craft

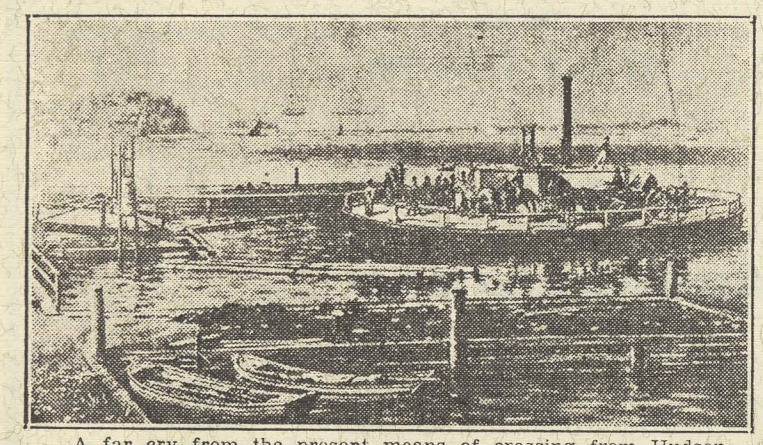
The success of Fulton's "Clermont" in 1807, however, suggested the use of steam for ferry boats; and in 1809 Elisha Boudinot, Gen. Cummings and a number of other Newark men subscribed $50,000 to start a steam ferry, and Fulton was asked to construct a boat suitable for such a purpose. In March, 1811, they obtained a lease of the ferry and the privilege of landing on the New York side.

In the meantime, John Stevens of Hoboken commenced the construction of a steam ferry boat for the Hoboken ferry and succeeded in completing it by October, 1811, nearly a year before Fulton's boat was used on the Paulus Hook ferry. The honor of putting in operation the first steam ferry boat, therefore, belongs to John Stevens; but having won the credit he seems to have abandoned the use of steam after a short period and gone back to the old-fashioned horse boat.

Fulton had ordered two boats to be built by Charles Brown, who had constructed the Clermont, and on July 2, 1812, one of them, named the "Jersey," was completed and put in operation. Some alterations were found to be necessary, however, and it was not until July 17 that the regular trips were begun. To celebrate the event an entertainment was given at Lyon's tavern in Jersey City to the Mayor and Common Council of New York City as well as a number of other prominent guests. A passenger who made the trip on the first day writes as follows: "I crossed the North River yesterday in the Steam Boat with my family in my carriage, without alighting therefrom, in 14 minutes with an immense crowd of passengers. I cannot ex-

(Continued on Page 17)

TRANS-HUDSON CROSSING IN 1811



A far cry from the present means of crossing from Hudson County to New York was the "Jerseyman," first steam ferryboat ever used on the Hudson River. Designed and built by the late John Stevens of Hoboken, it was completed and put into service in October, 1811, nearly a year before Robert Fulton's steam ferry, "Jersey" was put into service on the Paulus Hook to Manhattan. Stevens' boat operated between Hoboken and New York and had accommodations for horses and carriages as well as foot-passengers.

The
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LAUNDRY
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Specialists in Steamship Work
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The Standard of Quality Over 70 Years
MUELLER'S EGG NOODLES, *Fine and Wide*
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MUELLER'S SPAGHETTI
MUELLER'S THIN-SPAGHETTI
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MUELLER'S COOKED SPAGHETTI
C. F. MUELLER COMPANY
146-184 BALDWIN AVENUE
Jersey City, N. J.

Weehawken to Manhattan Crossing Has Two-Century Service Record

Ferry-Rowboat Was Early Forerunner of Tunnel

New Tunnel Has Many Improvements Resulting From Holland Tunnel Studies—Is Longer and Wider.

The Lincoln Tunnel has a history dating back 237 years. Records show a ferry was in operation from Weehawken to Manhattan as far back as 1700 and was one of the most important along the entire waterfront, being the only regular ferry between Manhattan and New Jersey within reasonably easy access to the farmers of Bergen County who were in the habit of bringing the produce to the New York markets. The location of this ferry was just below Kings Point near the mouth of the Weehawken Creek, not many hundreds of yards east of the plaza of the new Tunnel, and at the site of the present Electric Ferries.

The Holland Tunnel was the pioneer of vehicular tunnels and many of its engineering problems had to be painstakingly worked out along the "trial and error" method of procedure. The Lincoln Tunnel incorporates all of the improvements growing out of the research and development in connection with the Holland Tunnel.

The construction of the Holland Tunnel answered one great problem, that of providing a traffic artery out of Downtown Manhattan. The George Washington Bridge provided a similar answer to the problem of traffic to and from Uptown New York and New Jersey. However, with the Holland Tunnel only ten years old, figures show it is carrying 80 per cent of its capacity, and on a number of occasions, such as holidays or Summer week-ends, the Holland Tunnel was taxed to its capacity, and in a few instances traffic jams and resulting delays to motorists developed.

The studies of a tunnel from midtown Manhattan to Hoboken or Weehawken were begun by the joint Bridge and Tunnel Commissions even before the Holland Tunnel was completed. As far back as the 1890's plans for a Hudson River Bridge from 57th St., Manhattan, to Hoboken had progressed to such a point that a cornerstone for the Hoboken foundation of such a bridge was laid, and still remains on 12th St., Hoboken.

With the merging of the Bridge and Tunnel Commissions with the Port Authority in 1931, the tendency toward a duplication of effort was removed and left only one body to carry out the plans connected with Hudson River crossings. At the time the merging of the various commissions into the Port Authority was effected, a two-tube tunnel was recommended and its cost, including approaches, was estimated at a total of $75,000,000.

Stock Crash Delayed Plans

However, at the time, the downward trend of business activity which began with the 1929 stock market crash had produced an unfavorable condition in the bond market. The Port Authority, having completed its general design studies and acquired much of the property necessary for the Manhattan approaches, decided to suspend activity on the contemplated tunnel in October, 1931. For the next two years work on the project remained virtually dormant.

In 1933 an arrangement was effected with the Federal Emergency Administration of Public Works under which that body agreed to purchase Port Authority obligations up to a total of $37,500,000. This credit base was sufficient to finance the construction of one tube of the tunnel and portions of the approaches to form a first operating unit. This agreement was effected Sept. 1, 1933, and work was started immediately. A contract covering the manufacture of cast iron and cast steel tunnel segments, or ring plates, was signed Oct. 19, 1933, and one covering the construction of the shield-driven tunnel and shafts followed in March of the following year. Although work had already been in progress for more than a month, official groundbreaking ceremonies were not held until May 17, 1934, on each side of the river. By Aug. 3, 1935, the tube on the Weehawken side had reached the shore line.

Thousands of tons of earth and rock had to be excavated to create the New York and New Jersey approach plazas.

In the meantime, business and money-market conditions had been improving and toward the end of 1935 it again became practicable for the Port Authority to float a bond issue for the purpose of financing construction. This led to a modification of the agreement with the Public Works Administration, effected January, 1936, whereby the federal administration gave to the Port Authority an outright grant of $4,780,000 to finance construction of certain western extensions of the New Jersey approaches, not included in the original plan for the first operating unit.

From the proceeds of the bond sale the Port Authority refunded to the Public Works Administration all funds previously loaned by it for the construction of the south tube of the tunnel.

Into the construction of the south tube of the tunnel, which was opened yesterday, went 51,800 tons of cast iron and cast steel lining, constructed by a steel corporation for $2,358,150. The cassions for both the north and south tubes of the tunnel, which were sunk at the bulkhead wall of the Manhattan shore at the foot of 39th St., were fabricated by a Hudson County shipbuilding plant, the Federal Shipyards, in Kearny.

Initial Contract in 1934

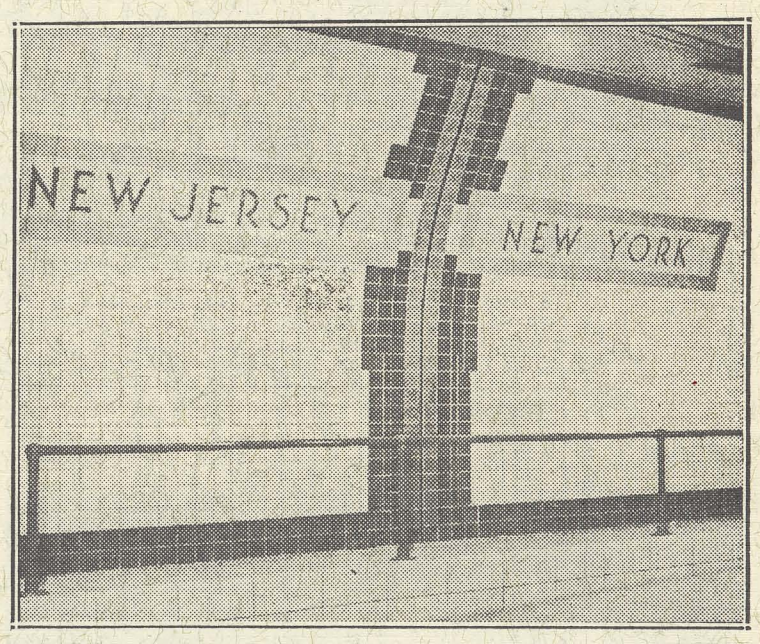
The contract for the under-river portion of the south tube was awarded March 20, 1934, to Mason & Hanger Co., Inc., whose bid of $6,452,300 was the lowest received.

This portion of the tunnel is about 6,000 feet long, extending from the Weehawken ventilation shaft to the New York construction shaft, on 39th St., between 11th and 12th Avs. The three ventilation buildings were constructed at an average cost of $400,000 each.

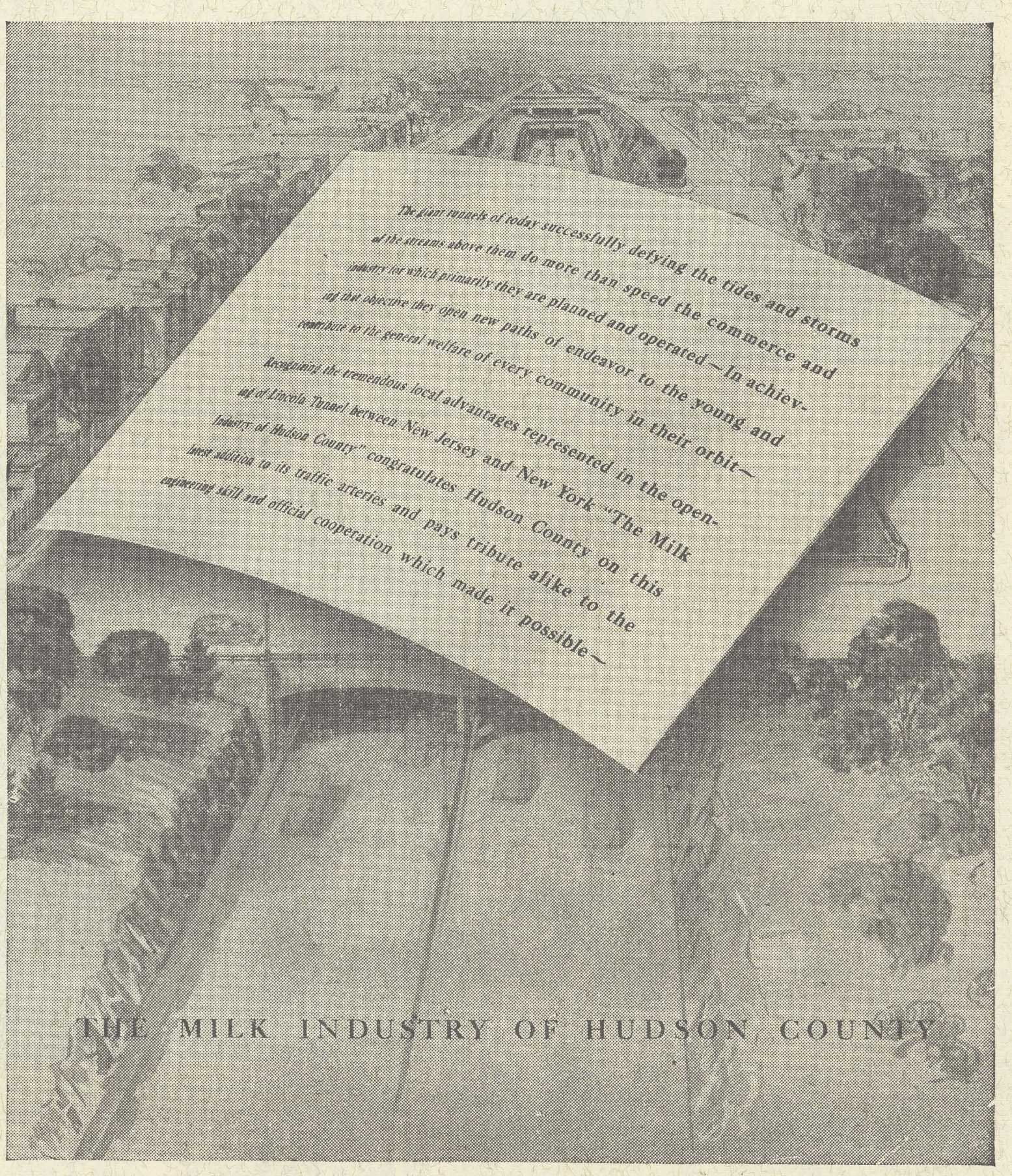
While construction work was progressing on the first or south tube of the Lincoln Tunnel, traffic on the Port Authority's existing facilities had increased at such a rate that it was voted to start without further delay on the second, or north tube, of the tunnel. On Nov. 24, 1936, the commissioners of the Port Authority, acting with the approval of Gov-

(Continued from Page 14)

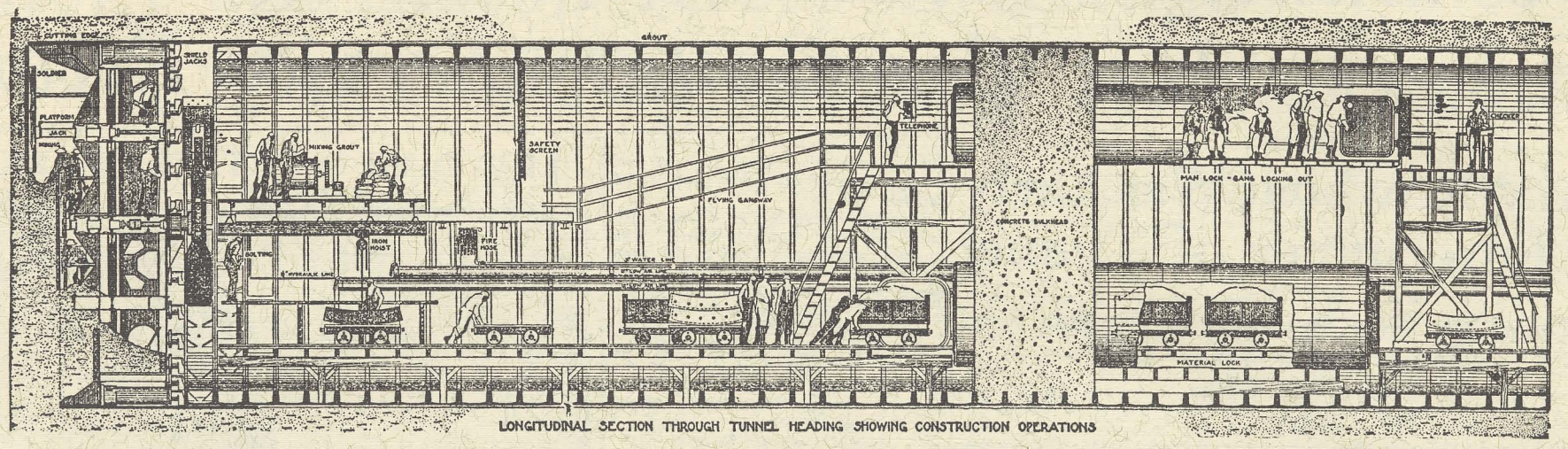
LINE DIVIDING STATES MARKED



Halfway through the new tunnel motorists are made aware when they cross the line from one state to the other by a wide red stripe extending from ceiling to "bench," with the name of one state appearing on one side, and the other state's name appearing on the other side. This sign, shown above, is much larger, and therefore more easily seen than a similar marker in the Holland Tunnel. Both sides of the tunnenl are equipped with these signs, which are made of brightly colored tile.



