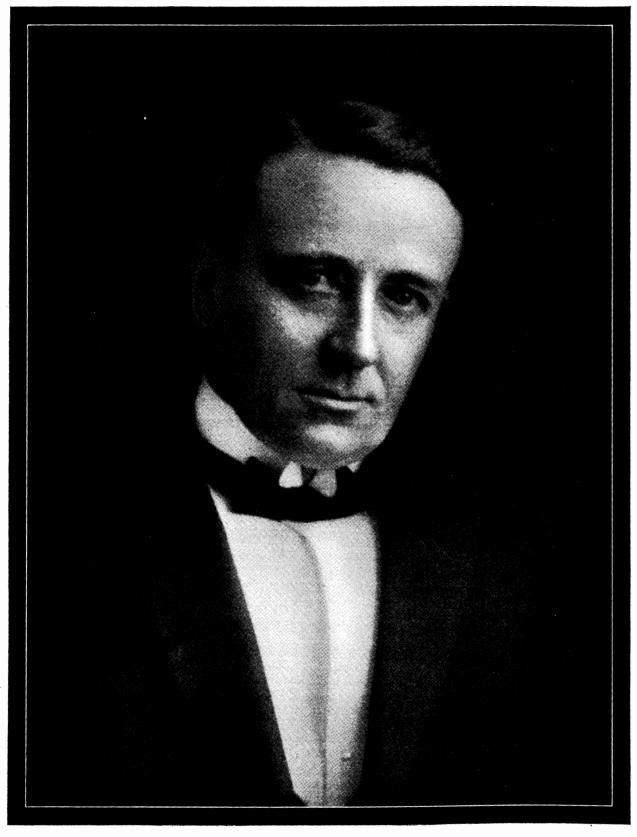
REPORT

OF THE

New Jersey Interstate Bridge and Tunnel Commission

1926



John C. McEnroe

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REPORT

OF THE

New Jersey Interstate Bridge and Tunnel Commission

TO THE

Senate and General Assembly of the State of New Jersey

THE HOLLAND TUNNEL

THEODORE BOETTGER, Chairman THOMAS J. S. BARLOW JOHN F. BOYLE ISAAC FERRIS

JOHN B. KATES, Vice-Chairman WELLER H. NOYES ROBERT S. SINCLAIR FRANK L. SUPLEE

E. MORGAN BARRADALE, Secretary ROBERT CAREY, Counsel OLE SINGSTAD, Chief Engineer



DATED JANUARY 2, 1926

MacCrellish & Quigley Co Printers Trenton, New Jersey

New Jersey Interstate Bridge and Tunnel Commission

ANNUAL REPORT

To the Honorable Senate and General Assembly of the State of New Jersey:

The New Jersey Interstate Bridge and Tunnel Commission respectfully submits its Annual Report for the year ending December 31, 1925, dealing with the construction of the Hudson River Vehicular Tunnel, now known at "The Holland Tunnel." The Commission is also charged with the responsibility of constructing the Delaware River Bridge from Camden to Philadelphia. Its activities with respect to the bridge will be accounted for in a report to be submitted by the Delaware River Bridge Joint Commission. Harmonious relations prevail between this Commission and those of New York and Pennsylvania. The Commission is extremely pleased to report the progress on these two great structures looking to their early completion.

The Commission reorganized March 10, 1925, at its offices in the Woolworth Building, New York City, with the re-election of Theodore Boettger, of Hackensack, as Chairman, and John B. Kates, of Collingswood, as Vice-Chairman, and the re-appointment of John C. McEnroe, of Newark, as Secretary. Hon. Robert Carey, of Jersey City, has continued to act as Counsel to the Commission.

The Commission held twenty-two stated meetings during the year, all of which were open to the public and were devoted exclusively to tunnel matters. In addition, the Commission has held two special meetings devoted exclusively to the consideration of the tolls problem confronting it with respect to the Delaware River Bridge.

The year 1925 has been marked by the completion of work of constructing the iron lining in the under-river tunnels, the completion of the New York approach sections, the practical completion of the concreting of the tunnel and the progress on the New Jersey approach section under Contract No. 6 let in December of last year. Sections of the tunnels can now be seen in a practically completed state, roadways paved, sidewalls tiled and light boxes installed, all of which justifies the expectation that the completed tunnel will not only be an important facility for traffic, but an exceedingly attractive one as well. During the year there were let eight contracts. These include: Contract No. 7, for the tile lining and interior finish of the tunnel; Contract No. 9, for transformers and oil switches; Contract No. 10, for the granite block tunnel roadway pavement; Contract No. 12, for the ventilation fans, motors and control; Contract No. 13, for the construction of the New York land and river ventilation buildings and the interior finish of the New York land and river ventilation shafts; Contract No. 14, for the construction of the New Jersey land and river ventilation buildings and the interior finish of the New Jersey land and river ventilation shafts; Contract No. 20, for the

power cables for carrying the power required for the operation of the tunnel; and Contract No. 24, for the pumping equipment.

Bids for these contracts were publicly advertised and publicly opened, as

follows:

La .		CONTRACT N	Vo. 7		
	L. Del Turco & Bros., Inc., Harrison, N. J.	Rodgers & Hagerty, Inc., 70 East 45th St., N. Y. City.	Dooley Stapleton Corp., 257 Adelphi St., Brooklyn.	Frederick Snare Corp., 114 Liberty St., N. Y. City.	Alexander & Reid Co., 355 West 36th St., N. Y. City.
Total of bid with 100% domestic tile,	\$909,180.45	\$1,219,725.75	\$1,233,831.35	\$1,254,502.50	\$1,375,030.40
75% domestic and 25% foreign, 50% domestic and	895,492.95	1,196,000.75	No bid	1,246,290.00	No bid
50% foreign,	881,805.45	1,172,275.75	No bid	1,238,077.50	No bid
75% foreign,	No bid	1,148,550.75	No bid	1,229,865.00	No bid
100% foreign,	. No bid	1,124,825.75	No bid	1,221,652.50	No bid
Overrun over Chief Eng	gineer's 1923 I	Estimate—\$128,241.	45.		

CONTRACT No. 9

Name and Address of Contractor	Amount of Bid
General Electric Company,	\$298,166.00
120 Broadway, New York City.	
Westinghouse Electric & Mfg. Co.,	310,220.00
150 Broadway, New York City.	
Underrun under Chief Engineer's 1923 Estimate—\$62,505.00	

CONTRACT No. 10	
Name and Address of Contractor	$\boldsymbol{Amount\ of\ Bid}$
W. J. Fitzgerald,	\$329,655.00
John Meehan & Son,	331,290.00
Booth & Flinn, Ltd.,	338,475.00
Poirior Contracting Co., Inc.,	353,330.00
Public Service Production Co.,	357,060.00
E. J. Flaherty Constr. Co.,	369,125.00
Overrun over Chief Engineer's 1923 Estimate—\$25,715.00	

CONTRACT No. 12

Name and Address of Contractor	Amount of Bid
B. F. Sturtevant Company,	\$571,631.00
Wagner Engineering Co., Inc.,	
Buffalo Forge Company,	
Green Fuel Economizer Co.,	776,975.00
Underrun under Chief Engineer's 1923 Estimate—\$119,833.00	
Contract No. 13	
Name and Address of Contractor	Amount of Bid
DeRiso Construction Company,	, , ,
D. C. Serber, Inc.,	1,291,130.00
George Colon & Co., Inc.,	
Emil Diebitsch, Inc.,	1,380,580.00
Thos. J. Waters Co.,	1,395,183.00
Fred Snare Corp.,	,
Lustig & Weil,	
Niewenhous Co., Inc., 16 East 43d Street, New York City.	1,544,890.00
John T. Brady & Co.,	1,738,056.00
Overrun over Chief Engineer's 1923 Estimate—\$500,635.00	
Contract No. 14	
Name and Address of Contractor	Amount of Bid
DeRiso Construction Co.,	•
G. DeKimpe, Inc., 30 Church Street, New York City.	1,587,331.00

6 NEW JERSEY INTERSTATE BRIDGE AND TO	JANAH COMMENT
The English Construction Co., Inc.,	_
Thomas J. Waters Co.,	
Overrun over Chief Engineer's 1923 Estimate—\$8	79,033.00.
Contract No. 20	
	Amount of Bid
Name and Address of Contractor Standard Underground Cable Co.,	\$128,670.00
Pittsburgh, Pennsylvania. James Sugden Company,	
17 East 42d Street, New York City.	
Grand Central Terminal, New York City.	
THE CHOOP NAW YORK VIIVA	
Fox Reynolds Company, Inc.,	
70 Flast 45th Street, New York City.	
Underrun under Chief Engineer's 1923 Estima	te—\$26,974.00.
Contract No. 2	
	A mount of Bid
Name and Address of Contractor Booth & Flinn, Ltd.,	\$37,700.00
Booth & Flinn, Ltd.,	
Maspeth, Long Island. Peerless Engr. Co.,	41 622 00
71 8th Avenue, New York City. Wagner Engr. Co., Inc.,	
Erickson Engr. Co., Inc., York City.	
Hart & Early Co., Inc.,	
John W. Hooley,	

64,200.00

70 East 45th Street, New York City.

81 East 125th Street, New York City.

Fox Reynolds Co., Inc.,

Underrun under Chief Engineer's 1923 Estimate—\$7,903.00.

A comparison of the bids on each of the above contracts will show the marked range between the low and high bids, which is evidential of the uncertainty to be met in estimating the cost in planning and conducting public works of this character. There are nine contracts yet to be let. The planning and preparation of these contracts is well under way, so that they can be awarded in time for construction work under them to commence on schedule. Barring interruption by unlooked for delays, the tunnel will be ready for operation early in the year 1927.

REAL ESTATE AND PLAZAS

During the course of the year, negotiations have been conducted and agreements reached with the New York Telephone Company, the Western Union Telegraph Company, and the Postal Telegraph Company, for the leasing of duct space in the low-tension ducts in the tunnel walls for the service of this important line of operation.

One of the most important steps in the progress of the year has been the satisfactory negotiation with the Delaware, Lackawanna and Western Railroad Company for the necessary lands and easements for the construction, maintenance and operation of the tunnel in the terminal yard properties of that company. A large number of important conferences were held during the course of the negotiations, and the Commission is gratified to report the successful negotiation upon a basis materially to the advantage of the State.