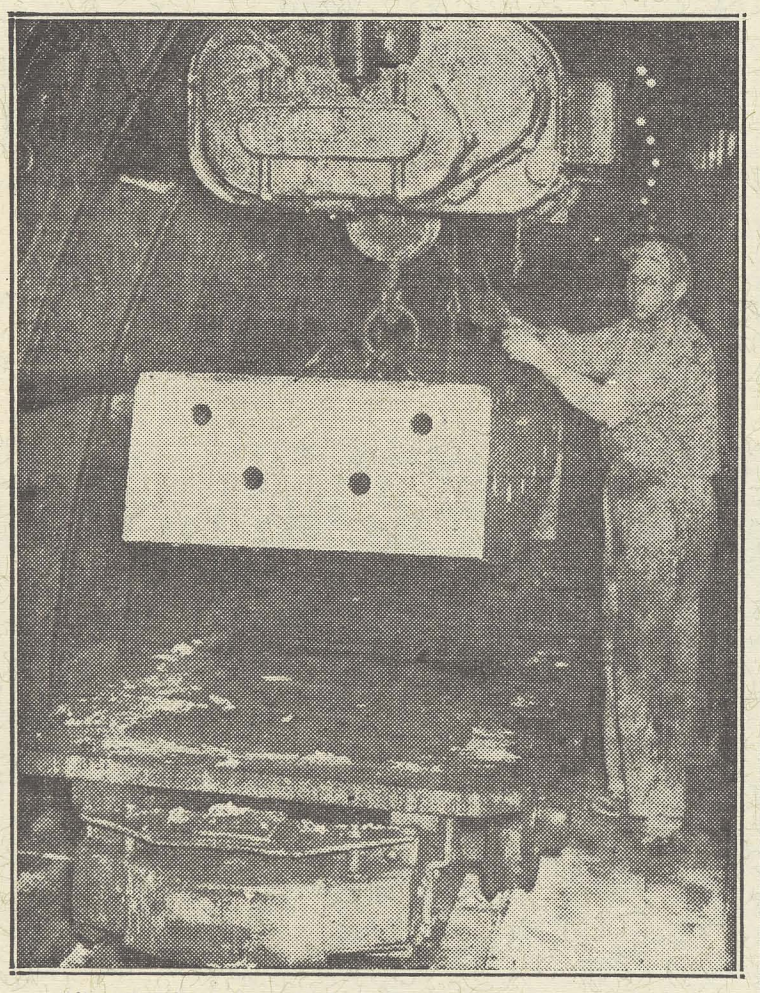
How the Lincoln Tunnel Was Driven Under the Hudson River



LONGITUDINAL SECTION THROUGH TUNNEL HEADING SHOWING CONSTRUCTION OPERATIONS

A diagram showing construction operations in the North Tube of the tunnel from a longitudinal view. Although the shield has progressed more than 1,000 feet from the concrete bulkhead, the principle of operation is the same. This diagram shows men working in front of the shield, while at the present time that is not necessary, the "muck" or silt from the river bottom being forced to one side or in through the shield ports by the hydraulic jacks' pressure on the shield. At the present time, also, the tunnel is nearly half-filled with the "muck" taken in through the shield ports, so that the narrow-gauge tracks have been raised to the level of the "flying" gangway. The positions of the hydraulic jacks, erector arm, man-lock and "muck-lock" or material lock are clearly shown.

CARS CARRY PLATES TO SHIELD



All material are brought from the "head" or shore end of the tunnel to the shield on narrow-gauge cars, one of which can be seen in the above photo. One of the 3,300-pound plates, 14 of which form one ring of the tunnel, is shown just after being lifted from a car by a mono-rail hoist. Held by the hoist, the plate will be moved to the end of the flying gangway, where it is picked up by the erector-arm. The erector arm swings the plate into its place just behind the shield. To the left of the photo can be seen the completed rings which form the shell of the tunnel.

TUNNEL

(Continued from Page 13)

ernors of both New York and New Jersey, authorized its construction. A series of three per cent bonds was floated the following month, from which $10,000,000 was made available to begin construction of the second, or north tube. In August of this year another series of bonds were disposed of, of which $11,306,000 of the proceeds were apportioned toward the construction of this same tube. Early in October of this year the Federal Emergency Administration of Public Works extended to the Port Authority a grant of $3,100,000 to be applied to the labor cost of the tunnel, and also made available a loan of $26,000,000 to be called on, if needed, for completing the construction of the second tube.

When completed, the tunnel project will consist of two separate tubes, each with a double-lane roadway. Until the second, or north tube, is completed, the first, or south tube, will carry both westbound and eastbound traffic, making possible some traffic relief at a much earlier date than would have been possible had the Port Authority delayed construction of the south tube to permit the simultaneous opening of both tubes.

The "holing through" of the south tube of the tunnel, which means the meeting of the two bores which were extending toward each other from opposite sides of the river, was accomplished Aug. 2, 1935, and shortly after that the final steel ring of the tunnel was in place. The work from that point included the lining of the entire tunnel with concrete, the construction of the roadway and ceiling sections, installation of ventilation equipment, and the installation of the electric lighting and signalling systems.

Separate Plazas in Manhattan

The present New York plaza, which is only for the south tube, is located between 9th Av. and 10th Av. and extends from 42nd St. south to 34th St., the north-south eight-block roadway being named Dyer Av., in honor of the late Maj. Gen. George R. Dyer, who, prior to his death, was chairman of the Port Authority Commission.

The plaza for the north tube will be located one block west of the other plaza, between 10th and 11th Avs., and between 37th St. and 42nd St. The five-block long street connecting the tunnel portals with the street levels, which will be located over the tracks of the New York Central Railroad's right-or-way, will be known as Galvin Av., in honor of the memory of the late John F. Galvin, who served as a Port Authority commissioner for 10 years, and who was vice-chairman and chairman for a number of years. With the completion of the north tube, this will be used for westbound traffic alone, and the south tube, opened yesterday for two-way traffic, will be used for eastbound traffic only.

Unlike the Holland Tunnel, the tolls will be collected only at the Weehawken side of the tunnel. The Weehawken plaza, which was cut out of the hillside between Park Av. and Boulevard East, was so designed that toll booths extend across the center of the plaza making it necessary for cars to pass through the toll gates on entering the tube, eastbound, or merging from the tube, westbound.

The total portal-to-portal length of the south tube is 8,215 feet. This includes cut-and-cover construction extending for distances of about 240 feet at the New Jersey end and about 560 feet at the New York end. The total portal-to-portal length of the north tube will be about 7,400 feet, including some cut-and-cover construction at each end.

Rings Weigh 23 Tons Each

The cut-and-cover sections are of the steel-bent type, similar to the usual subway construction, and are rectangular in section, while the remaining sections, constructed by shield tunneling methods, are of a circular bore. In the shield method of tunneling, the shield is pushed along by hydraulic jacks which are braced on the rim of the completed tunnel shell. As the shield progresses, sandhogs construct rings of cast iron or cast steel segments, or ring plates. Each ring is 31 feet in diameter and 30 inches long, composed of 14 plates or segments weighing 3,330 pounds each, and a "key" plate, weighing 700 pounds. Each ring of the tunnel, therefore, weighs more than 23 tons, although it takes up only 30 inches of the tunnel's entire length.

In addition to the river tunnel, which passes for the most part through Hudson River silt, there is about 1,200 feet of circular tunnel of the south tube passing through rock on shore.

About 750 feet of this rock tunnel is on the Weehawken side, immediately west of the ventilation building, and passing under Kings Bluff. Another 450 feet runs east from the New York land ventilation building. Corresponding sections of somewhat different length will be constructed as parts of the north tube. The outer diameter of the rock-tunnel shell, made up of structural steel segments instead of cast segments, is 32 feet, ten inches on the New Jersey side and 30 feet, four inches on the New York side.

The Weehawken section and the under-river section of the north tube will be about corresponding in length to the south tube, but the New York land portion of the north tube will be considerably shorter than that of the south tube, due to the approach plan.

At the low point, at approximately mid-river, the top of the tube structure is about 75 feet below mean high water and the roadway is about 97 feet below. At present channel depths, a minimum covering of 20 feet of silt and mud will be left permanently above the completed structure at all points. The north tube of the project will approximately parallel the under-river course of the south tube end and will lie about 75 feet north of it, as measured between the centers of the two. The inside of the cast iron and cast steel tunnel shell is lined with concrete to a minimum thickness of 16 inches, as measured from the outside of the structure.

In the circular tunnel a concrete floor slab incorporating steel beams supports the roadway and the space below it forms a fresh air duct. A ceiling formed by a reinforced concrete slab encloses the upper portion of the tube to form the vitiated air duct. The whole arrangement is very similar to that of the Holland Tunnel. Throughout the river portions of each tube the finished roadway will be 21 feet, six inches from curb to curb, or about 18 inches more than that of the Holland Tunnel. In a curved portion, at the Weehawken end, this curb-to-curb clearance will be increased to 24 feet. Headroom in the roadways will be approximately 13 feet, seven inches throughout, permitting safe operating clearance of 13 feet.

Electrical ducts are enclosed within the concrete of the side walls as these are constructed. Lighting, fire protection, communication, traffic control and other equipment will closely resemble that of the Holland Tunnel.

The ventilation system of each

(Continued on Page 15)

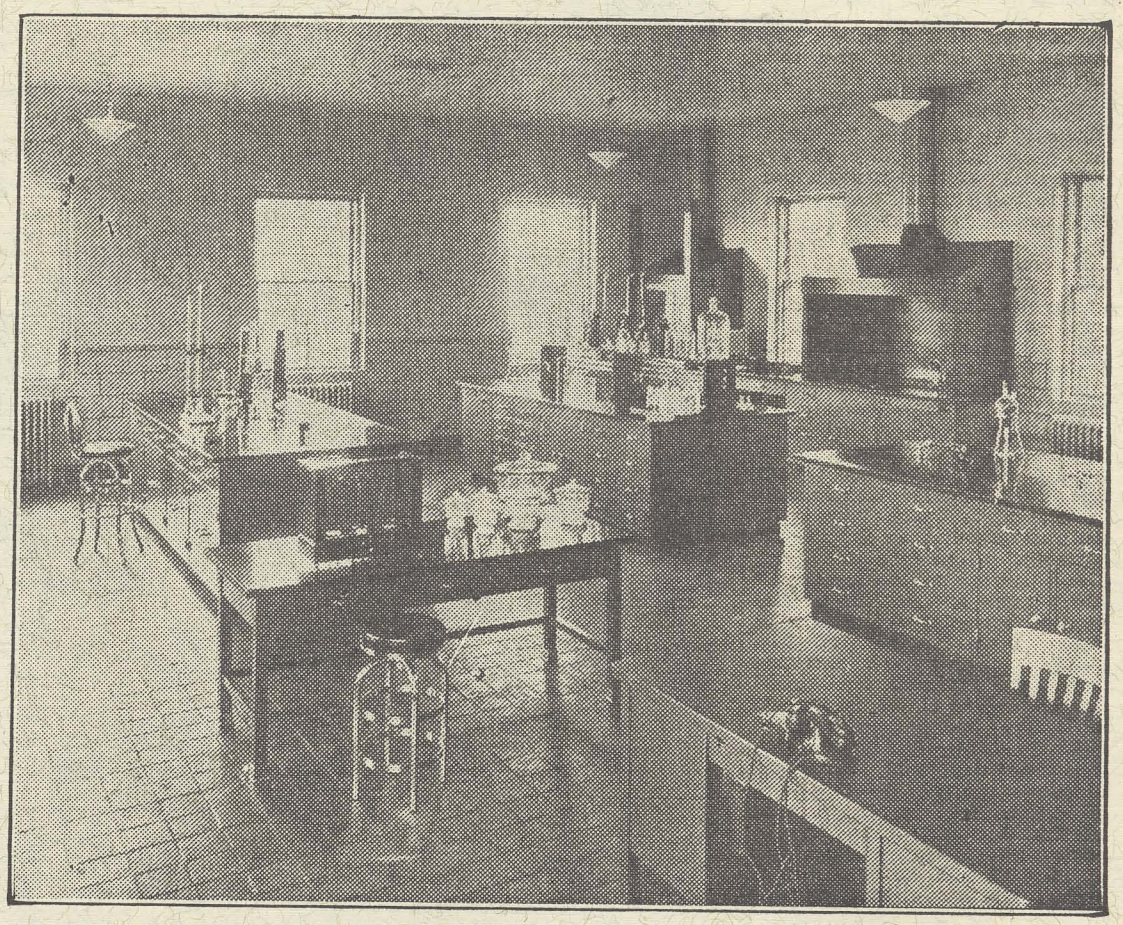
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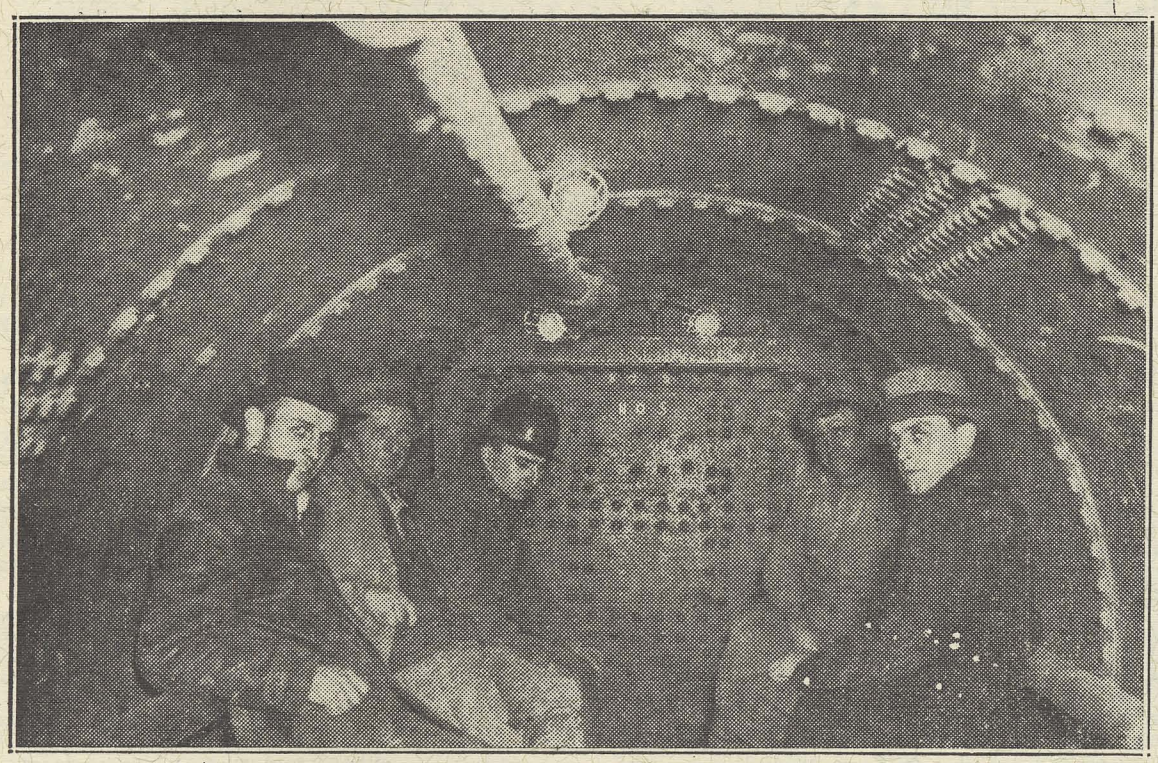
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"Taking the Air" to Enter North Tube of Tunnel