The property required for the needs of the plazas in New York City and Jersey City have now practically been acquired, with the exception of four parcels in New York City and sixteen parcels in Jersey City. Condemnation proceedings have been commenced and the right to actual possession acquired, so that no delay will be met with in the development of these plazas for tunnel purposes. The negotiations with the authorities of the City of Jersey City for the vacation of 11th Street, though not yet consummated, in all probability will be amicably adjusted to the satisfaction of all interested parties.

ORGANIZATION

The Commission regretfully recalls the sudden and unexpected death of Milton Harvey Freeman, its Chief Engineer, on March 24, 1925, and of John C. Mc-Enroe, its Secretary, on June 2, 1925. On April 7, 1925, the Commission named Ole Singstad, of Brooklyn, New York, as Chief Engineer, to fill the vacancy caused by the death of Mr. Freeman. Mr. Singstad had been Engineer of Designs under both Mr. Holland and Mr. Freeman. It was another evidence of the sterling qualities of Mr. Holland in forming an engineering organization so competent as to enable the Commissions to fill the vacancies caused by his death and of Mr. Freeman from the staff. On July 7th, the Commission named E. Morgan Barradale, of South Orange, New Jersey, as Secretary, to fill the vacancy caused by the death of Mr. McEnroe.

New Jersey Interstate Bridge and Tunnel Commission

MILTON HARVEY FREEMAN

The Commissions had not fully recovered from the shock of the loss of its first Chief Engineer, Clifford Milburn Holland, when it sustained a further blow in the sudden death of Milton Harvey Freeman, Chief Engineer to the Commissions, who died at his home at Valhalla, New York, on March 24, 1925, less than five months after his assumption of the heavy duties of Chief Engineer. Mr. Freeman had been with the tunnel project from the organization in July 1, 1919, and was recognized with the engineering profession as an unusual tunnel engineer. His indefatigability and sincerity of purpose were hidden behind a modesty which permitted but few to enjoy a complete realization of his sterling worth and high talents. It can be truly said that he gave himself completely to his professional work, and paid the great sacrifice through his sincerity of purpose. His loss was keenly felt by the Commissions and the staff, which had learned his real worth, his quiet and unassuming manner of accomplishing great results, and his high purpose. At a joint meeting with the New York State Bridge and Tunnel Commission, held on April 7, 1925, the following resolution was adopted:

Again the New York and the New Jersey Bridge and Tunnel Commissions meet in special session with a vacancy in the office of Chief Engineer. Milton H. Freeman, Chief Engineer to the Commissions, answered the final summons on Tuesday, March twenty-fourth, nineteen hundred and twenty-five, midway in the fifty-fifth year of an active, useful life. Appointed Chief Engineer December 1, 1924, to succeed the late Clifford M. Holland, he brought to the office eminent qualifications of education, trained judgment and wide practical experience. It may be said that he gave himself too unsparingly to the building of the Holland Tunnel. His service was intensive and untiring, his ways so quiet and unobtrusive, his words so considerate and his manner so courteous as to inspire respect and affection, making every member of our Commissions sensible to a personal loss and of the loss to the great undertaking in which we are engaged.

Resolved, That the foregoing be adopted and inscribed in the minutes of the New York and New Jersey Commissions as an appropriate tribute to the late Milton H. Freeman, and that an engrossed copy of this resolution be sent to Mrs. Freeman, with a suitable expression of our sincere sympathy.

JOHN C. McENROE

At its meeting on June 2, 1925, the Commission received the sad news of the death, that morning, of its Secretary, John C. McEnroe, of Newark, New Jersey. Mr. McEnroe had been at the office the day before attending to his duties, and with practically no hint of his impending end he died in the midst of a very active life. Mr. McEnroe had served the Commission as Secretary for a little more

than a year. He had come to the Commission with a high reputation for integrity and ability, having served his City and State in various capacities which demonstrated his ability and purpose. On the date of his death, the Commission adopted the following resolution, and adjourned out of respect to his memory:

It has pleased the all-wise power of Providence to visit its unknowable purpose again by removing from our midst John C. McEnroe, Secretary of the New Jersey Interstate Bridge and Tunnel Commission, and translate him to the greater life.

Mr. McEnroe served the Commission and the people of New Jersey in his present position since March, 1924. He had enjoyed the acquaint-ance and friendship of many men and women in public life, had served his native City as Deputy Commissioner of Public Safety, his State in the Department of Institutions and Agencies and finally through his connection with the Interstate Bridge and Tunnel Commission. In all his relations, both private and public, he earned the esteem of those with whom he served and the well earned commendation of those for whom he served. His capacity for endeavors and his sustained interest in his work wherever he found his interest, marked him among his fellowmen as a leader whom all enjoyed to follow. His ability in carrying on the work in which he was engaged for the Commission has left its impress and marked him as an upright, honest and capable public servant.

DELAWARE RIVER BRIDGE TOLLS

Reference to the 1924 Report of the Delaware River Bridge Joint Commission will show that the New Jersey Interstate Bridge and Tunnel Commission had taken the position that the collection of tolls on the Camden-Philadelphia Bridge rested upon a legal and moral obligation to the citizens and bondholders of the State of New Jersey for the amortization of the cost of the structure. In May, of 1925, the Pennsylvania Legislature adopted a statute providing for a Commission to operate the bridge, and defined its powers, declaring for a toll-free bridge, and took from its operating Commission the power to levy tolls. The New Jersey Interstate Bridge and Tunnel Commission immediately took steps to establish New Jersey's rights. It is the decision of the Commission to let no new contracts until the impasse now existing between the States has been closed to the satisfaction of the Commission.

With respect to the question of collecting tolls on the Delaware River Bridge, this Commission calls attention to the statutes under which it is now operating, and particularly to paragraph 8, of Chapter 69, of the Laws of 1919, which provides as follows:

8. The Interstate Bridge Commission, upon the completion of such bridge, is authorized and empowered to enter into agreements with the State of Pennsylvania, or its properly constituted agency or authority, to provide for the joint operation, maintenance and repair of such bridge,

for regulating its traffic and policing and protecting the same, for the fixing and collection of tolls and charges for the use of such bridge and for the regulation of such other matters as are incidental thereto, which agreements the said commission is authorized to alter, amend or repeal from time to time, upon agreement with the State of Pennsylvania, or its agency as aforesaid, as in the opinion of the commission may be proper.

Under existing statutes, this Commission must await the completion of the bridge before it has authority to enter into an agreement with the State of Pennsylvania for the joint operation, maintenance and repair of the bridge and for the sylvania for the joint operation, maintenance and repair of the bridge and for the fixing and collection of tolls. The Commission respectfully invites the attention of the Legislature to the necessity for authority to enter into such an agreement at

In the year 1923, revised estimates of the cost of the bridge and of the cost of the tunnel were submitted to the Legislature as the basis for the bond issue of 1924. Since that time, eleven important contracts have been let for the construction of the tunnel, which have developed an overrun of \$1,028,938.45, and twenty-two contracts have been let for the construction of the bridge which have developed two contracts have been let for the construction of the tunnel and five contracts overruns. There are still nine contracts to be let on the tunnel and five contracts on the bridge. Based on these overruns, there will be required for New Jersey's share for the completion of both projects the sum of \$2,500,000, and recommendation is made that this sum be made available at the very earliest moment, so that there may be no delay in the completion of these two most important structures, which will, upon their completion, become income producers for the State.

Respectfully submitted,

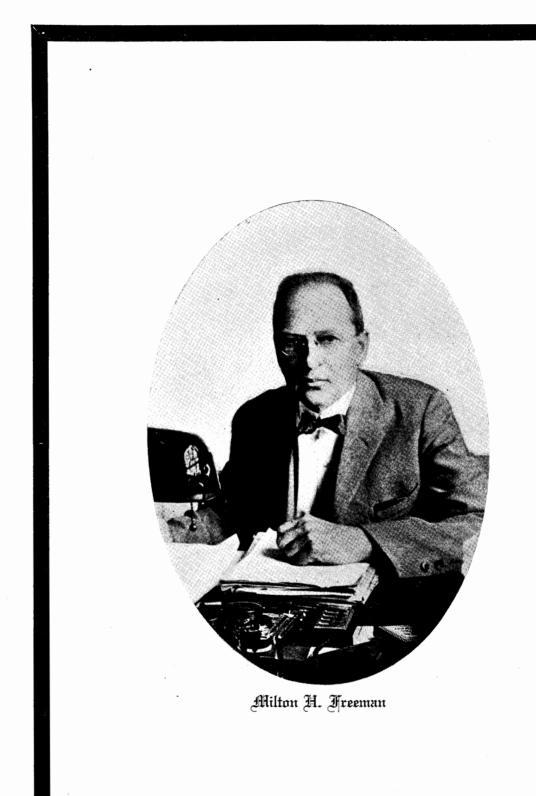
Holt. S. Similain

John Similain

John School

Market Grange

Mark



NEW YORK STATE BRIDGE AND TUNNEL COMMISSION

AND

NEW JERSEY INTERSTATE BRIDGE AND TUNNEL COMMISSION

REPORT OF CHIEF ENGINEER
DECEMBER 31, 1925

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December 31, 1925.

REPORT OF CHIEF ENGINEER

New York State Bridge and Tunnel Commission and New Jersey Interstate Bridge and Tunnel Commission:

GENTLEMEN—Submitted herewith is my report for the year 1925. Prior to March 24, 1925, the work of this year was under the direction of the late Milton H. Freeman. Chief Engineer of the Commissions.

The year 1925 was marked by the preparation and awarding of a large number of contracts, eight in all. These include the more important of the equipment and finish contracts, and were scheduled so that construction work under them could be started as soon as the progress under the earlier contracts would permit. The eight contracts involved the preparation of 347 contract drawings and the publishing of contracts and specifications comprising a total of 1252 pages of printed matter, all of which represents nearly twice the number of contract drawings and nearly 80 per cent of the printed matter contained in all previous construction contracts and extending over the preceding four years of tunnel construction. These contracts include tiling the tunnel walls, tunnel roadway pavement, ventilation fans and motors, electrical transformers and oil switches, tunnel power cables, pumping equipment, and the four buildings to house the ventilation equipment.

The work of constructing and equipping the Holland Tunnel is being done under twenty-three contracts. Six of them, namely, those comprising the tunnel structure proper, with the under ground portions of the approaches, had been let and prosecuted prior to 1925, one of which, Contract No. 1, for the land shafts, New York, had been fully completed and accepted by the Commissions and the final estimate approved.