In order to pass from the shaft into the North tube, which is now in the process of construction, workmen must first pass through an air-lock, a huge steel tank which passes through the concrete bulkhead at the "head" of the tunnel. Upon entering the air lock, the steel door is slammed shut, and the compressed air is turned on by "Jersey" Fahrenholz, the manlock tender, shown in the photo second from the right. The air pressure is gradually increased until it equals that maintained in the tunnel, which at the present time is about 16 pounds per square inch. In the photo, reading from left to right are Frank Hackstaff, Port Authority junior engineer; Albert Wilson, shift superintendent of sandhogs for Mason and Hanger, construction contractors of the tunnel; J. O. Haff, staff reporter of The Jersey Journal; Louis "Jersey" Fahrenholz, manlock tender; and Charles S. Tucker, Port Authority office engineer.

TUNNEL

(Continued from Page 14)

tube is divided into several sections and is patterned after that used in the Holland Tunnel. The space below the roadway in the circular tunnel forms the fresh air duct and the space above the tunnel ceiling forms the exhaust air duct. Three ventilation buildings are provided, studies of the economics having shown such an arrangement to be the most desirable for this tunnel.

All three buildings are completed so far as required for operation of the south tube of the tunnel. One building is at the base of the Palisades, another just outside the New York bulkhead line at the foot of W. 39th St., and the third is at the southwest corner of W. 39th St. and 11th Av., New York. Fresh air will be drawn in through louvers in the side walls, the intake fans being arranged on different floor levels adjacent to these openings. Exhaust fans drawing the vitiated air from the tunnel are similarly disposed on different floors and arranged to discharge vertically through evase stacks extending through the roof of each building.

Since the work was first started on the tunnel in March, 1934, work has progressed steadily and with little interruption. The south tube shield was driven at a faster pace than was ever known before, the shield progressing in one 24-hour period, June 22-23, 1935, a distance of 45 feet, an all-time record in tunnelling. It was in that same month of June, 1935, that an all-time monthly record of progress was made, with the shield moving forward a distance of 1,040 feet. This meant that 416 steel rings were constructed during the month, weighing a total of 9,846 tons.

The north tube of the tunnel is well under way, the bore from the Weehawken shaft having moved more than 1,000 feet under the river. It was started with the awarding of a contract for the fabrication of cast steel and cast iron segments in December of last year. The contract called for the expenditure of $3,080,252 on tunnel lining alone, and included approximately 50,000 tons of material in the contract.

The north tube will be completed late in 1940 or early in 1941, according to the engineers in charge. The total cost of the twin tubes and approaches will range between $80,000,000 and $85,000,000, it is estimated.

Traffic Figures Show Steady Trend Upward

The increase in automobile traffic on the facilities of the Port Authority over a certain period of time in one year as compared with the corresponding period of time in a previous year, is evidence of the growing popularity of the services offered by the Port Authority to the motoring public.

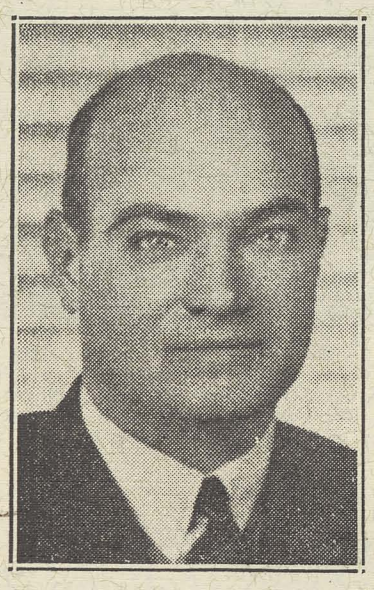
As an example: the automobile traffic over the Port Authority's interstate facilities for the first quarters of 1937 was 30 percent greater than the corresponding period of 1936. An upward trend was shown on all crossings.

The grand total for the first quarter of 1937 was 4,386,671 vehicles, an increase of 1,016,928 over the first three months of 1936. While a part of the increase was due to improved weather conditions in 1937 as compared to the same period of 1936, Port Authority officials report the increase is noted over the Summer months as well.

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New Era in Bridge-Building Came With George Washington Bridge

Fort Lee Span Twice Size Of Any Previously Built

Cable Construction Included 105,000 Miles of Wire; Enough to Circle Earth Four Times at Equator.

One of the most ambitious undertakings of the Port Authority was the George Washington Bridge, spanning the mighty Hudson River from Fort Lee to the Washington Heights section of New York. The structure is of such magnificent proportions that until last year it was the greatest single-span bridge ever built. At the time it was built its 3,500-foot span was so much beyond that of the longest in existence prior to its creation that it started an entirely new era—a new order of magnitude—in bridge construction.

The George Washington Bridge has a long history. It may be considered as the ultimate outcome of proposals to bridge the Hudson River which began as far back as the period immediately following the close of the Civil War. In 1868 the State of New Jersey passed an act authorizing the New York and New Jersey Bridge Company to erect a railroad bridge over the river near the Township of Union (now Union City). It was not until 22 years later that the corresponding and necessary enabling act was passed by the the Legislature of the State of New York, hence the application for federal approval was not made until 1890.

In the meantime, others showed interest in the idea of bridging the Hudson. The Pennsylvania Railroad in 1885 initiated some studies which resulted in the organization of the North River Bridge Company in 1887. Under the direction of the company's chief engineer, the late Gustav Lindenthal, several proposals were advanced over a period of many years. At first the propected bridge location was in the Downtown area of Manhattan, but in 1888 this was changed to the vicinity of 23rd St., and in 1923 to 57th St.

Conditions Cause Change In Plan

With each successive change the plans were modified to suit changing conditions, and the capaicity of the bridge was increased from the original four tracks to an ultimate plan showing a lower deck with four freight tracks, four passenger tracks and four rapid transit tracks, while the upper deck was to provide a total of 195 feet of roadway width for the accomodation of highway traffic. It was characteristic of all the earlier projects that they contemplated a railroad bridge exclusively. With the passing of time, designers began giving more consideration to street traffic and to the rapidly growing importance of motor vehicles.

These earlier projects were retarted by many factors — not the least being the tremendous cost involved. The great depth of solid rock below the river bed and the War Department's objection to mid-river piers introduced further problems of an engineering nature; for these necessitated a clear span so far beyond that of existing experience that even some bridge engineers themselves remained sceptical of the practicability of the proposals. As if these factors did not make trouble enough, the gigantic capacity envisaged by later plans introduced still further complications in the street congestion that would result from concentrating tremendous volumes of traffic.

Construction of the Holland Tunnel at Canal St. put an effectual end to all thoughts of a downtown bridge. However, even this important project could not meet the growing traffic needs. Hence, in 1923, a new proposal appeared which was destined to mark an epoch in the history of bridge building.

Amman Designer of Bridge

The proposal, made by Othmar H. Ammann, now Director of Engineering of the Port of New York Authority, and a former associate of the late Mr. Lindenthal, contemplated the erection of a bridge farther uptown, in the general vicinity of 179th St., designed mainly to serve highway traffic.

The tentative design called for a suspension bridge with a 3,400-foot span, substantially the same as the bridge which has since been constructed, and nearly double the span of the longest existing bridge at that time. The plans were submitted to the then Governor of New Jersey, George S. Silzer, who recommended that investigation of the project be undertaken by the Port Authority. In 1925 the Port body was authorized by the states of New York and New Jersey to undertake the work and M. Ammann was engaged as bridge engineer to direct the undertaking. The site was definitely fixed at 178th St. and 179th St. one one side, and Fort Lee on the other side. The span was increased from the original 3,400 feet to 3,500 feet to permit construction of the New Jersey tower foundation under better rock conditions nearer the shore. Revised estimates of construction cost and probable revenue were compiled, the latter being based upon extensive studies of potential traffic which had been made in the earlier stages of the project. These indicated the bridge could be made self-sustaining.

Work Started In 1927

With this promising outlook, the work of actual construction began. The first major contract (covering construction of under-river foundations for the massive towers on the New Jersey side) was let in May, 1927. Official ground-breaking ceremonies were held Sept. 21, 1927. Other contracts followed in accordance with a construction program planned to have each section of the work completed in such sequence as to dovetail with all of the other work. By June, 1928, erection of the New Jersey tower was under way and about one year later the steel work of both towers was completed. The first wire of the suspension cables was placed Oct. 18, 1929, and the last was strung across and laid in position Aug. 7, 1930. Erection of floor steel began in September, 1930. Dedication ceremonies were held Saturday, Oct. 24, 1931, and next day the bridge was opened to the public, bringing into realization the sixty-year dream of bridging the Hudson.

As an engineering achievement, this bridge is regarded as of outstanding importance throughout the world and is considered one of the greatest bridge engineering feats of all time. The main span of 3,500 feet is twice that of the Philadelphia-Camden Bridge, the then longest suspension bridge ever built. In its present, or initial stage of completion, the George Washington Bridge provides a single deck with two roadways each twenty-nine feet wide and two sidewalks each ten feet six inches wide. Between these roadways there is now an unpaved central space of about thirty feet which is to be paved when traffic demands warrant. The bridge is suspended by means of four great cables each three feet in diameter and each containing 26,474 high tensile steel wires about one-fifth of an inch in diameter. The total sectional area of these cables is 3,200 square inches of steel. Construction of the cables required 105,000 miles of wire, or enough to wrap four times around the earth at the Equator.

The towers are 600 feet high, and, combined, they contain more than 40,000 tons of structural steel. Each tower has two legs, the individual legs being formed by two groups of four columns tied together and braced by means of diagonals.

Cable Anchored In Concrete

On the New York side the suspension cable anchorage is formed by a block of concrete resting upon solid rock in Fort Washington Park. At its base, the anchorage measures 200 hundred feet in one direction and some 300 feet in the other. It extends to a maximum of 120 feet above its lowest point, and weighs about one-quarter of a million tons, the weight being that required to hold against the pull of the four great cables. Through the body of this great block and with only their uppermost ends projecting outside of the concrete, are rows of large steel eyebar chains. The buried portions of these chains run down through the block and are secured to anchor girders near the base. The New Jersey anchorage is entirely different in construction, being formed by digging two great holes into the solid trap rock of the Palisades. Into these holes were set the eyebar chains and then concrete was poured around them to secure the whole system to the rock itself. Each of the four suspension cables is formed of 61 strands, each strand consisting of 434 individual wires, and each strand being directly secured to its own individual chain of eyebars at each side of the river.

Because of the unusually great traffic capacity of this bridge exceptional consideration was given to the design of its approaches. At the New Jersey end, there was constructed a carefully planned system by which traffic is routed to each of the nearby main highways without grade intersection or the necessity of interruping traffic to make left turns. At the New York end, it became necessary to clear away several blocks of buildings to provide the approach and to build an elaborate system of roadways for connection with Riverside Drive without grade intersections of traffic, and without the necessity of interrupting traffic to make left turns. A tunnel under 178th St. and one under 179th St., each extending from the Plaza to Highbridge Park, are also included in the ultimate plan. The one under 178th St. was constructed up to the west side of Amsterdam Av. so as to connect with Amsterdam Av. at 175th St.

In its present stage of completion, the total cost of the bridge including all real estate is approximately $57,000,000. Each state agreed to advance $5,000,000 in aid of construction, and the balance was obtained through sales of $50,000,000 of Port Authority bonds.

There is new evidence that the Aleutian Islands and Alaska were a "race nursery" for the Aboriginal population of America. Traces are found there of an oblong-headed race.