Two of these six contracts were let in 1924, the one for the New Jersey approach from the westerly limit of the tube construction to the points where the tunnel meets the street surface; and the other for the New York approach from the portals to the easterly limits of the tunnel at its junction with the street grades. The outstanding feature of tunnel construction during 1924 was shield driving. With the exception of a comparatively short stretch in the north tunnel west, New Jersey, the bores of both tunnels were practically completed from their easterly limits at the land shafts, New York, to their westerly limits beyond the land shafts in New Jersey. The two shields in the north tunnel, one driven westward from New York and the other eastward from New Jersey, had been brought together in November. Those in the south tunnel were within 2.2 feet of each other on January 1, 1925. These were brought together and the compressed air was discontinued in the south tunnel on February 22, 1925. The last shove of a shield in any section of the tunnel occurred in the north tunnel west, New Jersey, on March 6, 1925, and compressed air was removed from this section on March 23, 1925.

During the year 1925, in addition to the preparation and awarding of contract work previously outlined, construction work on existing contracts continued and was begun on most of the contracts let this year.

These construction activities included completing, except for minor details, the underriver tunnel contracts, Nos. 3 and 4. The closer rings were placed at the junctions of the shields, most of the special connecting rings between the tunnels and the shafts were placed, and the concrete tunnel lining and interior construction, which had been started in 1924, were carried practically to completion. The placing of concrete necessitated the exercise of exceptional care and skill because of the smooth finish required for all air passages, the occurrence of niches of various sizes, manholes and other interior details which both complicate and interfere with the placing of forms. The small clearances, existing between the castiron flanges and the finished surfaces of the concrete lining, present further difficulties in

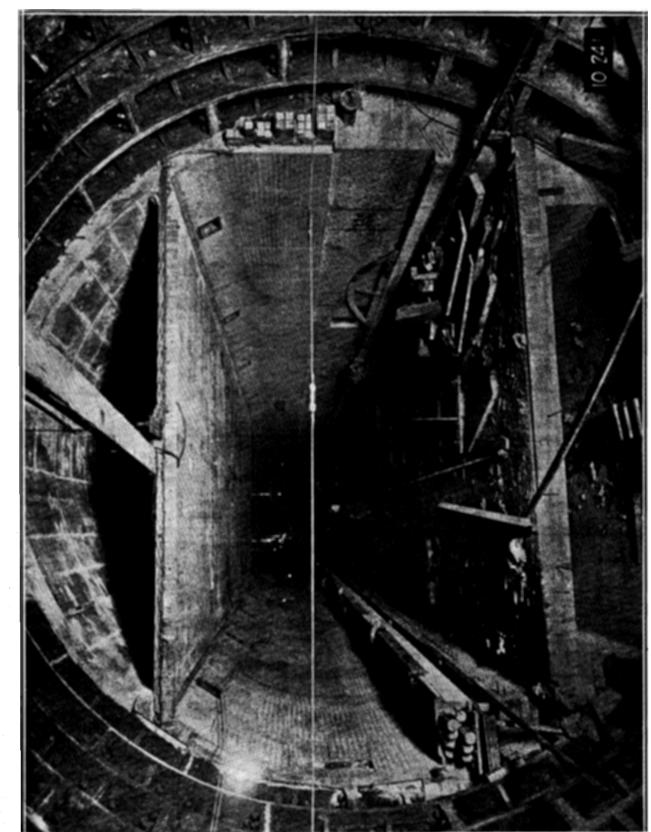
The construction work on the New York approaches, Contracts Nos. 5 and 5-A, including the completion of the tunnel structure and the restoration of numerous surface and subsurface structures, was carried to a point where there now remain only a few minor items

Early in the year, construction work was started under Contract No. 6. This contract is for the tunnel approaches, the foundations for the land ventilation building and the air duct construction between this building and the land shafts in New Jersey. By a coincidence, the use of compressed air required for the sinking of the thirty foundation caissons for the land ventilation building, New Jersey was started on the same day that the compressed air was removed from the last tunnel section, March 23, 1925. Compressed air has been used, with few interruptions, for this work throughout the year. The work under this contract carried both tunnels over and in close proximity to the tunnel structure of the Hudson & Manhattan R. R. in the Erie and D., L. & W. railroad yards. Special precautions had to be taken in prosecuting the work at these points so as to avoid damage to the Hudson & Manhattan tunnels, and in carrying out this work the full co-operation of the Chief Engineer of the Hudson & Manhattan R. R. Company has been accorded us.

The work under Contracts Nos. 3, 4, 5 and 5-A will be completed early in 1926, and work is now in progress on the preparation of the final estimates for all of these contracts. The construction work under Contract No. 6 is more than half done, and will be completed during the summer of 1926.

Work has been in progress on all of the eight contracts let this year, except the last two, No. 14, Ventilation Buildings, New Jersey, and No. 20, Tunnel Power Cables, which were awarded on December 22, 1925. Work under Contract No. 7, Tile and Tunnel Finish, has proceeded to a point where about 44% of the tile has been manufactured, and tile has been placed on the walls of the north tunnel from the portal almost to the river shaft, New York, and in the south tunnel from the portal half way to the land shaft, New York. Under Contract No. 10, Tunnel Roadway Pavement, work has been progressing rapidly, nearly one-half of the tunnel roadway has been paved with granite block, and a considerable quantity of granite block is on hand and will be laid as soon as the work of tunnel construction permits.

Construction plans of steel and concrete details and the checking of contractors' shop drawings have been in progress during the year for Contracts Nos. 3 to 7, inclusive, 9, 12 and 13. Work has been in progress on the preparation of contract plans and specifications for the remaining nine contracts, most of which will be let during the first half of 1926. Maps and descriptions were completed for lands still needed for tunnel plazas.



Studies and investigations have been continued on the architectural, mechanical and electrical features of the tunnel, protective coatings for steel, earth pressure on the tunnel lining and caissons, including physical properties of silt, and other subjects which aid in explaining tunnel movement phenomena.

The Contractor's plant and equipment in Canal Street, Spring Street, on the land shafts and on Pier 35, New York, were removed; the power house dismantled and the building razed, marking the completion of the work for which they had been installed. Nearly all the temporary clay blanket over the tunnels, 174,626 cubic yards, was removed from the river channel to conform with the requirements of the permit from the Secretary of War.

The lease from the City of New York for Pier 35 was terminated and a new lease was entered into for a 20-foot roadway over this pier to provide access, for construction purposes, to the river shaft. An agreement was negotiated with the Delaware, Lackawanna & Western Railroad Company for permanent and temporary rights-of-way in the Company's yards in Jersey City. Agreements were entered into with the Erie Railroad Company modifying the provisions for the support of warehouse loads on the air duct structure at the land shafts in the Erie Railroad yard; to provide four temporary pile clusters to serve as a protection for the New Jersey river shafts during the construction of the Erie Railroad pier around the shafts and over the tunnel and a lease was negotiated with the Erie Railroad Company for the rental of plant site in the Erie Railroad yard required for the prosecution of the construction of the ventilation buildings, New Jersey, under Contract No. 14.

Negotiations have been in progress with New York City and Jersey City relative to adjustment of street grades and other matters related to the paving of the plazas, and with the power companies on both sides of the river for the supply of electric power to operate the ventilation and other equipment of the tunnel.

The co-operation of the Fine Arts Commission of the State of New York was obtained and the final plans and architectural treatment of the ventilation buildings, New York, received the approval of that Commission.

Plans of the Erie Railroad Company for their new pier to be constructed over the tunnel and around the river shafts, New Jersey, were approved in accordance with the agreement between the Commissions and that Company. Work has been in progress on the construction by the railroad company of this pier and special precautions have been required to be taken by the Company to avoid damage to and undue displacement of the tunnel in the silt. This work has been carried on with the fullest co-operation between the Chief Engineer of the Erie Railroad Company and your Chief Engineer.

SCHEDULE OF CONSTRUCTION AND EQUIPMENT CONTRACTS

CONTRACTS LET PRIOR TO 1925

		Time	
Contract	Date of Delivery	in Mos.	Contractor's Bid
No. 1. New York Land Shafts,	Oct. 7, 1920	12	\$650,802.50
No. 3. New York River Tunnel and Shafts,	April 11, 1922	36	7,199,623.00
No. 4. New Jersey River and Land Tunnels and Shafts,	April 11, 1922	36	12,132,100.50
No. 5. New York Approach—Steel Concrete Section,	July 28, 1923	24	3,467,413.50
No. 5A. New York Approach—Open Section,	Dec. 13, 1924	10	301,312.25
No. 6. New Jersey Approach,	Dec. 17, 1924	18	2,582,969.25