TRUCK BAN

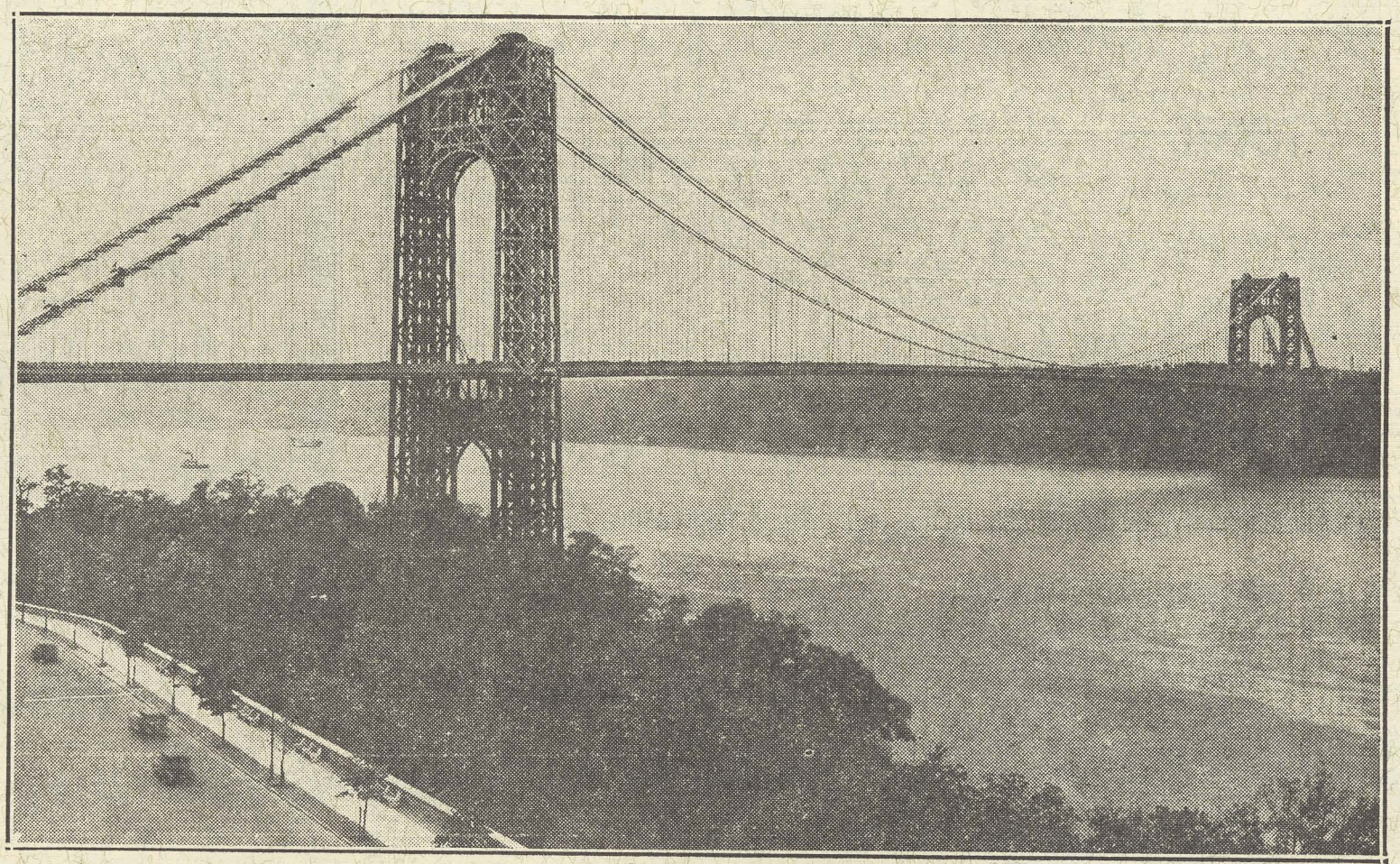
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ing of the other tube late in 1940 or early in 1941.

Also on the "taboo" list of the Lincoln Tunnel are all Diesel-propelled trucks, because of their propensity to emit, without warning or means of control, a dense, black odoriferous cloud of smoke which would obscure the vision of vehicles following or passing in the opposite direction. The exhaust of Diesel engines is not dangerous to human life, as far as fumes go, but create a hazard through the blinding cloud of smoke which might be discharged at any time.

Restrictions, similar to those in force at the Holland Tunnel, will include vehicles with dangerous cargoes such as fireworks, gasoline or other explosives.

GEO. WASHINGTON BRIDGE, AS SEEN FROM RIVERSIDE DRIVE, NEW YORK



Making the autos at the lower left corner of the photograph look like tiny insects, the majestic span of the George Washington Bridge is shown as it appears from Riverside Drive, near 176th St., New York. The bridge, longest single-span structure in the world when it was constructed, connects Fort Lee with 169th St. Into its cables went 105,000 miles of wire, enough to circle the earth four times at the equator. It is so constructed that rapid-transit lines could be run over the bridge. The total cost of the bridge and approaches was close to $60,000,000. The length of the center span is 3,500 feet, and the overall length of bridge and approaches is 12,430 feet, or more than two miles.

Lincoln Tunnel Is Higher, Wider Than Holland Tunnel

The following figures show briefly a comparison of the new Weehawken-New York tunnel with its ten-year-old Jersey City-to-New York predecessor.

	Lincoln Tunnel	Holland Tunnel
Length (portal to portal)	8,180 ft. (S. tube) 7,400 ft. (N. tube)	8,371 ft. (S. tube) 8,557 ft. (N. tube)
Length of under-river portion	4,600 feet	5,480 feet
Width of Roadways	21½ feet	20 feet
Headroom	13 feet	12 feet, 6 inches
Maximum depth of top of tunnel below mean high water	75 feet	72 feet
Maximum depth of roadway below mean high water	97 feet	93 feet
Total cost	$75,000,000 (estimated	$50,000,000

ARTHUR KILL

(Continued from Page Eight)

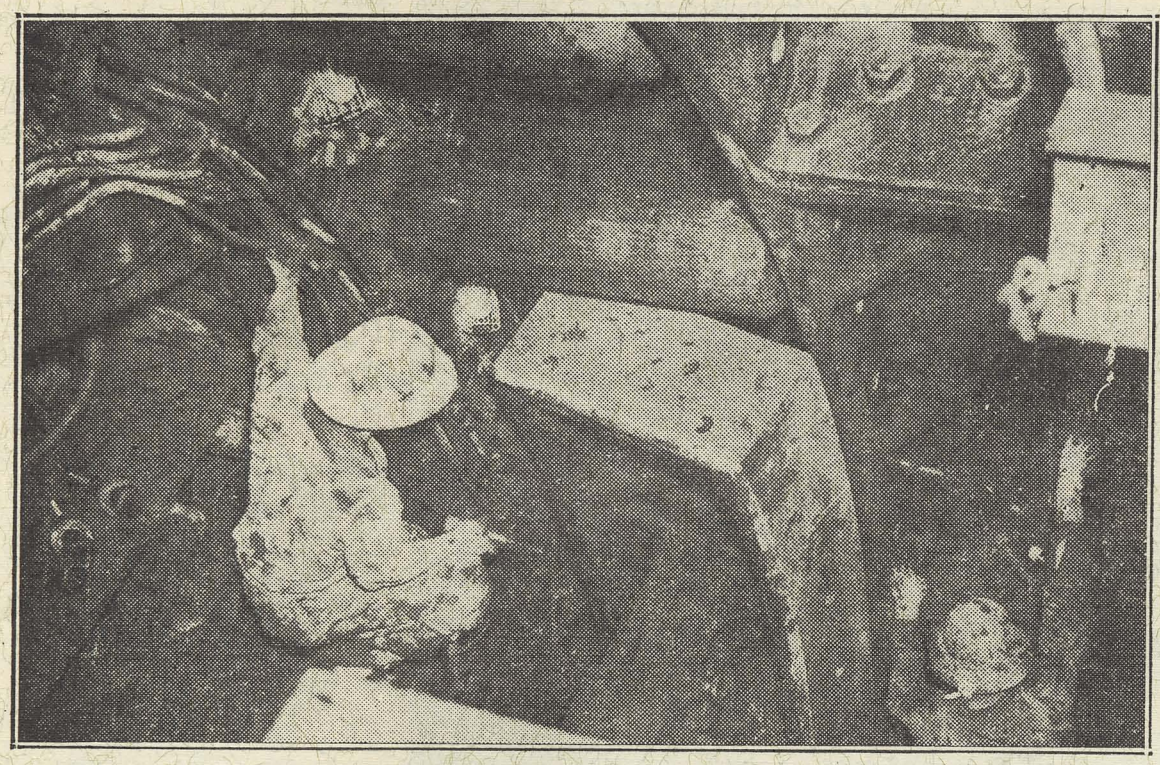
of the bridges crossing the East River, linking Brooklyn with Manhattan.

The bridges have the same roadway capacity, each with a 42-foot roadway with four lanes of traffic and two five-foot sidewalks. The Outerbridge Crossing cost a little less than $10,000,000 and the Goethals Bridge a total of almost $7,500,000. The Outerbridge Crossing's greater cost was due to the greater length of the span and overall length.

A comparison of the statistics of the two bridges, given below, further explains the difference in cost:

	Goethals Bridge	Outerbridge Bridge
Length, main span	672 feet	750 feet
Length, total truss span	1,152 "	2,100 "
Length, plaza to plaza,	8,600 "	10,200 "
Length, N. J. approach	3,450 "	5,200 "
Length, Staten Island approach	4,000 "	2,900 "
Height of roadway above water	142 "	142 "
Clearance, bridge above water	135 "	135 "
Concrete in piers	61,835 cubic yds.	86,642 cubic yds.
Steel in superstructure	11,700 tons	16,100 tons

Inserting a Ring-Plate Just Behind the Shield



Securely held by the erector-arm, this 3,300--pound steel plate is being placed into position to form part of one of the rings of the tunnel shell. Sandhogs on each side wait to slip the big ten-pound bolts into place as the plate is swung into its proper place. The sandhog to the left is standing on a portion of the rear of the shield, which keeps the muck and silt from the river-bottom out of the tunnel. Directly above the plate and at the top of the photo can be seen two of the 10-inch hydraulic jacks, each capable of exerting a pressure of 200 tons. There are 28 of these jacks around the edge of the shield and they are used to force the shield through the silt of the river-bottom. Although the jacks are capable of a full pressure of 5,600-tons, only about one-third of this is necessary to move the shield. The copper pipes seen above the sandhog on the left are the hydraulic lines which feed the jacks and carry from 2,000 to 6,000 pounds pressure per square inch. At the upper extreme right of the photo can be seen the end of the mono-rail on which travels the hoist which moves the plates from flat-cars to shield.

HISTORY

(Continued from Page 12)

press to you how much the public mind appeared to be gratified at finding so large and so safe a machine going so well. On both shores were thousands of people viewing the pleasing object."

Two Boats in One

Fulton's description of the boat is as follows: She is built of two boats, each ten feet beam, eighty feet long, and five feet deep in the hold; which boats are distant from each other ten feet, confined by strong transverse beam knees and diagonal traces, forming a deck thirty feet wide and eighty feet long. The propelling water wheel is placed between the boats to prevent it from injury from ice and shocks on entering or approaching the dock. The whole of the machinery being placed between the two boats leaves ten feet on the deck of each boat for carriages, horses, cattle, etc.; the other having neat benches and covered with awning, is for passengers, and there is also a passage and stairway to a neat cabin, which is fifty feet long and five feet clear from the floor to the beams, furnished with benches and provided with a stove in Winter. Although the two boats and the space between them give thirty feet beam, yet they present sharp bows to the water, and have only the resistance in the water of one boat of twenty feet beam. Both ends being alike, and each having a rudder, she never puts about."

In connection with the operation of these boats, Fulton invented the floating bridge which rises and falls with the tide and by counter-balancing weights on the shore; and about this same period Stevens devised the spring pile for guiding the boats into the slip.

In 1813 the "York," constructed on the same plan as the "Jersey," was completed and put in operation. These boats started every morning at sunrise from each side of the river and were scheduled to run all day, every half hour by "St. Paul's Church clock." The fares were collected on the boat during the passage.

Ice a Severe Obstacle

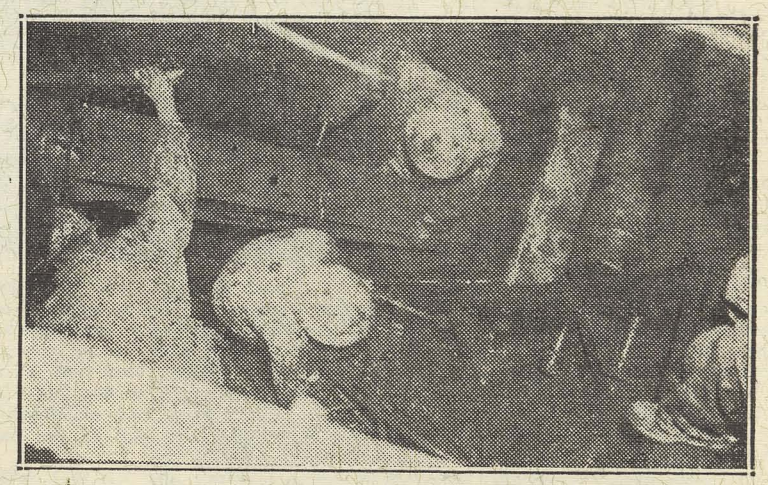
As may be seen from the description these boats were a great improvement over the former sail and row boats, but even these must have given very poor accommodation. It was said that they were very slow and that they often took an hour and a half to make a trip. When the wind was very severe they were often unable to cross. In Winter the floating ice would be blown by the northwest winds against the piers on the New York side of the river and would interfere with the navigation of the ferry boats so that they would be compelled to load and receive passengers at the foot of Broadway.

In fact, when there was much ice in the river the passage was sometimes very perilous. These conditions existed many years, but with the improvements in steam navigation and the introduction of the more powerful machinery they gradually disappeared.

The experience of the company which introduced the steam ferry was, as regards finances, similar to the companies that preceded it. Up to May, 1816, they had made but one dividend of five per cent, and they requested the Common Council of New York either to purchase the ferry, reduce the rent or increase the rates of ferriage. The only relief granted was to increase the fare for passengers to 12½ cents. The management changed hands several times until it finally returned to its owners, "The Associates of the Jersey Company." In 1831 they leased the ferry to the New Jersey Railroad

(Continued on Page 18)

BOLT TIGHTENER SPEEDS WORK



After the plate has been lodged in its proper place and the bolts slipped into position by two of the sandhogs, a hydraulic bolt-tightening machine is used to tighten the bolts to precisely the right degree of tension. The amount the bolt is to be tightened is controlled by hydraulic pressure. The man at the left of the photo is the operator of the bolt-tightening machine. The Lincoln Tunnel was the first job on which the hydraulic bolt-tightening machine was used. Previously, in the Holland Tunnel and earlier tunnel jobs the bolts were tightened by a five-foot wrench which required three men to turn. The perforction of the bolt-tightening machine speeded up progress in the construction of the tunnel by 50 per cent. The greatest number of rings erected in one day on the Holland Tunnel job was 11 in 24 hours, while the maximum on the Lincoln Tunnel job is 18 rings in 24 hours.

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HISTORY

(Continued from Page 17)

and Transportation Company which operated it until it was transferred to the Pennsylvania Railroad Company in 1871. The railroad company has controlled it ever since.

Night Trips Started in 1835

The first permanent night ferry was established in 1835, in response to a petition presented to the proprietors of the ferry by a committee of the citizens of Jersey City. This committee consisted of the most prominent men of the city, including R. Gilchrist, C. Van Vorst, G. Dummer and D. S. Gregory, to whose efforts the result was largely due. Previous to this the citizens of Jersey City had been virtually prisoners after nightfall; and the event was celebrated by fireworks and music.

The landing place of the Jersey City ferry has been changed several times. It was first situated at the foot of Grand St., about 100 feet west of Hudson St. It was afterward changed to a point between Grand St. and York, with the slip opening diagonally up the river. From there it was moved to the foot of York St. On April 1, 1839, it was again moved to the corner of Montgomery St. and Hudson. In 1856 the block east of Hudson St. was filled in, and the landing place was finally changed to its present location. The landing place on the New York side has remained at the foot of Cortlandt St. ever since the ferry started.

On May 5, 1851, the Common Council of New York City gave permission for a landing at the foot of Desbrosses St. and this line was opened in 1862. The ferry to 23rd St. was opened May 16, 1897.

In 1890 double-decked boats were put in operation and the service greatly improved. The use of the screw propeller in place of the side wheel was first introduced on Nov. 16, 1891, when the Pennsylvania Railroad ferryboat, Cincinnati, was put in operation on the Cortlandt St. line.

Pavonia Ferry Founded in 1733

The earliest record of the Pavonia ferry is a patent from King George the Second, dated Jan. 7, 1733, granting the exclusive right of ferriage from Pavonia to New York, to Archibald Kennedy. Apparently he did not fulfill the conditions of the grant and so forfeited the privilege. Nothing more is heard of this ferry until 1753, when a petition was presented to the Common Council of New York for a ferry from the west end of Pearl St. to Harsimus, but nothing came of this either.

In 1802, Nathaniel Budd, without a license, built a dock at 8th St. and Provost and started a ferry to New York. In November, 1802, the Legislature of New Jersey authorized Budd to erect a ferry; but there is no record that he ever obtained permission from the authorities in New York to land his boats on that side of the river. On Oct. 24, 1803, however, he advertised his ferry as being in operation and it seems pretty certain that he ran his boats for some years after that.

In April, 1818, a number of persons petitioned for a ferry from the foot of Chambers St. to Harsimus. Nothing more seems to have been heard of the Pavonia ferry until May, 1861, when it was revived by the Erie Railroad Company, which has run the ferry since.

In 1822 a ferryboat was run between Jersey City and Long Island City. This boat, however, was only used for the accommodation of people attending the races which were being held at the Union Race Course at Long Island. It only made four trips a day and was discontinued when the races were over. The first permanent ferry between Jersey City and Brooklyn was started when the Brooklyn Annex was put in operation on Aug. 12, 1877. On Dec. 7, 1897, this ferry was purchased by the Pennsylvania Railroad, which operated it intermittently until several years ago when lack of business caused it to be permanently suspended.

On Dec. 1, 1891, the Pennsylvania Railroad opened a ferry from the foot of Morgan St., Jersey City, to 13th St., New York. This was used principally for wagon traffic, and was discontinued May 1, 1900.

Considering the long time the Jersey City ferries have been in operation and the enormous number of passengers that have been carried during that period there have been remarkably few accidents. Soon after the steam ferry was started, the boiler of one of the boats, the "Jersey," exploded while she was lying in the slip. This occurred shortly after the boat was built, and two of the persons who happened to be on board were killed.

On Oct. 31, 1899, the ferryboat "Chicago," of the Cortlandt St. line, was run into by the Steamer "City of Augusta" and sunk. The accident occurred about one o'clock in the morning. There were over one hundred passengers on board, but only two lives were lost.

At the present time there are four ferry lines connecting Jersey City with New York, and ten ferry lines between Hudson County and the Island of Manhattan.

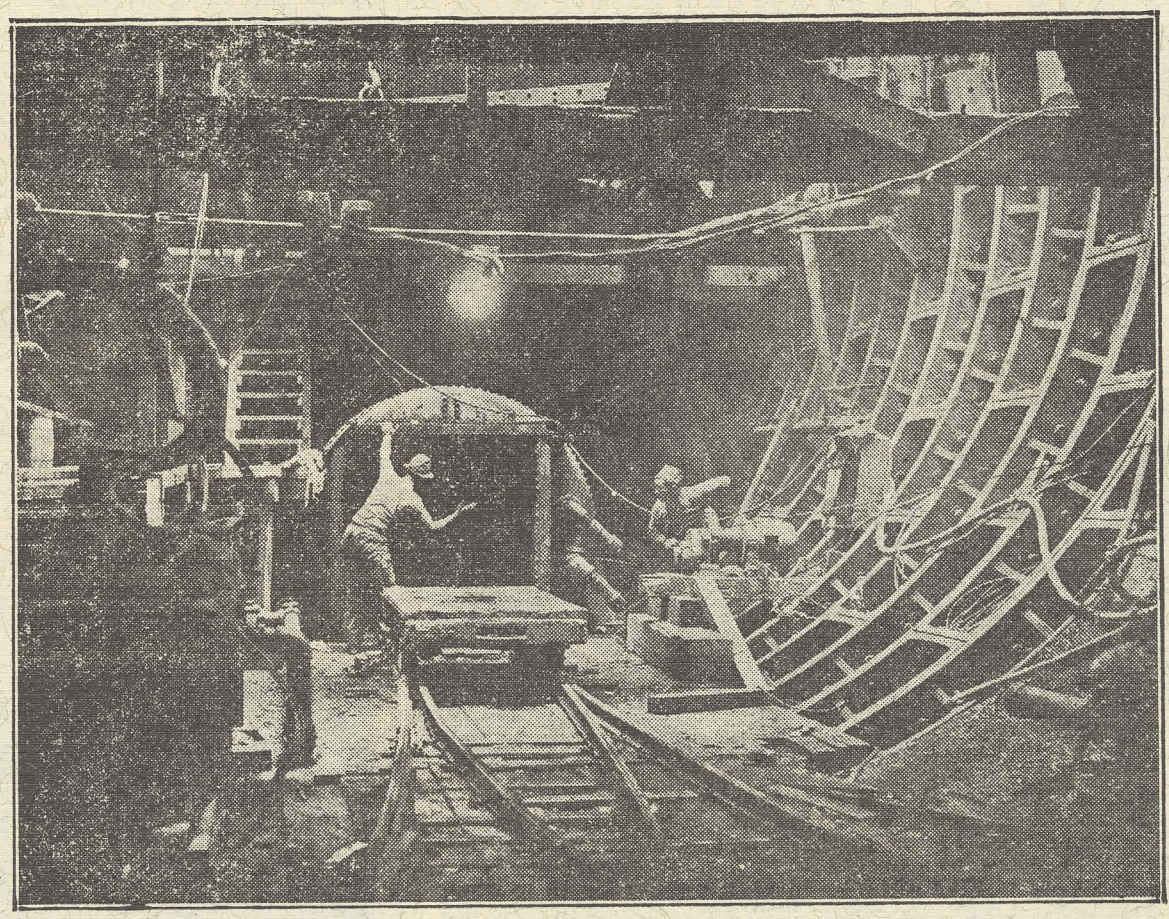
On the 25th of February, 1908, the first tunnel under the Hudson, from Hoboken to Christopher St. via the Erie Terminal, was completed and opened to the public. This was the consumation of one of the greatest engineering feats of modern times and marked the beginning of a new era in the history of transportation between Jersey City and New York.

History of Tunnelling

The art of tunnelling has been known to man from the earliest times and doubtless originated from the caves and other natural underground passages which were used for shelter by prehistoric man. In Egypt long tunnels have been found, which were cut through solid rock thousands of years ago, serving as passages to the tombs of ancient kings. Similar rock-cut tunnels were made by the early inhabitants of India in building their temples and by many other ancient races. The tunnels constructed by the Assyrians are probably the earliest examples of built-up tunnels. The vaulted drain under the palace of Nimrud, built about 860 B. C., may be considered a genuine soft ground tunnel. A similar example and what might be considered as the first sub-

(Continued on Page 22)

"Muck-Lock" at Foot of Weehawken Shaft



Through the steel chamber, shown in the direct center of the photo, pass all the material going into the tunnel, and all of the "muck" or silt being removed from the tube. Hence it is variously known as the "muck-lock" or material lock. Cars loaded with material are wheeled into the lock, the heavy steel doors are shut, and an operator outside the lock forces compressed air into the chamber, or "lock" as it is known. Pressure in the lock is raised to that of the inside of the tunnel within a few seconds. The "man-lock" through which the men must pass is located above the "muck-lock" and although similar in construction, the operator is located inside the lock and lets the air into and out of the lock much slower so that the men will not suffer an attack of the "bends."

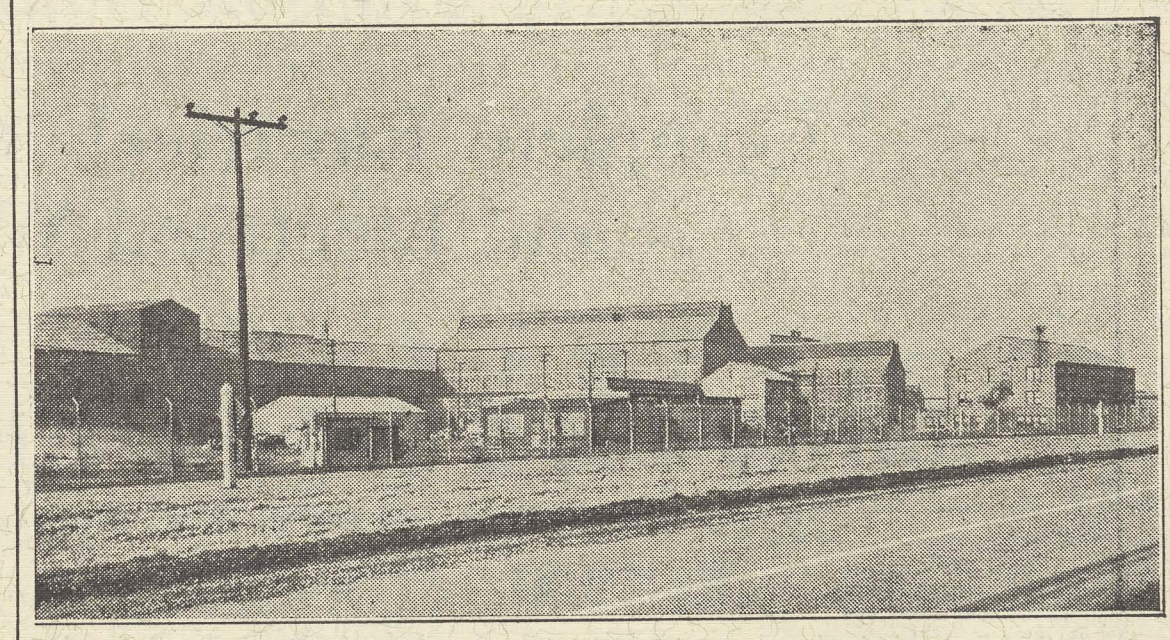
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JERSEY CITY, N. J.

The M. W. Kellogg Company designs and manufactures welded pressure vessel equipment and corrugated piping, gaskets, steam and auxiliary headers and connections, special boiler piping, refractory cements and bonding mortars, materials for furnace lining, radial brick chimneys and heat insulating materials.

In addition to the manufacturing which is done at the plant in Jersey City, the M. W. Kellogg Company has a corps of research men studying and developing new processes, engineers, who design equipment, and construction men, who are equipped to take charge of everything to do with the construction of a complete plant. Our products go to the oil refineries, power plants, and manufacturing organizations in the United States and abroad.

Plant of The M. W. Kellogg Company At the Foot of Danforth Avenue, Jersey City

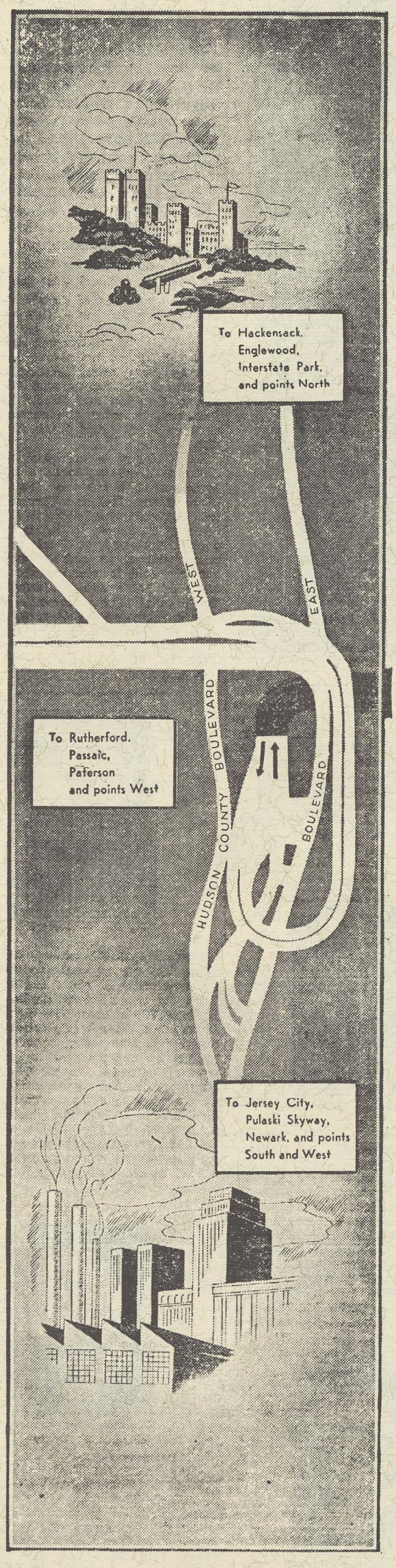


In addition to the United States, we have shipped equipments to and built plants in France, the Netherlands, West Indies, England, Canada, Manchuria, Persia, Argentina, Japan and Poland.

We are more than pleased to be identified with the opening of the new Lincoln (Mid-town) Tunnel. It is our belief that it will add greatly to the convenience, prosperity and wellbeing of all of us who are on the Jersey end of this great enterprise.

AND NOW ANOTHER BOND BETWEEN TWO GREAT STATES

The Lincoln Tunnel provides one more direct link between the metropolitan communities of New York and New Jersey. May its dedication usher in a period of coordinated activity and prosperity which will redound to the benefit of all.



PUBLIC SERVICE CORPORATION OF NEW JERSEY and its subsidiary operating companies extend to the citizens of New Jersey and New York heartiest commendations upon the opening of a great tunnel between Weehawken and midtown New York.

This new traffic artery under the Hudson constitutes an enduring tribute to the legislative vision and engineering skill which made it possible; it is a striking evidence of modern transportation methods; and it will add materially to the population and industry of New Jersey.