CONTRACTS LET DURING 1925

Time

Contract		•	in Mos .		tractor's B id
	Mav	6, 1925	16	\$88	31,805.45
Tile and Tunnel Filish,	July	31, 1925	11	29	98,166.00
Furnishing Power Transformers and On Switches,			14	32	29,655.00
Tunnel Roadway Paving,	-	26, 1925	$14\frac{1}{2}$	- 52	71,631.00
Fans, Motors, Transmissions and Control,					
Ventilation Buildings and Interior Share Constitution	Oct.	24, 1925	14	1,2	77,953.00
York, Prildings and Interior Shaft Construction, New					
Ventilation Buildings and Interior Share Communication	Dec.	29, 1925	12	1,5	77,953.00
Jersey, Cobles	*Dec.	22, 1925	10	1	28,670.00
Tunnel Power Caples,	Oct.	26, 1925	6		37,700.00
Pumping Equipment,					
CONTRACTS REMAINING TO BE I	ET				
CONTRACTS TEMMENTO		Control	ict	Con	ntract
		to be	e	tc	o be
Contract		Deliver	red	Con	npleted
		No date	set	No d	late set
Architectural Work at Entrance, Exit and Plazas, New York,	,			No o	date set
Architectural Work at Entrance, Exit and Plazas, New Jersey	,			Jan.	15, 1927
Emergency Equipment Buildings, New York,			*	Feb.	1, 1927
Emergency Equipment Buildings, New Jersey,	P1aza	jane	,		
Lights, Traffic Signals, Supervising System, Tunner and	1 Ittzu	May 15	. 1926	Jan.	15, 1927
Wiring, etc.,			,	Dec.	15, 1926
Emergency Trucks,		5	,	Nov.	15, 1926
Plaza Pavement, New York,			,	Dec.	15, 1926
Fire Extinguishers and Miscellaneous Equipment,			,	Nov.	15, 1926
Plaza Pavement, New Jersey,			,		-
	Contract Architectural Work at Entrance, Exit and Plazas, New York, Architectural Work at Entrance, Exit and Plazas, New Jersey Emergency Equipment Buildings, New York,	Tile and Tunnel Finish, May Furnishing Power Transformers and Oil Switches, July Tunnel Roadway Paving, June Fans, Motors, Transmissions and Control, Sept. Ventilation Buildings and Interior Shaft Construction, New York, Oct. Ventilation Buildings and Interior Shaft Construction, New Jersey, Dec. Tunnel Power Cables, *Dec. Pumping Equipment, Oct. Contract Architectural Work at Entrance, Exit and Plazas, New York, Architectural Work at Entrance, Exit and Plazas, New Jersey, Emergency Equipment Buildings, New York, Emergency Equipment Buildings, New Jersey, Lights, Traffic Signals, Supervising System, Tunnel and Plaza Wiring, etc., Emergency Trucks, Plaza Pavement, New York, Fire Extinguishers and Miscellaneous Equipment,	Tile and Tunnel Finish,	Tile and Tunnel Finish, May 6, 1925 16 Furnishing Power Transformers and Oil Switches, July 31, 1925 11 Tunnel Roadway Paving, June 4, 1925 14 Fans, Motors, Transmissions and Control, Sept. 26, 1925 14½ Ventilation Buildings and Interior Shaft Construction, New York, Oct. 24, 1925 14 Ventilation Buildings and Interior Shaft Construction, New Jersey, Dec. 29, 1925 12 Tunnel Power Cables, Sept. 26, 1925 10 Oct. 24, 1925 16 Contract Dec. 29, 1925 12 Tunnel Power Cables, Sept. 26, 1925 10 Oct. 26, 1925 6 Contract Contract Contract to be Delivered Architectural Work at Entrance, Exit and Plazas, New York, No date set Architectural Work at Entrance, Exit and Plazas, New Jersey, No date set No date set Emergency Equipment Buildings, New York, May 15, 1926 Emergency Equipment Buildings, New Jersey, June 1, 1926 Lights, Traffic Signals, Supervising System, Tunnel and Plaza Wiring, etc., June 15, 1926 Emergency Trucks, April 1, 1926 Emergency Entringuishers and Miscellaneous Equipment, Aug. 15, 1926 Emergency Entringuishers and Miscellaneous Equipment, Aug. 15, 1926	Tile and Tunnel Finish, May 6, 1925 16 \$88 Furnishing Power Transformers and Oil Switches, July 31, 1925 11 22 Tunnel Roadway Paving, June 4, 1925 14 3. Fans, Motors, Transmissions and Control, Sept. 26, 1925 14½ 5. Ventilation Buildings and Interior Shaft Construction, New York, Oct. 24, 1925 14 1,2 Ventilation Buildings and Interior Shaft Construction, New York, Oct. 24, 1925 14 1,2 Ventilation Buildings and Interior Shaft Construction, New Jersey, *Dec. 22, 1925 10 1 Pumping Equipment, Oct. 26, 1925 6 **Contract** *

II—CONSTRUCTION PROGRESS

Progress of construction is described in detail under the different contracts.

CONTRACTS Nos. 3 and 4

Contractor,	Booth	& Flinn, Limited
Contractor,		April 11, 1922 Three Years 3. Contract No. 4. 0 \$12,132,100.50
Date of Contracts,		April 11 1922
- A D 11 C C Lucata		. 110111 11,
Contract Time,		Tillee Tears
	Contract No. 3.	Contract No. 4.
Contract Bid Price,	\$7,199,623.00	\$12,132,100.50
Contract Bid Price plus estimated over-run,	7,649,623.00	
Estimated Value of Contract to date,	7,432,795.90	11,935,532.55

TUNNELING-

The shield driving in the portions of the tunnels to be built under Contract No. 3 was completed during 1924, but for reasons of convenience the New York shields were driven over the dividing line between the two contracts and the junctions of the New York and New Jersey shields were made within the limits of Contract No. 4. In the North Tunnel the last shove was made on December 9th, 1924, the compressed air was removed on

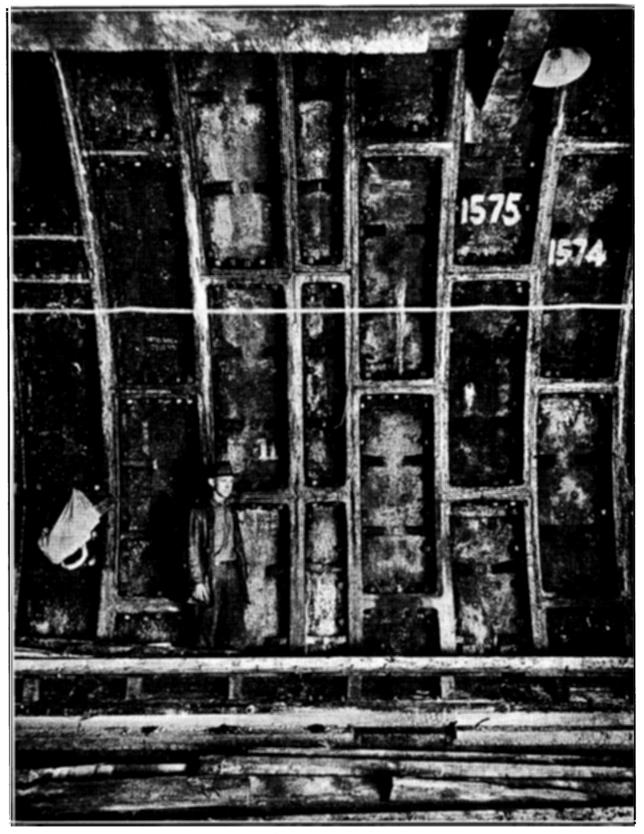
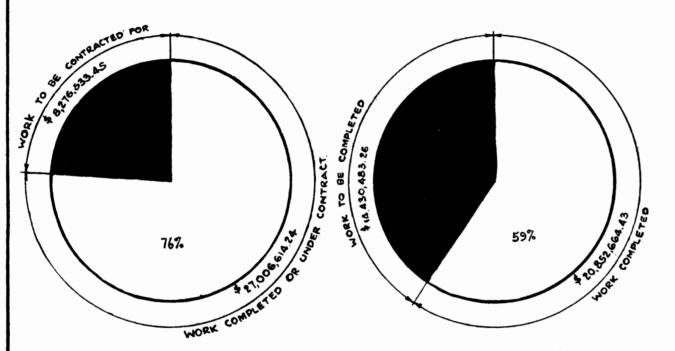


PLATE No. 2-Closer Ring at Junction of Shields, North Tunnel.

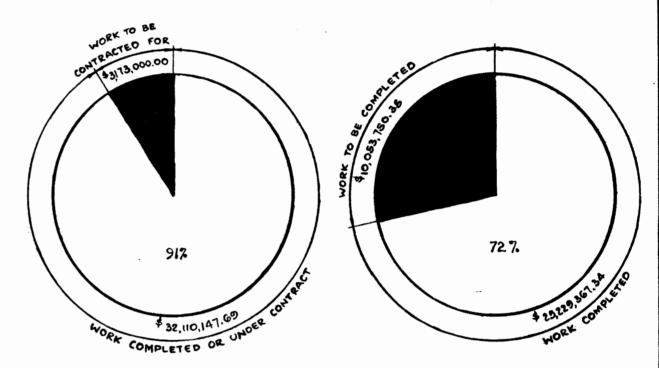
^{*} Date awarded—not yet delivered.

PLATE Nº3

THE HOLLAND TUNNEL CHART SHOWING CONSTRUCTION PROGRESS DURING 1925







STATUS AS OF DECEMBER 31, 1925.

			Nº OF CONTRACTS	AMOUNT
CONTRACTS	AWARDED	ARIOR. TO JAN. 1, 1925.	6	^{\$} 27,006,614.24
•	PI.	DURING YEAR 1925.	8	5,103,533.45
•	YET TO	BE AWARDED	9	3,173,000.00
•		TOTAL	23	\$35,283,147,69
CONTRACTS	COMPLETED	& FINAL ESTIMATE APPROVED	TO DATE	\$6431952 4

DECEMBER 31,1925.

January 3d, 1925, and the last regular cast-iron ring was erected on January 27th. In the South Tunnel the last shove was made on January 10th, 1925, the compressed air was removed on February 22d and the last regular ring was erected on February 28th. The two shields which met in each tunnel were dismantled, the outside cylindrical portions or "Skins" being left in place and the cast-iron lining erected inside them. The narrow space left between the last two rings erected in each tunnel was closed in the North Tunnel on June 30th, by means of a special cast-iron ring, where the space was considerable, and on or about March 15th, by special wedge shaped steel plates in the South Tunnel where the space was smaller.

In Contract No. 4 tunneling was completed in 1924, except for the North Tunnel West, which had been advanced about 610 feet from the North Land Shaft, with 172 feet still to be driven. The last shove in the North Tunnel West was made on March 6th, 1925. The nature of the material through which this last tunnel was progressing was such that it slowed down the rate of driving considerably. This tunnel shield passed diagonally under the 8-foot steel sewer in the Erie yards on the prolongation of Twelfth Street. The supporting material of this sewer consisted of stone fill, which had apparently been dumped here for the purpose. The large stones comprising this fill extended down for a depth of about 15 feet, below which was a 5-foot stratum of silt overlying fine running sand. The top of the heading was so close to the surface of the ground at this point that none but the lowest air pressure could be used. This made it impossible to dry out the sand in the bottom. The air escaped freely through the spaces between the stones above, so that an abnormally large air consumption was unavoidable. The shoving of the shield pushed stones up against the bottom of the sewer, heaving its invert as much as three feet in some places and allowing the water to pour into the tunnel. The low pressure air, gas and water lines under which the shield passed had to be by-passed on account of the heaving of the ground.

In spite of these obstacles the work was finished successfully and the tunnel built close to line and grade. Before taking the compressed air from the heading the Contractor constructed a sump of pea gravel under the shield, with the idea that this sump would help him in draining the ground for the section of the North Tunnel to the west of this work and included in Contract No. 6. Concrete cut-off walls were built under the north and south lower quarters of the cast-iron lining with a view to expediting the excavation for the North Tunnel under Contract No. 6.