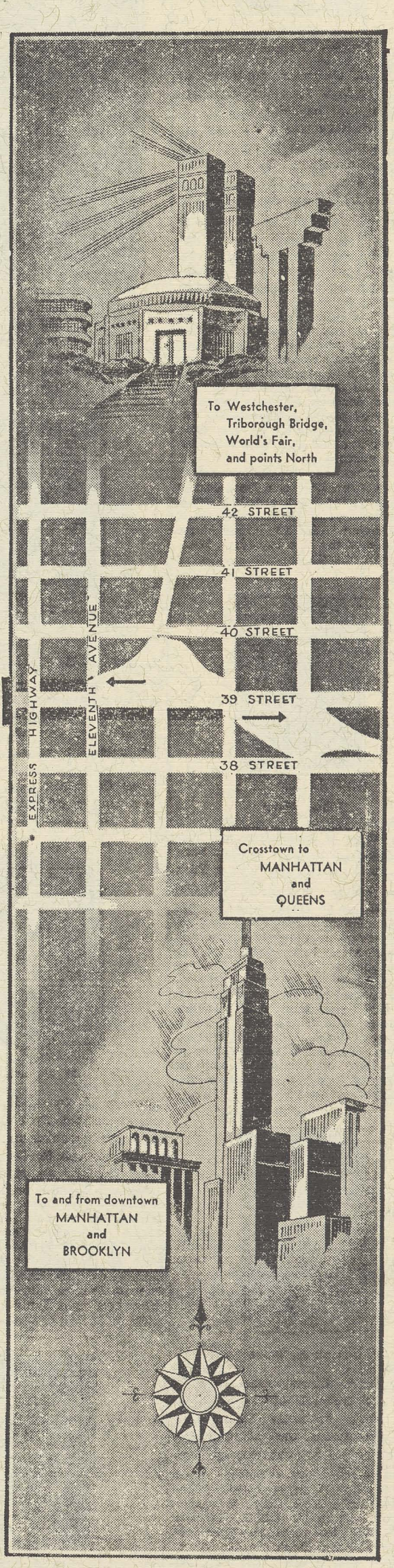
As an organization of 20,000 employes serving approximately 400 New Jersey municipalities, the welfare of Public Service is inextricably interwoven with the progress and fortune of the state in which it is located. The new tunnel is one more manifestation of such progress.

In its use of the tunnel for bus lines, in its provision of electric power and light during construction, and in its supply of current for operation of the tunnel's ventilating and lighting systems, Public Service is identified in a very real way with this huge engineering achievement.

Industrial New Jersey with its unusual waterway and rail facilities now has another vehicular route to New York markets. New York concerns can expand across the Hudson without prohibitive transportation delay. Commuters and shoppers may now drive between business districts without undue expenditure of time and energy. Two rich communities with like interests are more indissolubly tied.

The mighty Hudson has been conquered many times since Henry Hudson sailed slowly along in his "Half Moon". First came the broad beamed ferries, then the bridges, and now the vehicular tunnels. Great benefits followed the completion of each and it is hoped that the same spirit will continue to further genuine progress in New York and New Jersey. We stand on the threshold of a new era and must continue our onward march.

Telephone Journal Square 2-7000



PUBLIC SERVICE

NEW JERSEY COMMISSIONERS



Frank C. Ferguson

Frank C. Ferguson, chairman of the Port of New York Authority, has served in that capacity since Sept. 6, 1934, when he was elected by his fellow-commissioners to succeed the late Maj.-Gen. George R. Dyer, who had died a week earlier.

Mr. Ferguson, who is president of the Hudson County National Bank, Jersey City, and makes his home in East Orange, is also dean of the Port Authority commissioners, having served since 1924, when he was appointed by the then governor, George S. Silzer.

Urged on several occasions during the 10 years he had been on the Port Authority Commission prior to Gen. Dyer's death to accept the chairmanship of the commission, Mr. Ferguson had declined because of the pressure of other business interests. After Gen. Dyer's sudden death, Mr. Ferguson's associates on the commission prevailed upon him to accept the chairmanship.

Active in national and New Jersey banking circles for years, he served a number of years as collector of internal revenue of New Jersey as an appointee of the late President Warren G. Harding.



John Milton

Former Hudson County Prosecutor John Milton of Jersey City has been a member of the Port of New York Authority Commission since the death of Gen. William C. Heppenheimer, also of Jersey City, in 1933, having been appointed by Gov. A. Harry Moore to succeed the late Gen. Heppenheimer. Mr. Milton, widely known Jersey City attorney, long identified with politics, although never having run for an elective office, is a close friend and associate of Mayor Frank Hague. Prior to serving as Hudson County prosecutor, he was corporation counsel of Jersey City. He has been a life-long resident of Jersey City, where he has an extensive law practice.

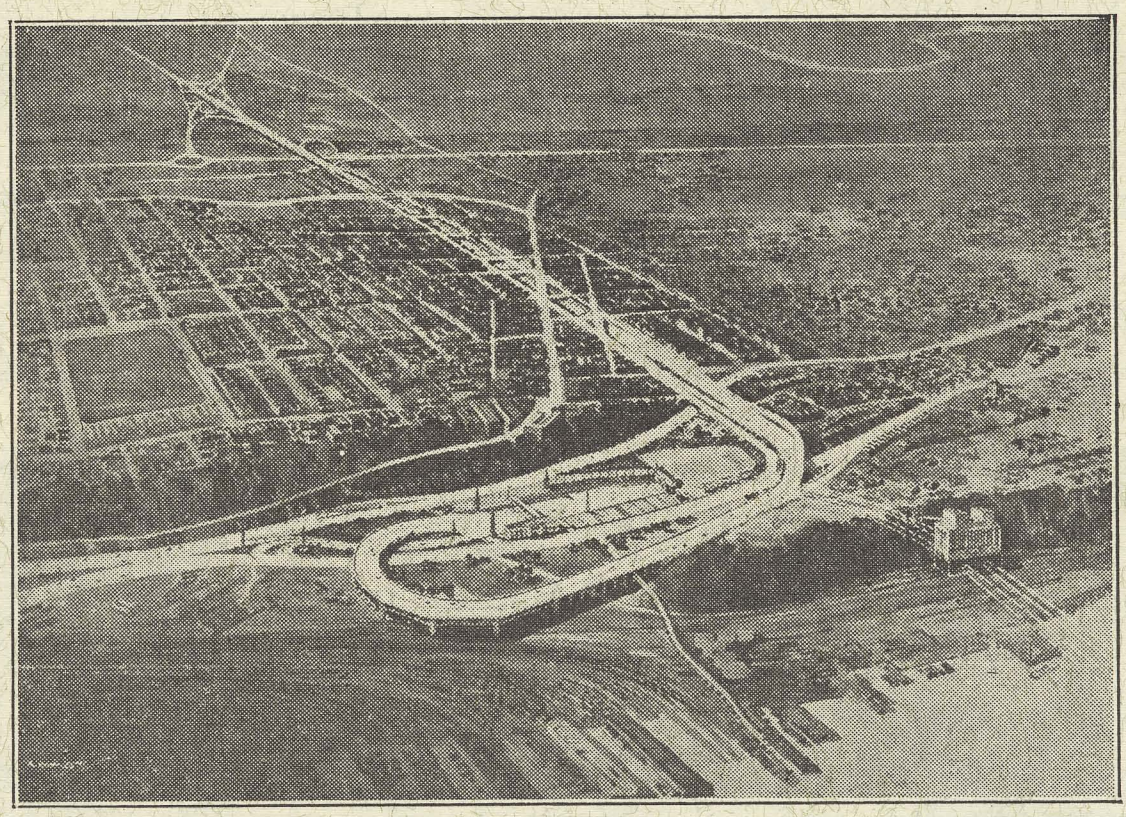


Joseph A. Bower

Joseph A. Bower, most recently appointed member of the Port of New York Authority Commission from New Jersey, took office July 9, 1936, after his appointment by Gov. Harold G. Hoffman to succeed John Quinn of Red Bank, resigned. A native of Pike's Peak, Colo., Mr. Bower's home is in Montclair. He is a director and executive vice-president of the Chemical Bank and Trust Co. of New York.

In his long and active career, Mr. Bower was a member of the Detroit bar and later was vice-president of the Detroit Trust Co. Still later he was president of Hale and Kilmourn Co., Philadelphia. Coming to New York, he was vice-president of the Liberty National Bank and later vice-president of the New York Trust Co. He organized and was president of the Bankers Commercial Corporation. He is a director of the Commercial Investment Trust.

Artist's Conception of Weehawken Approaches



This artist's conception shows how the New Jersey plaza and approaches of the Lincoln Tunnel will look from the air. Work is progressing rapidly on the depressed highway and marginal highways which will cut through Union City and North Bergen to connect with State Highways Nos. 1 and 2 on each side of the Meadows of the Hackensack River. Dotted lines at the lower right corner of the drawing show the line of the tunnel as it goes under Kings Bluff, the West Shore railroad yards, and the river.



George DeB. Keim

George DeB. Keim of Edgewater Park retired from his Philadelphia law practice about 10 years ago He served as secretary of the Republican National Committee during the administration of President Hoover and has been chairman of the New Jersey Commission on Historic Sites for a number of years.



J. M. Byrne, Jr.

Joseph M. Byrne, Jr., of Newark, was appointed Port of New York Authority commissioner in 1934, succeeding Joseph G. Wright of Paterson. He was an appointee of the then Gov. A. Harry Moore. Commissioner Byrne is in the finance and insurance business and is widely known for his activity in the Notre Dame University Alumni Association. He served in the U. S. Army both on the Mexican Border in 1916 and in France during the World War, holding a lieutenant's commission.



Ira R. Crouse

Ira R. Crouse of Perth Amboy was appointed as a New Jersey member of the Port of New York Authority by former Gov. Morgan F. Larson in 1930. He was reappointed last year by Gov. Harold G. Hoffman. Head of a Perth Amboy lumber concern, Mr. Crouse is also widely known in Middlesex County financial circles.

HIGHWAY FACTS

Numerous Roads Lead To Lincoln Tunnel Plaza

With the opening of the Lincoln Tunnel, many Hudson County thoroughfares which heretofore were used to a great extent by local traffic only will become busy highways, assuming a new importance as temporary approaches to the tunnel. Most of the traffic load will be taken off these streets when the new depressed super-highway cutting through North Bergen, Union City and Weehawken from Route No. 1 to the Tunnel Plaza is completed.

Until the new highway is completed, however, the principal approaches to the tunnel will be as follows:

From Bergen County points, either Boulevard East or West Boulevard to 43rd St. or 32nd St., then along either one of those streets to Pleasant Av. or Park Av., and thence to Boulevard East.

From the Tonnele Circle on the Holland Tunnel approach, those wishing to go to uptown New York or the Times Square area can drive up Tonnele Av. on Route 1 to Manhattan Av., to Hudson Boulevard; along the Boulevard to Bowers St., to Palisade Av., to the 14th St. Viaduct, and from the Viaduct along Willow Av. in Hoboken and Weehawken to the Tunnel Plaza. An alternate route would be along the Holland Tunnel depressed highway approach from Tonnele Circle to Henderson St., then north in Hoboken and east along Observer Highway to Washington St.; then to 14th St. and west to Willow Av., turning north again to the Tunnel Plaza.

On the New York side the Tunnel Plaza connects with 34th, 35th and 36th Sts. on the south and 40th, 41st and 42nd Sts. on the north via Dyer Av., the Port Authority highway which consists of two ramps from the depressed Tunnel Plaza to the street level. Over Dyer Av. are underpasses, on which 37th, 38th and 39th Sts. cross.

Folders can be obtained from the Port Authority containing maps, directions as to best routes, etc., and descriptive matter about the crossing facilities.

Approach Contracts Awarded Low Bidders

Most recent contracts awarded by the Port Authority was one for the excavation and incidental structures of the portion of the depressed super highway extending between Bergenline Av., Union City, and Prospect Av., North Bergen. The contract was awarded the low bidder, Perini and Sons of Framingham, Mass., of $773,272.50. Another contract was awarded Sigretto and Sons., Inc., of Rutherford, on a low bid of $231,250 for the excavation and grading of part of the loop east of Boulevard East and along the west side of Kings Bluff.



John J. Pulleyn

John J. Pulleyn, a member of the old New York Tunnel Commission, became a member of the Port of New York Authority Commission when the Tunnel Commission was absorbed by the Port Authority in 1930. Mr. Pulleyn, with Alexander J. Shamberg and the late Maj.-Gen. Dyer, were the three New York tunnel commissioners who became Port Authority Commission members at the time. Mr. Pulleyn has been a director of the Lawyers Trust Co. for many years, and is the retired president of the Emigrant Savings Bank of New York. He is a resident of New York.



Rudolph Reimer

Rudolph Reimer, U. S. Commissioner of Immigration and Naturalization for the New York District, has been a New York representative of the Port of New York Authority since December, 1933, when he was named by Gov. Herbert H. Lehman. A native of Brooklyn, Mr. Reimer is president of the Brooklyn Children's Aid Society and a trustee of the Brooklyn Public Library and the Brooklyn Y. W. C. A. He has been immigration commissioner at Ellis Island since 1934.



C. S. Whitman

Charles S. Whitman, former Republican governor of the State of New York, was named a member of the Port of New York Authority Commission by Gov. Herbert H. Lehman early in 1935, succeeding the late Maj.-Gen. George R. Dyer as a New York member of the commission. Commissioner Whitman served two terms as governor of New York, being first elected in 1915.

NEW YORK COMMISSIONERS



H. S. Cullman

Howard S. Cullman, a New York member of the Port Authority Commission since 1927, has served as vice-chairman of that body since Sept. 6, 1934, when he succeeded Frank C. Ferguson, when the latter was elected chairman. An appointee of former Gov. Alfred E. Smith, Mr. Cullman served as chairman of the Port Authority Commission's terminals committee when the latter negotiated for the establishment for a union inland freight terminal to serve as a point of collection for less-than-carload quantities of freight moving to and from the port. This was designed to reduce motor truck congestion on the waterfront and was accepted by all trunk-line railroads serving New York, leading to the construction of the present Port Authority Building and Inland Freight Terminal, covering the entire block between Eighth and Ninth Avs. and 15th and 16th Sts.

Mr. Cullman is an executive of Cullman Brothers, packers and importers of cigar tobacco. He is president of the Beekman Street Hospital. He maintains homes in Manhattan and Purchase, N. Y. In 1928 he was sent abroad, as Port Authority commissioner, to make a study of airports, and it was largely on the basis of his recommendations that the present Floyd Bennett Airport was constructed on Barren Island. He was reappointed to the commission by the then Gov. Roosevelt in 1930, and since by Gov. Lehman in 1933 and 1936.