SUMMARY OF PROGRESS IN NORTH TUNNEL WEST-NEW JERSEY

				2101.		reei	
			Time	Work	Prog.	Work	
	Station	Date	Days	Days	Feet	Day	
Shield erection begun,		7/21/24					
Shield erection completed,		9/2/24	43	36			
Compressed air applied,		9/2/24					
Removal of west bulkhead of land shaft begun,		9/2/24					
Removal of west bulkhead completed,		9/9/24	7	6			
Shield advanced excavation begun,	24/24.9	9/10/24	1	1			
Iron erection begun,	24/28.0	9/11/24	1	1			
Iron erection completed,	16/42.5	3/5/25	175	145	785.5	6.7	
Shield at end,	16/29.4	3/6/25			795.5	6.8	
Compressed air removed,	• • • • • • • • • • • • • • • • • • • •	3/23/25	202	168			

Materials encountered were Hudson River silt, sand, gravel, clay, wooden piles and boulders.

CONCRETING TUNNEL LINING.

The conspicuous work of 1925 was lining the tunnel with concrete. Therefore this feature will receive more detailed treatment than in last year's report.

At the first of the year, under Contract No. 3, the concrete lining of the tunnel between the Land Shafts and the River Shafts, New York, was about 85% completed in the North Tunnel and 60% in the South Tunnel. No concreting had been done west of the River Shaft. Under Contract No. 4, the lining was begun in 1924 in the South Tunnel West and in the River Tunnels between the Land and River Shafts, New Jersey.

During 1925, under Contract No. 3, the concrete lining was completed except for a few tunnel rings at the River Sump and River Shaft, New York. High and low tension electric ducts were also placed. The tunnel was cleaned in preparation for the work of tile setting under Contract No. 7.

Under Contract No. 3, immediately following the lowering of the air pressure to normal in the North Tunnel, the demolishing of the concrete bulkhead and the removal of the air locks and equipment was begun. The corresponding bulkhead in the South Tunnel was removed later. The work of concreting was started in the North Tunnel at the New York River Shaft and proceeded westward, while simultaneously similar work was begun near the middle of the river and carried eastward. This concreting was in the portion of the tunnel below the sidewalk level.

Upon the completion of this portion of the lining in the North Tunnel, the forms used were transferred to the South Tunnel and the concreting accelerated by increasing the form length from 60 feet to 75 feet. Searching out and stopping leaks in the concrete, begun in the spring, had to be discontinued in the warmer months because of the water of condensation in the tunnel. This moisture, condensing upon concrete and exposed metal interfered with locating leaks as well as painting of metal surfaces. Resumption of this activity in the fall, however, permitted the Contractor to finish 1,000 feet of this tunnel ready for tile setting by the end of October last.

Under Contract No. 4, concreting in the South Tunnel West was begun at the western end and proceeded easterly toward the Land Shaft. Next the North Tunnel East, between the Land and River Shafts, was prepared for concreting. This last concrete work was started just east of the air lock bulkhead used for driving the North Tunnel West and then in place. The work in both North and South Tunnels East progressed from the Land Shafts eastward to the River Shafts, thus permitting the moving of the forms, except those for the ceiling slab, toward the mixer at the river shafts while transporting the concrete by an elevated trackway. Meanwhile forms were started at the middle of the river and progressed westward. The entire tunnel, under Contracts Nos. 3 and 4, has been lined with concrete except for a few rings at the west end of the South Tunnel West, New Jersey, and at the tunnels' junctions with the shafts, to permit the erection of special connecting rings and for joining the work more advantageously with that of future contracts. There also remains to be poured the concrete in approximately 140 feet of the roadway ceiling slab in various parts of the tunnels west of the River Shafts, New Jersey.

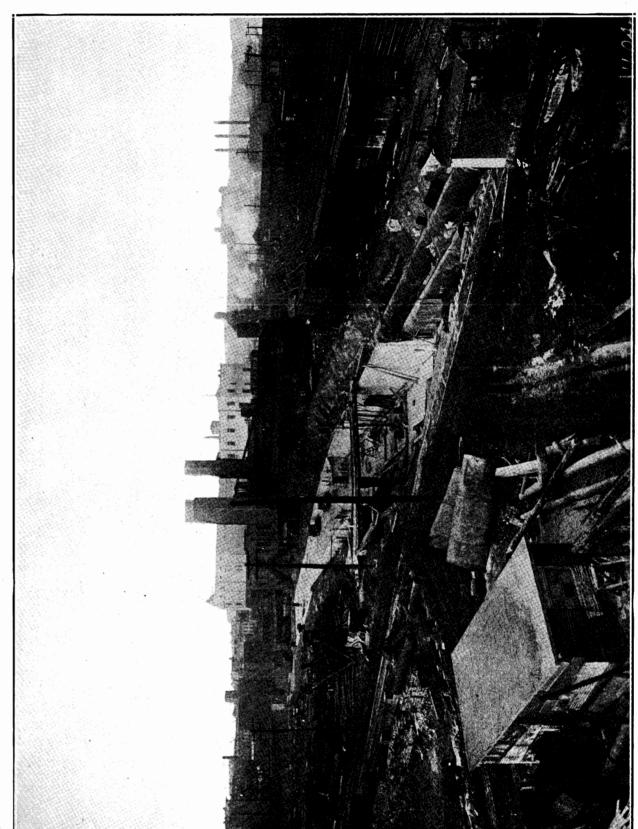


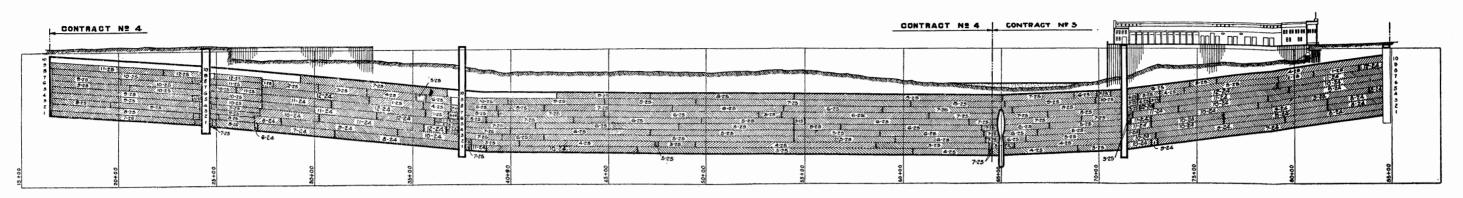
PLATE No. 4—General View of Operations West of Portal of North Tunnel, New Jersey.

PLATE N

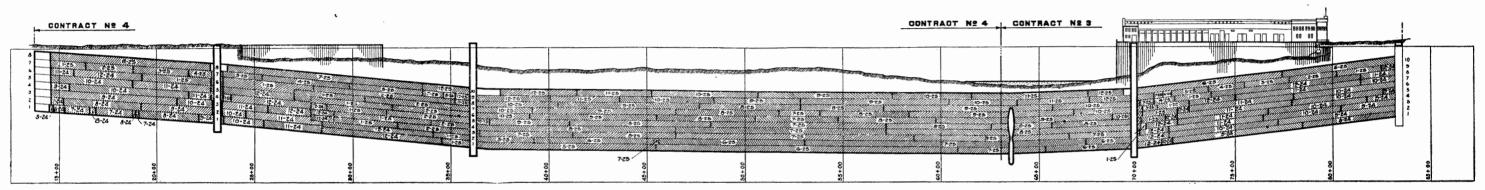
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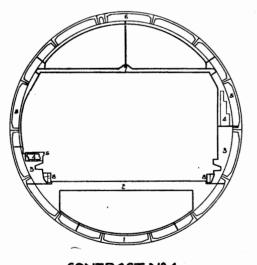
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NORTH TUNNEL



SOUTH TUNNEL



N

R

CONTRACT Nº 4
CONCRETING SCHEDULE

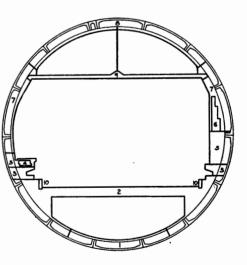
This method of Construction was used up to December 1924 after which the method used for Contract Nº3 was adopted THE HOLLAND TUNNEL

CONTRACTS Nos 3 and 4

CONCRETE TUNNEL LINING

PROGRESS PROFILES

DECEMBER 31, 1925



CONTRACT Nº 3
CONCRETING SCHEDULE

NEW YORK STATE
BRIDGE & TUNNEL COMMISSION
NEW JERSEY INTERSTATE
BRIDGE & TUNNEL COMMISSION

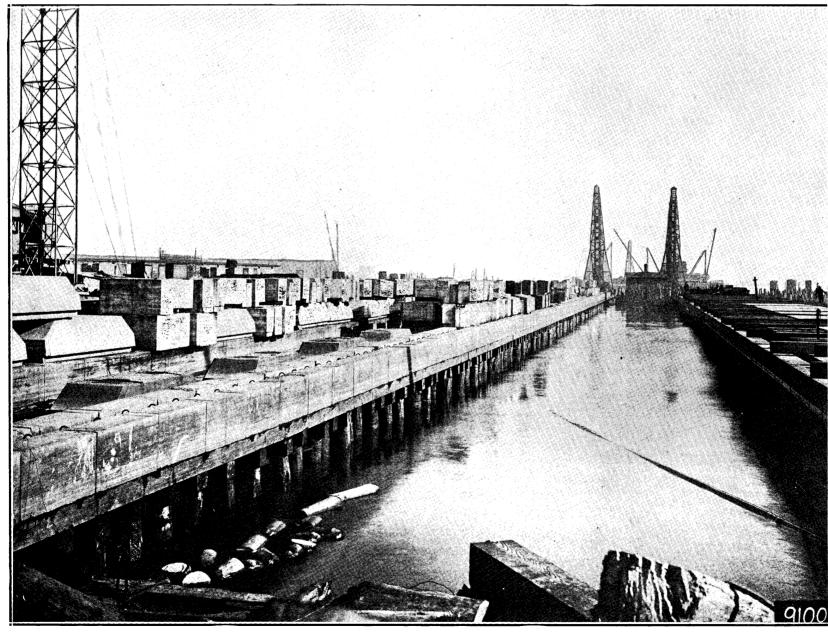


PLATE No. 6—New Erie Railroad Pier, New Jersey. Looking East from Bulkhead.

Throughout the tunnel the iron was cleaned and caulked and made water tight, preparatory to concreting the lining. The placing of concrete, which was begun in 1924, was continued during 1925 with greater activity, as the Contractor was able to improve his organization and methods from his previous year's experience.

The arched portion of the tunnel, besides the usual difficulties of concreting as experienced in all tunnels, was particularly subject to most of the complications heretofore mentioned, and an attempt was therefore made to deposit this portion of the concrete lining, and later the ceiling slab, by blowing it into place with compressed air, but due principally to the scant clearances, this method did not prove satisfactory and hand shoveling was resumed. In the case of the ceiling slab the Contractor abandoned the method of blowing, because the general delays incidental to this method more than offset the speed of actual depositing.

MIXING AND TRANSPORTING-

The mixing plants were constructed in the river shaft caissons with timber bins for storage of aggregate placed above them. The cement storage was on the top of the shafts, convenient to barge shipment and the cement was conducted to the loading hoppers through pipes into the tops of which the bags were emptied. A track high enough to be out of the way of the progress of all forms except the arch form was hung from the top of the tunnel iron, over which elevated railway the concrete was delivered to the different parts of the tunnel. This railway was taken down after serving the arch form and concrete for the ceiling was delivered on a track laid on the completed roadway of the tunnel, and raised to the ceiling slab by means of an elevator at the point of deposit.

Specially designed collapsible concrete forms, 60 feet in length, carried on a movable steel frame, were employed in this work. There were five types of forms for the different parts of the lining.

Plate No. 5 will assist in what follows.

The procedure of concreting consisted of nine distinct steps, beginning, first, with the pouring of the invert concrete in the lower air duct. This was done without the use of a form. Second, Form No. 1 served from this point for the roadway slab, and the sides to the bottom of the expansion chambers. The third step, for which a detached portion of the No. 2 Form was used, brought the concrete to the high tension duct bench on the one side and to the nosing level on the opposite side. The fourth stage of the procedure consisted of laying the high tension ducts below the sidewalk level. Fifth, the No. 2 Form was employed to concrete the sidewalk on one side and the low tension duct bench on the opposite side of the roadway. The sixth stage comprised laying the low tension ducts and pouring concrete behind them. The seventh stage was carried on by Form No. 3, for side walls to the top of the ceiling slab level. Eighth, Form No. 4 serves for the arch concreting at the top. The ninth and last stage was the pouring of the ceiling slab for which Form No. 5 was put in place.

Subsequent to lining the tunnel with concrete the granite curb was laid and the space behind it concreted. Approximately 24,070 lineal feet of granite curb have been set, about 5,850 lineal feet still remaining to be placed.

Six days were required for the setting of the concrete in the ceiling slab before drawing the forms. In order to compensate for the resulting delay, the ceiling forms were lengthened from 60 to 120 feet.

MIDRIVER SUMP-

At the beginning of the year excavation for the sump had been practically completed. The concrete invert, sidewalls and pump chamber floor were placed. The cast-iron for the arch was erected and grouted, and also the special cast-steel taper ring at each end which joins the sump iron to the tunnel iron. A special ring at each end joins the cast-steel taper ring to the straight cast-iron sump rings. A certain amount of caulking and the lining of the arch with concrete remains to be done.

Just before the compressed air was removed from the North Tunnel, a temporary concrete bulkhead was built at the north end of the sump, sealing this sump opening. Compressed air was removed from the sump when taken off the South Tunnel. The concreting of the sump and pump chamber walls and bench had been completed by this time and the straight cast-iron roof rings of the pump chamber had been erected. A temporary water-proof seal was placed between the sump iron and the tunnel iron, so that compressed air could be removed before the special rings were made and placed.

LAND SHAFTS, NEW YORK-

Between the first of August and the latter part of October the roofs of the land shafts, New York, were completed.

REMOVAL OF CONTRACTOR'S PLANT, CONTRACT No. 3-

Early in the year the overhead gantries in Spring and Canal Streets, New York, and the Contractor's equipment except the concrete mixers in the River Shaft, New York, were removed from the tunnel and from the top of the land shafts and the cages and head frames are now being removed from the River Shafts. The power-house on the Canal Street park site was dismantled, the building razed, concrete foundation removed, the sidewalks and roadway restored, and the Canal Street park graded. This included the bypassing of conduit, water and gas lines and the restoration of street surface. The Contractor removed his materials and equipment from Pier No. 35 and the pier was turned over to the City, the Contractor retaining the use of a portion of the west end and a 20-foot strip on the north side from West Street to the west end of the pier.

TEMPORARY CLAY BLANKET-

On August 19 dredging to remove the temporary clay blanket over the tunnels began, and by November 14 a total of 174,626 cubic yards had been removed toward bringing the river bottom in the 2,000-foot channel to the depth required by the War Department. Material dumped into the slip between Piers 34 and 35 was left in place by arrangement with the Department of Docks of the City of New York, as the City expects to build the new pier on this site during 1926.

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Plate No. 7

TABLE OF DECOMPRESSIONS AT VARIOUS PRESSURES AND CASES OF COMPRESSED AIR ILLNESS (BENDS) UP TO DECEMBER 31, 1925

	Contr		1 (NEW You	RK)		CONTRACT	r No. 3 (Na	EW YORK)	Complete	D	c	ONTRACT]	No. 4 (New	JERSEY)	COMPLETE	•					Compl	ETED					CONTRACT NO. 6			or No. 6				
BESSURE LBS. PER Q. INCH	(NORTH) SHAFT C		(SOUTH) SHAFT C		NORTE 1		SOUTH T		SHAFT C			NORTH LAND SOUTH LAND SHAFT CAISSON				RIVER AISSON	SOUTH RIVER NORTH SOUTH NORTH SOUTH SHAFT CAISSON TUNNEL EAST TUNNEL EAST TUNNEL WEST TUNNEL WEST												Tot Compl.		FOUNDATION CAIBBONB		GRAND TOTAL	
	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions		Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions	Cases of bends	Decom- pressions		Decom- pressions			
	Note 1	No. 1	Note 1		Note 1		Note 1		Note 1	No. 2	Note		Note !		Note N	To. 2	Note:	No. 2	Note	No. 1	Note	No. 1	Note 1	No. 1	Note 1	No. 1			Note	No. 2		-		
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and concrete for the foundation and basement of the Ventilation Building on Washington



Erie Pier-

On the Jersey side, Piers Nos. 8 and 9 of the Erie Railroad were demolished during the summer and dredging for the new Erie pier completed. On August 13th the driving of piles for the new pier over the North and South tunnels was begun. Timber piles 85 to 110 feet in length are being driven closely together from the river bulkhead to the pierhead line in three groups, one group north of the North Tunnel, one between the two tunnels and the third south of the South Tunnel. The total number of piles required is 8,686, of which 65% have been driven to date. Daily surveys and close inspection accompany the driving of these piles to observe the effect upon the tunnels. As the piles drop of their own weight through the silt to the spring line of the tunnel or below it, the chance of driving a pile against the outside of the tunnel is remote. But there has been observed some vertical movement of the tunnel together with some lateral movement. By careful control of the order of driving in the three different groups, the lateral motion of the tunnel has been kept within two inches. During the pile driving the tunnel rises for a length extending back of the pile driver about half-way to the bulkhead, and then settles gradually. The maximum rise has not exceeded four and one-half inches to date, and subsequent settlement has reduced this amount to about two and one-half inches. The removal of the old piers and construction of the new is being done by contractors for the Erie Railroad Company.

The demolition of the working platform constructed by the Contractor for Contract No. 4, in 1922, around the site of the river shafts, was begun in November and has been completed so as to permit the construction of the new pier about the river shafts.

CONTRACT No. 5

Contractor	Rodgers & Hagerty, Inc.
Date of Contract	July 17, 1923
Date of Delivery of Contract	July 28, 1923
Contract Time	Two Years
Contract Bid Price	\$3,467,413.50
Estimated Value of Contract to Date	\$3,294,785.57

The work under this contract included the construction of two tunnels, one beginning at the shaft in Canal Street, and extending eastward under Canal Street to the east side of Hudson Street, and the other beginning at the shaft in Spring Street and extending eastward in Spring Street to Hudson Street, thence curving southward to the north side of Dominick Street. The work also included the foundations for the Ventilation Building on the west side of Washington Street between Canal Street and Spring Street, the construction of ventilation ducts between the Canal Street and Spring Street shafts and the Ventilation Building, and the removal of certain buildings.

The tunnel structure in general is of steel bent and concrete construction. The actual work under this contract was successfully completed during the year, except for a few minor items of cleaning up. The north structure was practically completed in the previous year, together with a portion of the south structure and the excavation for the Ventilation Building. There remained, principally, the erection of steel and placing of waterproofing and concrete for the foundation and basement of the Ventilation Building on Washington

Street; the completion of concreting and waterproofing of the south structure and the restoration of subsurface structures interfered with during the work of tunnel construction.

In general, the Contractor's methods and the chief difficulties encountered in the prosecution of the work were described in the last report. No additional difficulties were met with, except for a break in the bottom of the 16-foot Canal Street sewer at Washington Street, which occurred on February 7th, and caused the flooding of both tunnels east of the shafts, resulting in delaying the work about one week.

The restoration of subsurface structures involved considerable work, since, in addition to the Contractor's obligation to replace structures to their original condition, many changes were required on account of interference with the tunnel structure. Plate No. 10 illustrates in part the condition encountered at Spring and Hudson Streets and is typical of conditions met elsewhere.

In order to provide adequate protection against fires which may occur in the tunnel or Ventilation Building, a separate system of six-inch water mains is provided. These were laid along Canal, Washington and Spring Streets and in the Ventilation Building. The water pipe was placed in the streets instead of within the tunnel structure, wherever practicable, to prevent freezing. They are interconnected and tap the city mains at three different points to insure a supply of water at all times. These independent mains are connected to the tunnel at intervals of about 120 feet, where hose connections are provided.

The construction of new sewers was required in Desbrosses, Hudson, Canal and Spring Streets. These varied in size from 15-inch vitrified pipe to two feet eight inches by four feet six inches, egg-shaped concrete sewers cast in place and, with the exception of the Desbrosses Street sewer and that on the north side of Spring Street between Greenwich and Washington Streets, were located under the sidewalks.

The raising of Hudson Street from Vestry to Watts Street, and Canal Street from Watts Street to about 200 feet east of Hudson Street, was accomplished with but minor inconvenience to the public, the work being done in sections as far as possible in order to permit operation of traffic.

Finally, the Contractor's plant was entirely removed and the tunnel cleared and cleaned for the use of other Contractors, especially in preparation for the setting of tile under Contract No. 7, and the roadway paving under Contract No. 10.

The work of preparing the final estimate for this Contract is now under way.