A. J. Shamberg

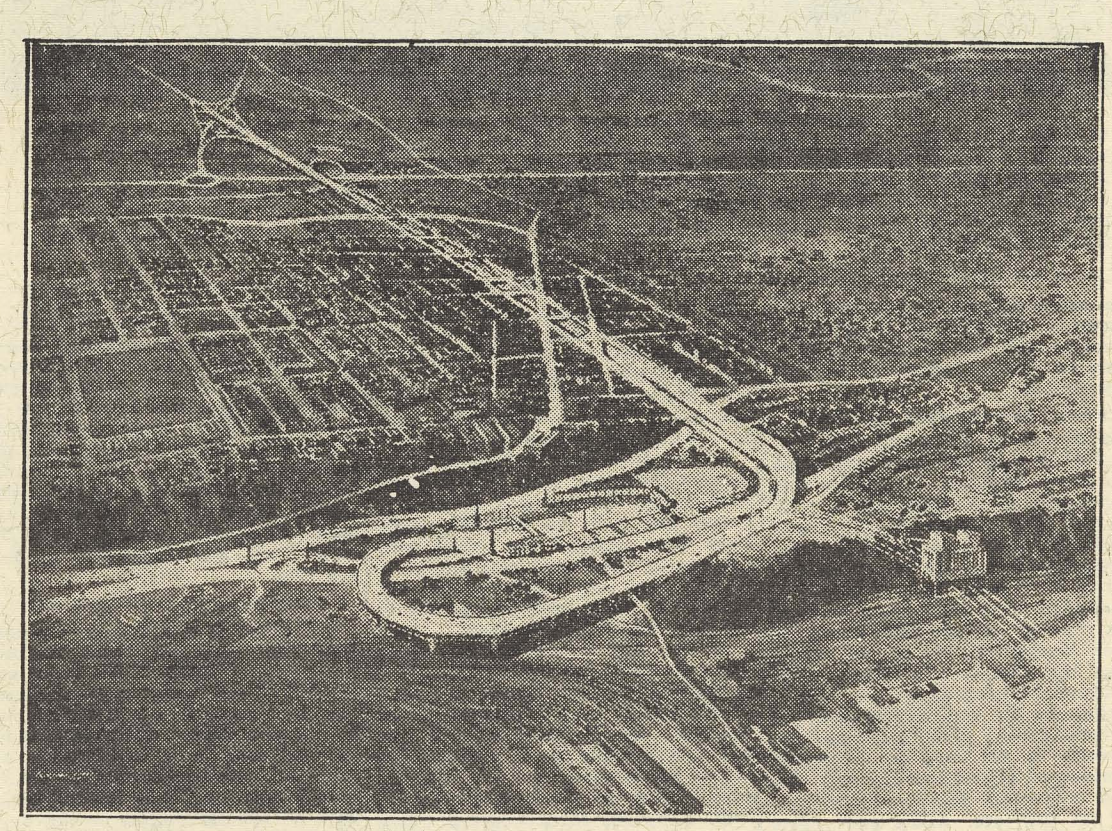
Alexander J. Shamberg, of New York, has served continuously as a representative of the State of New York on commissions dealing with Hudson River crossings since 1906. It was Mr. Shamberg's interest and activity in interesting others in the project of constructing a vehicular crossing between New York and New Jersey which led to the introduction of initial legislation, creating the first Bridge and Tunnel Commission in New York in 1906. He was appointed by Gov. Higgins as a charter member of that commission and has served continuously since that time. He is an exporter.



Michael F. Walsh

Most recent appointee on the Port Authority Commission is Michael F. Walsh of Brooklyn, a lawyer, who was appointed to succeed the late John F. Murray as a New York member of the commission by Gov. Herbert H. Lehman in April of this year. He served in the Navy as chief petty officer, Board of Investigation in 1917 and 1918, and as an ensign in the Transport Service in 1918 and 1919. He is lecturer on real estate at Columbia University, a director of the Brooklyn Public Library and of Holy Family Hospital, Brooklyn. He is a past state deputy of the New York Knights of Columbus, and is a member of the New York and Kings County P[illegible] Association.

Building the Arteries of Progress



BIRD'S-EYE VIEW OF LINCOLN TUNNEL AND APPROACHES

Brewster-Built Plaza, Roads and Approaches
To the New Lincoln Tunnel at
Weehawken and Union City

Builders of Good Roads for Over 30 Years
Including Almost Every Main
Highway in Bergen County

GEORGE M. BREWSTER & SONS, Inc.

General Contractors

FORT LEE ROAD, BOGOTA, N. J.

TELEPHONE, HACKENSACK 3-2000

Engineering Head

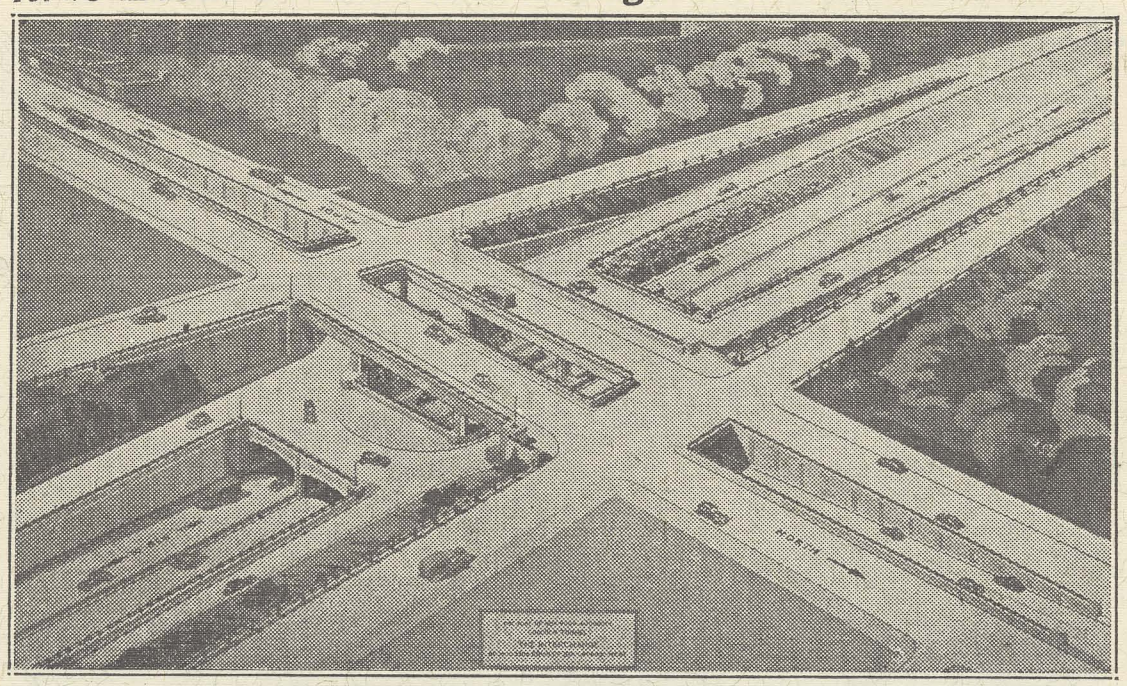


O. H. Ammann

Othmar H. Ammann, director of engineering of the Port of New York Authority, is regarded by many of his contemporary engineers as the ablest bridge engineer in the world. A graduate of the Swiss Federal Polytechnic Institute, Class of 1902, he has served in many engineering capacities both in this country and in Europe. He was an engineer in the construction of the Queensboro Bridge, across the East River; was selected to make an investigation and report on the failure of the first Quebec Bridge over the St. Lawrence River; made studies and submitted a tentative design for the new Quebec Bridge; reported to the Pennsylvania Railroad on the Hell Gate Bridge and approaches; designed the Provincial Government arch bridge across St. John's River, Canada; assistant chief engineer of construction, Hell Gate Bridge and approaches; assistant chief engineer, proposed 57th St. Bridge. First conceived the idea of constructing a highway bridge across the Hudson River at 179th St. in 1923. Was retained by Port Authority as bridge engineer in 1925, later became chief engineer and, during the past few months, was promoted to the post of director of engineering. He is the holder of the Thomas Fitch Rowland Award in Engineering for his papers on the Hell Gate Bridge and approaches. Designed and directed the construction of the George Washington Bridge.

Mr. Ammann is a member of the American Society of Civil Engineers, American Railway Engineering Association, and the American Association for the Advancement of Science.

Three-Level Traffic Interchange at Hudson Boulevard



Part of the elaborate plans which have been prepared made to make approaches to the Lincoln Tunnel as "foolproof" as possible is the crossing of the new highway approach and Hudson Boulevard. An artist's conception of the way the project will look when completed is shown above. The Boulevard is shown running from the top left to the bottom right of the picture, while the high-speed highway is the lower level of the depressed highway. A series of ramps and marginal highways are so designed as to reduce the danger of accidents to a minimum. The intersection will be near Columbia Park, North Bergen.

Chief Engineer



John C. Evans

John C. Evans, chief engineer of the Port of New York Authority, was promoted to that post this year, after a long period of service as terminal engineer. A graduate of the University of Pennsylvania, Class of '05, he took his degree of Civil Engineer in 1911. He served as assistant bridge engineer and designer for various railroads from a date prior to his graduation from the university in 1910, then served as assistant engineer, superintendent of construction and assistant valuation engineer of the Long Island Railroad. In the last capacity he was assigned largely to studies of special nature in the Metropolitan district, relating to both freight and passenger terminal facilities.

HISTORY

(Continued from Page 18)

aqueous tunnel on record was under the Euphrates River. This was built of brick masonry and was 12 feet wide and 15 feet high. When this was being constructed, however, it was not, strictly speaking, a subaqueous tunnel for it was built under the dry bed of the river, the waters of which were turned aside until the tunnel was completed.

Among the ancient people such work was all done by hand, the tools being pick and shovel for soft ground, and hammer, chisel and wedge for rock tunnelling.

The Romans were the greatest tunnel builders of ancient times and devised many ingenious methods for the work. Their tunnels were constructed principally for acqueducts and roads. Many of these tunnels are wonderful examples of engineering.

During the middle ages tunnels were built only for military purposes and little progress was made in the methods of work until the introduction of gunpowder. Up to the beginning of the 19th century almost all the tunnels were built through rock or hard ground, the soft ground tunnel being scarcely ever attempted.

In 1803 a tunnel 24 feet wide was cut through soft soil for the St. Augustine Canal in France. Timbering was used to support the roof and side walls while the earth was being removed, and was followed by a lining of masonry.

Railways Boomed Tunnels

One of the greatest factors in bringing the art of tunnelling to its present importance was the development of the steam railway. Almost immediately tunnel building increased. About 1820 two tunnels were constructed on the Liverpool and Manchester Railway in England. In the United States the first railway tunnel was built on the Allegheny Portage Railroad in Pennsylvania, in 1831-33. This increase in tunnel building was accompanied by corresponding progress in methods of construction and the introduction of improved machinery, and special devices.

One of the greatest of these improvements was the invention and development of the shield system, without which the construction of the present great submarine tunnels would have been impossible. In the construction of mountain tunnels such as those under the Alps and other rock tunnels the principal difficulties encountered were the hardness of the rocks, the great length of tunnel, the lack of ventilation, etc. Tunnelling under water, however, is radically different. The mere excavation presents little trouble; but flooding has constantly to be guarded against, and as the work is usually through soft soils, mud, gravel or clay, the engineering problems are very different and exceedingly difficult.

Shield Solved Great Problem

By the use of the shield and compressed air most of these difficulties have been overcome. The shield was invented by Sir Marc Brunel in 1825, and has been steadily improved and so changed that little remains of the original device except the idea. One of the first great improvements in connection with the shield method was the use of cast iron lining by Peter Barlow in 1869 in the tunnel under the Thames in England. Lord Cochrane first suggested the use of compressed air and in 1830 took out a patent for air locks and other appliances to be used in tunneling. Compressed air without a shield was used in the old Hudson River tunnel in the late 1870's and early 1880's. The next great step in the art of tunnel building was made in 1887, when a greatly improved shield was devised by J. H. Greathead. This is the one which is now generally used, but in minor details the construction and use of the shield varies considerably. The shield used in the construction of the Hudson and Manhattan tunnels was described in "Review of Reviews" in 1909 as follows:

"This shield, which is one of the greatest inventions in construction machinery of the past half century, resembles in appearance a great drum built of heavy steel plates. In the head of this drum, which is known as a diaphagm, there are doors for the passage of the workmen and the withdrawal of the clay and other excavated material. The upper edge of the drum is a cutting knife which goes through the hardest material when the shield is driven forward by hydraulic jacks, holding up the river as it goes with compressed air while the waste material is removed. The upper portion of the drum, which extends backward over that portion of the tunnel tube which has been completed, is known as the 'tail of the shield,' and forms the protection for the men who are setting up the iron castings, ring by ring, and making the tunnel proper. Immediately back of the head is the great crane, or 'erector,' which picks up the castings and holds them in place while they are bolted together. The entire work is carried on under air pressure, which is made possible by placing in the mouth of the completed tunnel, some distance in the rear of the shield, a solid bulkhead in which are fitted and placed air locks through which workmen and materials pass to the work at the shield. Thus the completed tunnel advances. The tunnels themselves are made up of iron castings bolted together and set in place consecutively as the boring shield opens the way for them."

First Hudson Tunnel Planned

In 1874 a civil engineer by the name of D. C. Haskins, conceived the idea and organized a company to construct two tunnels from a point near the Palisades, in Jersey City, to a terminus at or near Washington Square, New York. At that time it was his purpose to build, if possible, a union railroad station at Washington Square, and induce trunk line railroads in New Jersey to make joint use of it. Haskins began the construction of one of these tunnels in 1879, and built about 1,800 feet of one tunnel. In 1882 his company failed. In 1890 the company was reorganized and the English contracting firm of S. Pearson and Sons undertook to build the tunnel to the foot of Morton St. After building 1,800 feet additional the company again failed in 1892, leaving at that time 3,600 feet of single tunnel constructed from the waterfront of Jersey City towards New York. This tunnel was 18 feet in diameter, one-half brick and one-half iron.

At the time the work was commenced there had been little experience in the construction of such a tunnel and with the difficult conditions that existed the work was necessarily dangerous and costly. It is said that over $4,000,000 was expended by these early companies in the prosecution of the work.

At first the shield was not used, the excavation being made under pneumatic pressure. In was extremely difficult to keep this pressure as the earth was too loose to retain the air, and as soon as it escaped the water would rush in.

At 4:30 in the morning of July 21, 1880, a serious leak occurred which resulted in the loss of 20 lives and brought out one of those instances of heroism which have so often been displayed during the progress of great engineering works. One of the workmen, named Peter Woodland, a resident of Jersey City, was the first to discover the leak. He was at the door of the airlock and, giving warning to the men, hurried them through the exit. After eight of the men had botton through, Woodland saw that if the door was not closed quickly from the inside all would be drowned. To save the lives of those who had already passed, he at once closed the door and the water, soon filling the chamber, drowned him and the others who had been unable to pass. Woodland could have saved his own life when he discovered the accident, but, instead, he kept to his post to save his comrades. A monument commemorating the event has been erected over his grave in the New York Bay Cemetery, in Jersey City.

McAdoo Revives Tunnel Plan

The tunnel proposition lay dormant until 1901 when William G. McAdoo became interested in the idea and started negotiations with the group which owned the rights to the old incomplete tunnel. At first McAdoo planned completion of the one tunnel, which was to contain two tracks and be operated with narrow gauge cars of special design to run from the Lackawanna Terminal in Hoboken to 9th St. and Christopher in New York. A short time later he became convinced that this would not be a feasible plan so he fostered the idea of two tunnels with standard gauge tracks and electric trains to be operated by the third rail system. He also was convinced that such tunnels would not be satisfactory unless they served the downtown district as well. With this in mind the new tunnel system was planned to extend from Hoboken, through the Erie and Pennsylvania terminals in Jersey City, thence crossing to a terminal station at Cortlandt St. and Church. This route very closely approximated the earliest ferry routes.