CONTRACT No. 5-A

Contractor	Rodgers & Hagerty, Inc.
Date of Contract	November 25, 1924
Date of Delivery of Contract	December 13, 1924
Contract Time	10 months
Contract Bid Price	\$301,312.25
Estimated Value of Contract to Date	\$259,260.18

The work under this Contract comprised the construction of two approaches in open cut, including a short stretch of subway construction, one beginning at the tunnel portal in Canal Street near the east side of Hudson Street, and extending eastward along Canal Street to grade at the west side of Varick Street, and the other beginning at the north side of Dominick Street and extending under Dominick Street to the northerly building line of Broome

Street. This Contract also included the retaining walls and backfill necessary for raising the grades of Dominick Street and the extension of manholes up to the new grades.

The tunnel structure under Dominick Street is of steel bent and concrete construction. The open approaches are of reinforced concrete, with provisions for securing a facing of granite masonry to be included in a future contract.

The actual construction work under this Contract was completed according to schedule. A small amount of cleaning up remains to be done.

Excavation for the north approach was begun on March 9th and for the south approach on April 27th. Steam shovels were used on both sections, being supplemented at Dominick Street by a derrick operating an orange peel bucket, and by a locomotive crane on the south approach using a similar bucket. New sewers were built in Varick and Dominick Streets and on the south side of the structure along Canal Street. Ground water was encountered in the excavation for the north approach, but was easily taken care of by subdrains leading to a sump.

The buildings at Nos. 38 and 46 Dominick Street located on each side of the cut, were required to be underpinned, as well as No. 576 Broome Street.

The roof of the tunnel crossing Dominick Street was required to be built above the existing street grade, thereby necessitating the raising of the street about 5½ feet, dropping to the old grades at Hudson and Varick Streets. This grade change entailed the altering of all the areaways and stoops as well as the raising of a gas main and electric conduits. To insure sufficient water supply for the tunnel service a new 12-inch main was laid from Hudson Street to Varick Street, replacing the old 6-inch main.

By agreement between the city of New York and the Commissions, a new granite curb was placed to the new grade on the south side of Canal Street from Hudson to Varick Streets, the new street pavement being provided by the city.

The Contractor has removed his plant and, except for a few minor items of cleaning up, has left it in an acceptable condition for the use of other contractors.

The work of preparing the final estimate for this Contract is now under way.

CONTRACT No. 6

Contractor	Booth & Flinn, Limited
Date of Contract	November 25, 1924
Date of Delivery of Contract	December 17, 1924
Contract Time	Eighteen Months
Contract Bid Price	\$2,582,969.75
Estimated Value of Contract to Date	\$1,396,412.23

This Contract provides for the construction of two tunnels westward from the ends of the cast-iron tunnels constructed under Contract No. 4, about 1,000 feet west of the river bulkhead in the Erie and Delaware, Lackawanna & Western railroad yards, Jersey City. The north tunnel consists of a covered section, 675 feet long, constructed of steel bents and concrete, passing under the Delaware, Lackawanna & Western railroad yards, and an open approach section, 470 feet long, terminating at grade in Fourteenth Street at the east side of Provost Street, Jersey City. The south tunnel consists of a covered section, also of steel bents and concrete, 400 feet long, and an open approach section of reinforced con-

crete, 513 feet long, terminating in Twelfth Street at the east side of Provost Street. In addition to the tunnels, this Contract includes the construction of air ducts below the surface of the ground in the vicinity of the New Jersey land shafts and the sinking of thirty small caissons in the same locality for foundations for these and for the Land Ventilation Building. The tunnel construction necessitates the reconstruction and relocation of several large sewers in the vicinity of the entrance and the exit.

During the year 1924 and in the early part of 1925, the Erie Railroad cleared a certain part of their yards to accommodate the construction of the south tunnel. Similar work was begun by the Lackawanna Railroad December 9, 1924, and completed January 29, 1925.

SOUTH TUNNEL-

A program for the construction of the south tunnel was decided upon in conference with the Erie Railroad with a view to allowing the railroad to operate trains on certain essential sidings. This program called for immediate work on the covered section, the part west of the portal being postponed until the covered section was completed. One track is to be maintained over the cut near the east end. This track is supported on timber piles that will carry it until the steel bents have been placed for the tunnel, after which the load will be transferred to the tunnel.

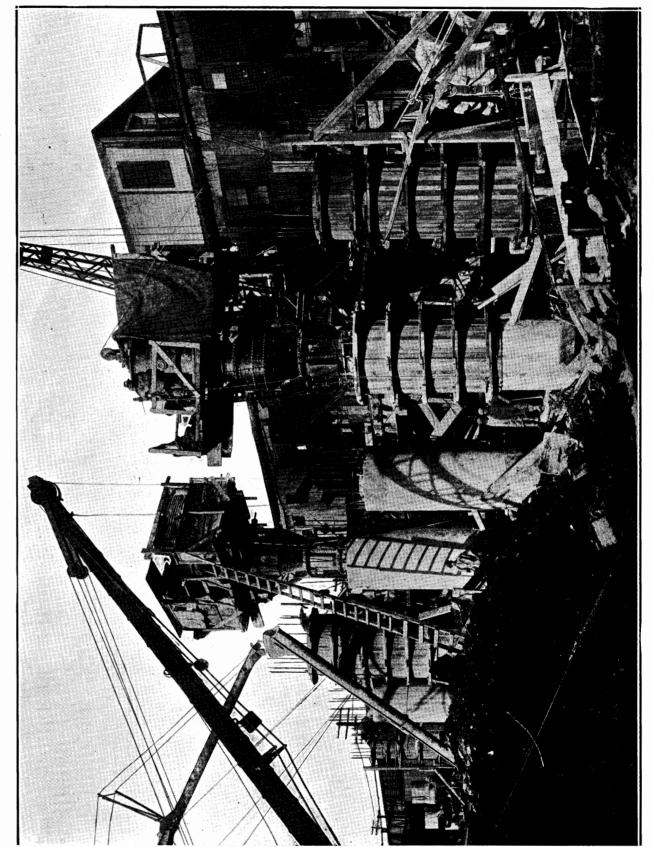
Excavation was begun March 13, 1925, with a dragline, a cut of about ten feet being made. This was followed by driving wood sheeting and placing its bracing. Derricks were erected at the sides of the cut and excavation continued to subgrade. At the east end of the Contract the cut reaches its greatest depth. Here steel sheeting was driven from the surface of the ground to about five feet below subgrade before excavation was begun.

The presence of the tunnel of the Hudson & Manhattan Railroad close under the subgrade of our structure required special precautions in driving sheeting and in pumping operations to reduce to a minimum the disturbance of the ground around the tunnel. Surveys at regular intervals have been made in co-operation with the engineers of the Hudson & Manhattan Railroad to watch for any movement in their structure.

The deeper excavations presented difficulties in drainage. The material encountered was cinders and other fill for a depth of ten feet from the surface and below this, a stratum of silt about fifteen feet deep. Under the silt is a fine quicksand, the drainage of which necessitated the exercise of utmost care. A sump constructed of steel sheeting driven to a depth of twelve feet below subgrade was built before general excavation was begun. As soon as the sand was reached in the sump, it boiled up. No pumping device attempted served to remove the water without the sand. However, by sinking a number of sumps, each one only a few feet below the depth to which the general excavation had advanced, the water was eventually drained off and the excavation was completed without the surrounding structures or the tunnel structure suffering settlement or other disturbances.

The progress to date in the steel bent and concrete covered section of the south tunnel may be summarized as follows:

Excavation 100% complete, steel 77% erected and 75% riveted, concrete 65% complete. The 8-foot steel sewer, located in Twelfth Street, has been reconstructed in a new position to avoid interference with the tunnel. The reinforced concrete bulkhead, constructed under Contract No. 4, at the west end of the cast-iron tunnel, has been removed and a wood-and-mud bulkhead built in the tunnel as a safeguard against flooding.



The Erie Railroad shops on the south side of Twelfth Street east of Provost Street have been underpinned with steel cylinders filled with concrete.

NORTH TUNNEL-

The Contractor began excavation for the open approach of the north tunnel on April 15, 1925. A five-foot steel sewer located in Thirteenth Street and a five-foot six-inch steel sewer running south on Provost Street from Fifteenth to Thirteenth Street and turning there into Thirteenth Street, were reconstructed in new positions lying north of the north tunnel. The five-foot six-inch steel sewer carries water from the higher section of Jersey City, west of the Palisades formation, and is under a heavy pressure in a rainstorm. Special by-passes of three-foot diameter pipe instead of the usual open flumes were employed during construction. The relocation of the five-foot sanitary sewer has presented no special difficulty. An abandoned section of the five-foot six-inch sewer, 200 feet long, was again put in service and thus utilized in the reconstruction of the five-foot sewer.

Excavation for the open approach section of the north tunnel was carried on simultaneously with the sewer work. The greater part of this section was excavated without sheeting. After digging through the filled-in ground that underlies this part of Jersey City, a material composed of partly decayed roots and grasses was encountered. This was deemed to be an unsatisfactory foundation for the tunnel structure and so wooden piles were driven for a length of 280 feet of the tunnel.

The construction of the reinforced concrete roadway and retaining walls has been carried forward rapidly. West of the portal, excavation is now practically complete and 90% of the concrete is poured.

Excavation for the covered section of the north tunnel was delayed pending protracted negotiations among the Commissions, the Contractor, the Lackawanna Railroad Company and the receivers of the Philippine Vegetable Oil Company, over arrangements for providing facilities for the operation of the Oil Company's plant. This plant has been closed down for some time. The negotiations resulted in an agreement whereby the Railroad Company took over the Oil Company's lease and the Contractor was allowed to undertake construction without the necessity of maintaining the plant in a condition for operation.

As in the south tunnel, the first step was the digging of a trench by dragline methods. Sheeting and bracing the excavation followed immediately. The part of the covered section of tunnel attacked did not include the east end, since the location of the eight-foot steel sewer here interfered. The by-passing of the sewer could not be undertaken at that time without cutting off access to the work in the vicinity of the land shafts. The west end also had to be left untouched until the relocation of the large sewers on Thirteenth Street had been completed.

Where work has been in progress, the draining of the fine sand encountered under the silt presented the same difficulties as in the south tunnel. The surrounding ground has proved very unstable, and movements causing damage to sheeting and timbering have had to be overcome. Work is now well under way. Excavation of the steel bent and concrete covered section is 58% complete, 34% of the steel has been erected, practically all of which is riveted, and 12% of the concrete has been poured.