Prior to the completion of the Hudson Tunnels, Mr. McAdoo gave the following description of some of the obstacles met with in the construction of these tunnels:

"At the deepest part of the river near the New York side a ledge of rock was encountered at the bottom of the river. This ledge was only twelve feet high while the tunnel was 18 feet. The problem that was presented was having to build the bottom of the tunnel through rock and the top through silt and at the same time support a river more than a mile wide and 62 feet deep, with a cover of only 15 feet of silt between the top of the tunnel and the bottom of the river. It was necessary to blast the rock in the bottom and hold the slit at the top. The problem was considered so serious that for many years doubts were entertained by eminent engineers as to whether or not it was possible of solution. This was, however, solved by the chief engineer, Charles M. Jacobs, and inside of a year the 800 feet of rock had been blasted out and the successful construction of the tunnels under the Hudson River was assured."

The Hudson and Manhattan Tunnels consist of two tubes entirely separate from each other, about 15 feet in diameter. The tubes are con-

(Continued on Page 23)

Employees of the
American Can Company
extend their greetings
on the opening of the new
LINCOLN TUNNEL
CANCO

HISTORY

(Continued from Page 22)

structed of iron rings, bolted together. Each ring weighs five tons. (Each ring in the Lincoln Tunnel weighs 46,900 pounds, or more than 23 tons apiece.—Ed.) In most places they are covered with a coating of concrete so the interior of the tube is smooth. The tunnel tubes are from 60 to 90 feet below the surface of the Hudson River and the distance from the top of the tunnel and the bed of the river varies from 15 to 40 feet. The twin tubes are about 30 feet apart.

Pennsylvania Tunnel Next

The next tunnel to bore under the Hudson from New Jersey to Manhattan was the Pennsylvania Railroad tunnel, which brought about the transfer of the railroad's chief metropolitan passenger terminal from Exchange Place to the Pennsylvania Terminal, 33rd St. and 7th Av., New York.

By this time the automobile had taken its place as a vital means of transportation of both people and freight. Agitation was started, even before the Hudson and Manhattan Railroad tunnels were built, for the construction of a bridge over the Hudson between Downtown New York and Jersey City or Hoboken. The engineering problems for this were so great, due to the tremendous height necessary for the bridge to allow for the passage of trans-Atlantic liners up the Hudson, and the prohibitive cost of land for approaches, that most engineers believed the true answer to the problem lay in a vehicular tunnel, rather than in a bridge. The resultant research in ventilation methods and the engineering involved resulted, in 1927, in the completion of the Holland Tunnel.

Its success assured from the first, the popularity of the Holland Tunnel was so great that Bergen County residents and persons from other sections in Northern New Jersey began clamoring for a bridge or tunnel further up the river. In 1931 the George Washington Bridge was completed, the greatest single span bridge ever built up to that time, and almost twice as long as its largest predecessor.

Both the Holland Tunnel and George Washington Bridge crossings proved to be an outstanding source of revenue, and the latest addition to the Port Authority's facilities, The Lincoln Tunnel, was planned to give direct access to Times Square from New Jersey.

The details of the New York plaza of the Lincoln Tunnel has been so designed that it will be possible to connect this tunnel by another tunnel running under Manhattan, to the Midtown-Queens Vehicular Tunnel, now under construction between Mid-Manhattan and Long Island City under the East River. This will give persons from the west side of the Hudson River, desirous of reaching Long Island, a high-speed underground highway direct from Weehawken to Long Island, without the traffic problems of Manhattan to cause delays.

So the Hudson River crossing of today is a far cry from that of one, two or three hundred years ago. Across her broad surface swiftly move the ferries of ten lines. Under her bed pass three railroad tunnels and two great vehicular tunnels, and high over her waters stretch the graceful steel span of the George Washington Bridge.

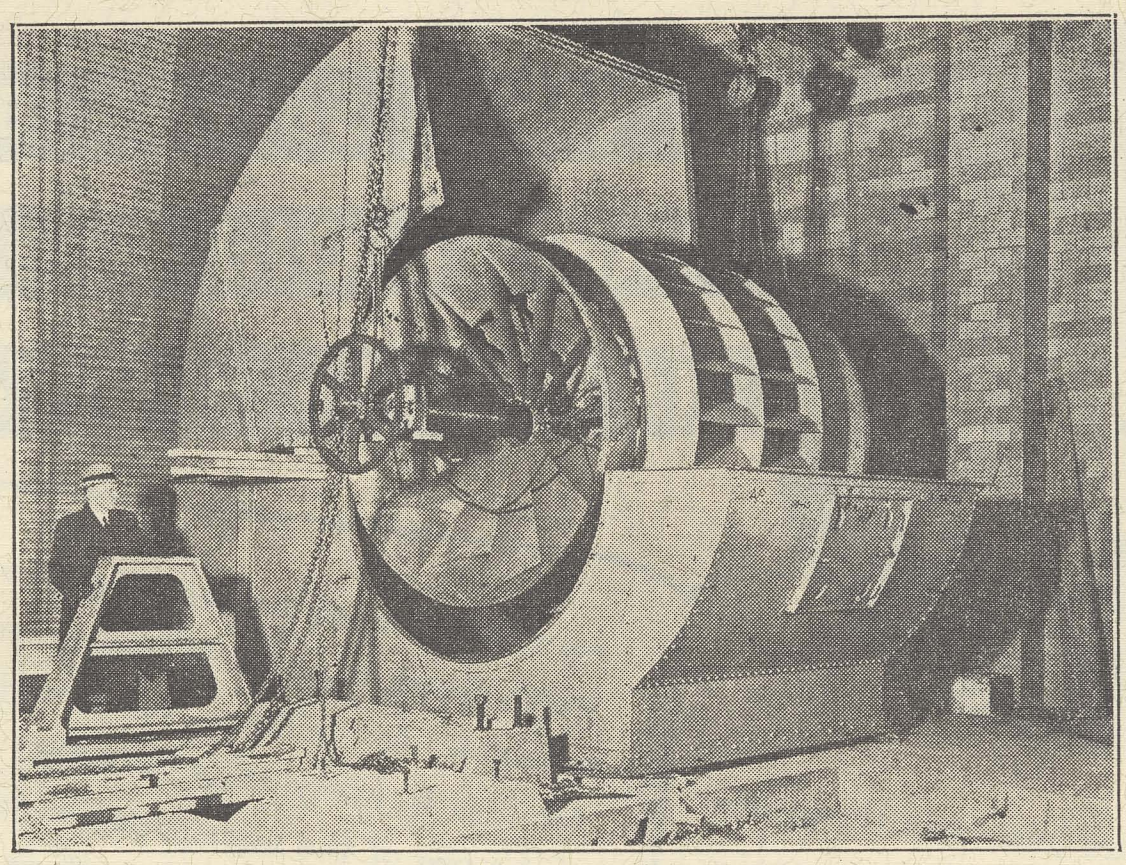
In 1812 residents of Paulus Hook were struck with awe over the speedy Fulton steam ferry. In 1909 persons doubted their senses while taking their first ride in the Hudson and Manhattan tubes from Jersey City to New York in three minutes. In 1927 the dream of driving to New York in your own auto under its own power became a reality. Who knows what the future may hold in store?

U. S. JUNIOR C. C. POST FOR CLARK

James B. Clark, 24, of 54 Kensington Av., has been elected a director of the United States Junior Chamber of Commerce, according to an announcement made today by Roswell Perry Rosengren of Buffalo, N. Y., national president. Clark is declared to be the youngest member of the board which governs 350 units throughout the country and whose membership totals more than 150,000 young business and professional men.

Clark organized the Jersey City Junior Chamber of Commerce three years ago and is at present national councilor of the local unit and vice-president of the State Junior Chamber of Commerce. He is a graduate of Notre Dame University and John Marshall College of Law, president of the Ninth Ward Young Men's Democratic Club and a member of the Smyth Club.

Thirty-two Fans Keep Tunnel Air Pure



One of the 32 huge ventilation fans is shown as it was being installed in the Weehawken ventilation building. A portion of the outer casing has been removed to show the many-finned wheel which forces fresh air through the mile-long tube. The size of the fan can be seen by comparing it to the size of the man standing at the left of the photo. These fans can supply the South or completed tube with a maximum of 1,736,000 cubic feet of air per minute. The fan motors have a maximum operating horsepower of 2,237.

AUTOISTS

(Continued from Page One)

count placed outside cars at 12.6 per cent of the total traffic.

Cars have been noted on many days from as many as forty and more of the forty-eight states, along with the District of Columbia and several Canadian provinces, as well as Cuba, Panama, Mexico and the Hawaiian Islands.

It required ten days of actual clocking to catch license plates of all forty-eight states, the last ones to come along having been from Idaho, Montana, Wyoming, South Dakota, Utah, Nevada, and New Mexico. The combined motor vehicle registration of these seven States is only two and one-half per cent of the total of the entire country.

The checks made during the past year were carried on by personnel supplied by the Federal Emergency Administration of Public Works and was limited to eastbound passenger cars in the twelve-hour daytime period starting at 7 a. m.

POLICE

(Continued from Page One)

the two-way emergency truck, one of the most powerful of its kind ever built, which can pull a 70-ton load up a four per cent grade if necessary.

As a result of the opening of the Lincoln Tunnel, 20 bridge and tunnel traffic patrolmen were promoted to the rank of traffic sergeants; and four sergeants to lieutenancies. The Port Authority Police Department is now the largest doby of special traffic police of its kind in the world.

The BIGGER the JOB

...the better you will appreciate

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Combustion Equipment

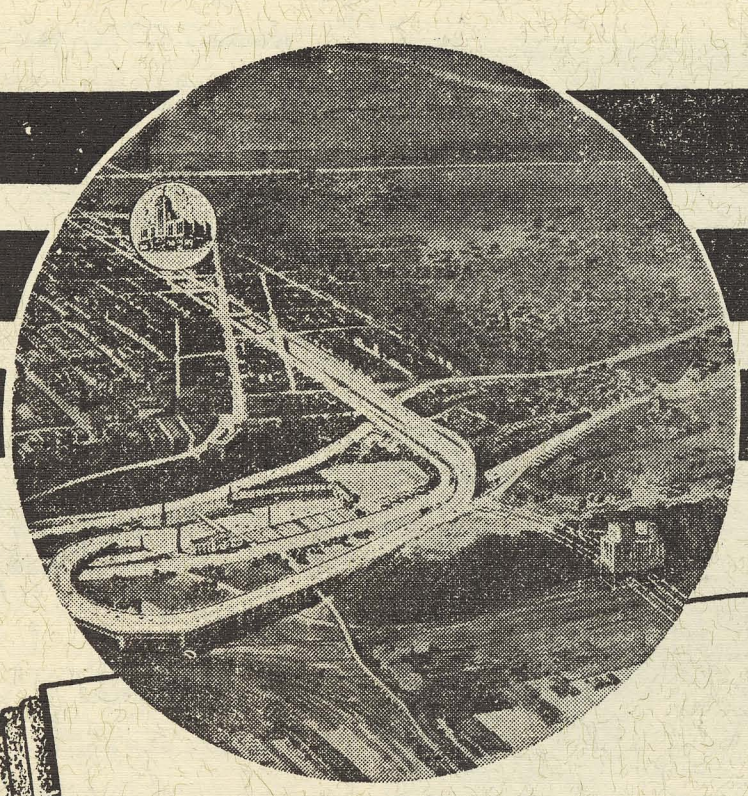
Todd installations pay in factories, office buildings, institutions—wherever heavy demands are placed on heating or power plant. Inspect a number of our installations . . . designed for heavy duty, "proved out" by years of reliable performance.

Todd Combustion Equipment, *Inc.*

Division of Todd Shipyards Corporation

601 WEST 26TH ST., NEW YORK *Tel. BRyant 9-4725*

TODD NEW YORK, U.S.A.



A NEW Service Begins— And An Old One Enters Its Fifty-Second Year . . . .

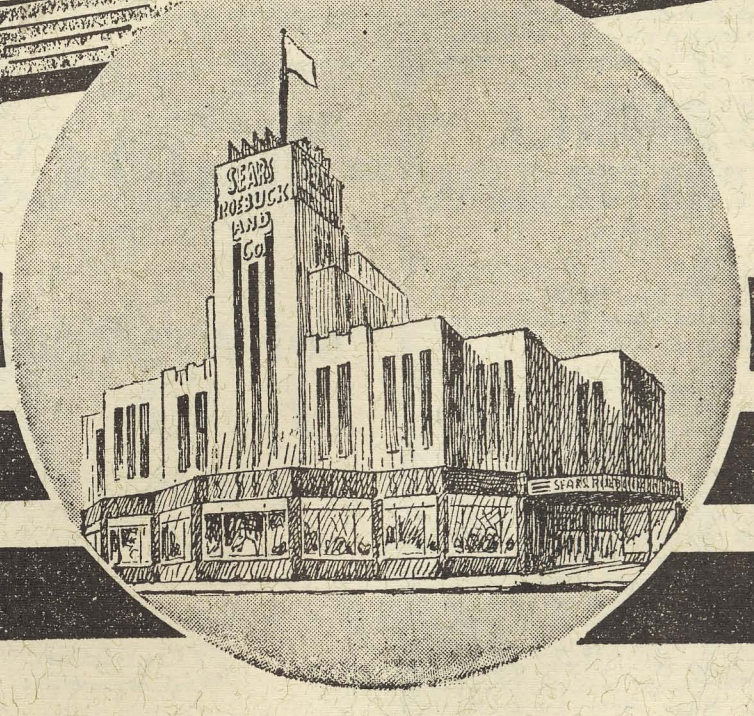
TODAY, Sears joins with thousands of men and women in saluting a noteworthy achievement . . . the opening of the Lincoln Tunnel. Completed after years of planning and effort . . . the result of the expenditure of large sums of money—it is now ready to take its place as a new traffic artery —as a service which any citizen can use to further his own convenience, to save his time . . . perhaps to make some frequent routine or duty a little easier, a little more economical to do.

The Lincoln Tunnel is ready today to serve you and all of us—to give us a better, faster and therefore cheaper way of travel from one place to another. Today it becomes a **local** institution of which we can be proud . . . the same as we are of our homes, our stores, our banks, our schools. In **transportation** it is now ready to render a service locally, similar in many respects to the **retailing** service which Sears has, for 52 years, made available to millions of American families in **every** state. Whether you make use of the transportation facilities of the Lincoln Tunnel or the merchandising facilities of Sears, you are making use of a **local** institution—planned, completed and operated solely for the purpose of serving **you** . . . to take care of **your** needs in the best, quickest and the most economical manner.

So today this company, this store, and all of its employees, pay tribute to the Lincoln Tunnel, newest of the many progressive developments which are now part of this community and of the State.

Season's Greetings

It is our sincere wish that you may have a very Merry Christmas and that the New Year of 1938 will be a Happy and a Prosperous one for you and for all of those dear to you.



SEARS, ROEBUCK and CO.

Hudson County's Largest Department Store

Hudson Blvd. at 32nd St. Union City