AIR DUCT STRUCTURE

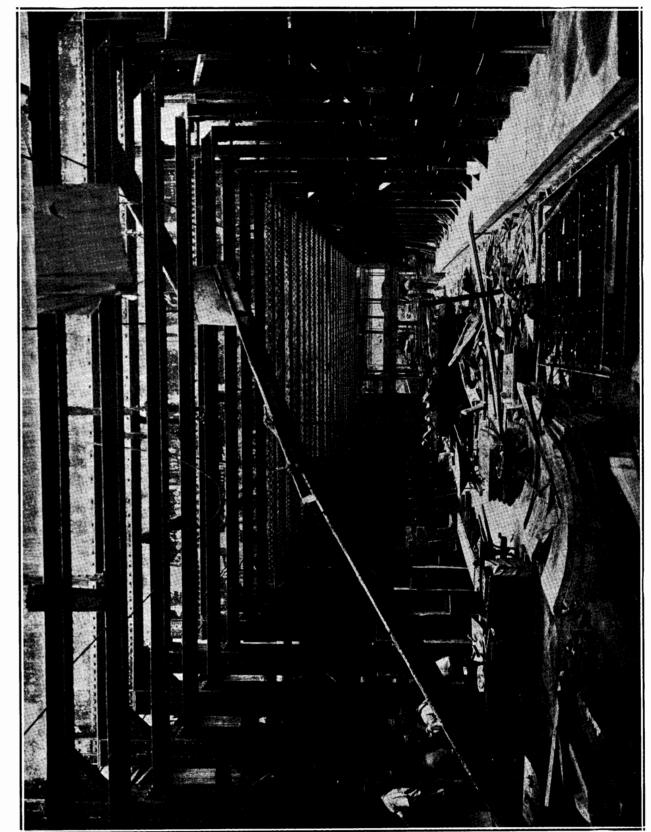
Large air ducts and other passageways are to connect the land shafts with the site of the Ventilation Building. These ducts are all below the surface of the ground. Thirty concrete foundation caissons and about three hundred timber piles form the foundation for the air duct structure, the Ventilation Building, and certain structures to be constructed by the Erie Railroad Company.

Sinking of these caissons was started January 20, 1925. Up to the present time, eight caissons have been put down to bedrock, and all but six of the remaining ones are under way. Certain of these caissons go down through an old crib filled with riprap and now completely covered over by filled-in ground. Compressed air was used on these cylinders during the time that the cutting edges were passing through the crib. Other caissons encountered nothing but filled-in material and silt. These latter were sunk by excavating with a small orange-peel bucket in normal air. At about elevation 228 the cutting edges entered the stratum of sand, gravel and boulders overlying bedrock. Air locks were then put on and the remainder of the sinking done under compressed air, as required by the Contract, with pressures up to 37 pounds per square inch. Bedrock, which is serpentine, was met at various elevations between 205 and 212.

The caissons are reinforced concrete cylinders of from five-foot to six-foot six-inch diameter. The working chambers are of steel. The caissons were all sealed with concrete to the rock under compressed air and in most instances the sealing and the filling of their interiors with concrete were done in one operation, the air pressure being gradually reduced as the column of concrete was poured. The cylinders were relatively light so that they were sunk by jetting and weighting with pig iron. In some cases the skin friction was broken by raising the air pressure beyond that actually required for the given depth to cause the air to blow out around the cutting edge. This procedure was effective but rendered the ground above porous, thereby making it difficult to hold the air during later sinking.

Excavation for the air ducts and Land Ventilation Building has been partly completed. In the chamber east of the land shafts, the erection of steel and pouring of concrete is well under way. West of the land shafts foundation piles have been driven, and the six-inch base of concrete has been poured and ply-waterproofing applied. In the area between the site of the Land Ventilation Building and the north land shaft, driving of foundation piles is progressing.

All concrete for the north and south tunnels is mixed in a central plant. Fine and coarse aggregates are raised to elevated bins in bucket elevators. Bags of cement reach the mixer platform on an endless belt. The inundation method of sand and water measurement is being used with excellent results. Mixed concrete is transported to various parts of the job in Ford trucks. Concrete for the caissons and the air ducts is mixed at a second plant and is distributed from a tower by a chuting system.



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	EW JERSEY INTERSTATE BRIDGE AND TUNNEL COMMITTHE HOLLAND TUNNEL CANVASS OF BIDS RECEIVED APRIL 7 1925.	4		EL T & OS I		RODGERS & HAGERTY INC.		DOOLEY STAPLETON CORP.		FREDERICK SNARE CORP.			ANDER 4 D CO.	ENGINEER'S ESTIMATE		
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	Hollow tile masonry Galvanized steel boxes for type A sand niches	Cu.Yd.			00	12/50/00	23 00		43 00 27 50		4500 2300		30 80 85 00		40 00 70 00	
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95-d -e	Cast-iron relay boxes type A	:	/2		200	1 248 00	40 00		167 00 164 00		75 00 90 00		5650 5130		75 00 8500	
-7	fire alarm and telephone boxes		22	10	000	880 00	40 00	3 520 00	87 00	7 656 00	24 00	2 //2 00	17 65	/ 553 20	5000	4400 00
-g 106-a	" frames for air outlets at refuge niches Applying neutralizing wash to ceiling	100 5q.Ft.	37.50	4	100	256 00 4 687 50	20 00		3 80 48		2000		5 20 70		200	
-6	each coat of paint " "		75 00		150	11 250 00	7.5	5 625 00	64	4 800 00	140	10 500 00	140	10 500 00	200	15 000 00
	Double bronze doors for gate valve and cleanout niches	Set	36		00	6 552 00	305 00		198 00		3/0 00		450 00		18500	
- <i>a</i>	Single " " fire alarm or telephone niches " " type A fire extinguisher "	Each .	88 127		125	1 540 00 7 778 75	40 00 /42 00		18 15 66 25		50 00 140 00		33 00 240 00		20 00 45 00	
	Double " " " " " " "	5et	59	143	300	8 437 00	29200	17 228 00	155 10	9 150 90	300 00	17 700 00	360 00	21 240 00	165 00	9 735 00
<u>-9</u>	Four-door set for large low tension splicing chambers (tunnel)	"	<i>32</i> 32		00	13 60000		10 296 00	140 80		26500 80000				120 00	
7/	Two-panel " " small " " " " " " " "		26		00	4 160 00	33700		175 00		325 00				17500	
-J	Bronze doors of L.T. splicing chambers (shafts) and misc. bronze	Lb	15 0 00 44		72	10 800 00	/25		77		/ 25	¥ 1.7-2-12-E	/ 25	18 750 00	.100	
	Single bronze doors for relay boxes Double " " type A sand niches	Each Set	<i>5</i> 7		200	2 343 00	32500		5750 21890		195 00 340 00		87 50 560 00		200 00	
-m	" " 8 " "	*	26	207	100	5 382 00	382 00	9 932 00	225 50	5 863 00	370 00	962000	435 00	11 310 00	22000	
- <i>n</i> - <i>o</i>	" " pump niches " " + type A fine hose niches	•	116		00	772 00 16 356 00	28300	1 132 00	210 65 153 23		280 00 230 00		452 00 422 50		175 00 90 00	
- P	" " " " " " " " " " " " " " " " " " "		25			3275 00	230 00		142 35		220 00		422 50		100 00	
	Single " " A flushing "	Each	116	30	00	3 480 00	110 00	12 760 00	32 10	3 723 60	100 00	11 600 00	160 00	18 560 00	3000	3 480 00
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-7	" " for light boxes	·	1774	17	00	30 158 00	26,00	46 124 00	17 60	31 222 40	4000	70 960 00	24 75	43 906 50	55 00	97 570 00
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CONTRACT No. 7

Contractor	L. Del Turco & Bros., Inc.
Date of Contract	April 21, 1925
Date of Delivery of Contract	May 6, 1925
Contract Time	16 Months
Contract Bid Price	\$881,805.45
Estimated Value of Contract to Date	\$144.361.56

This Contract provides for lining the tunnel with tile, placing bronze doors and other trim, erecting sidewalk handrail, and painting the ceiling.

The specifications for tile lining the walls of the Holland Tunnel are unique, in that they provide requirements more rigid than those usually satisfactory in tiling work. The maximum permissible absorption is five per cent. by weight. The tests specified are severe, in order to insure a product that withstands extremes of temperature and freezing action, or a tile that will be non-crazing and non-spalling.

The tunnel tile is square, $4\frac{1}{4}$ inches by $4\frac{1}{4}$ inches. The decision as to size was reached after the completion of an extended series of investigations, including the placing of sample sections on the tunnel wall, the sections being laid up in tile of different sizes. The light reflection characteristics of tile of several makes were carefully determined and an appropriate standard fixed as a specification for the tunnel tile, in order to secure an increased efficiency of the tunnel lighting system.

The color of the tile is white, care being taken to eliminate tile containing blue, green or red tints. These tints were declared unfavorable, in the expert advice of a color psychologist, because of their depressing effects. The color of the borders was arrived at by a process of elimination of suggested colors, rejected for various reasons, until the choice finally settled upon light orange.

NORTH TUNNEL-

Work was begun on this Contract in the north tunnel on August 6th near the portal of the New York approach, the first operation being the placing of hollow tile in the side walls of the steel bent section. After this was completed the mortar scratch coat was applied.

On September 1st, the first shipment of glazed wall tile arrived and the work of setting was begun on September 7th, being completed from the portal to about 155 feet east of the river shaft by the close of the year. Tile for the north tunnel is being furnished by the American Encaustic Tiling Company, Zanesville, Ohio.

About September 15th, the work of setting bronze frames was begun, those for the light boxes being the first placed. After this work had been completed as far as the New York river shaft, bronze frames for the other niches were set; also cast-iron frames for relay boxes and fire alarm boxes. This work was completed to the river shaft by December 31st.

SOUTH TUNNEL-

Work was begun erecting the hollow tile in the side walls of the south tunnel about September 1st, being completed on October 6th. The placing of the scratch coat was started on November 23d, and about December 1st the setting of glazed wall tile was started near

the portal, being completed to about 508 feet east of the Canal Street shaft by the end of the year. Tile of foreign manufacture is being used in the south tunnel and is furnished one-half each by Villeroy & Boch, Mettlach, Germany, and Rakovnik and Unter Themenauer Ceramic Works, Rakovnik, Czechoslovakia.

GENERAL—

The delay in beginning work on this Contract was primarily due to the difficulties experienced by the manufacturers of the tile in turning out a product which met the stringent requirements of the specifications for this work. These difficulties appear to have been successfully overcome and deliveries are now being made regularly.

CONTRACT No. 9

Contractor	The General Electric Company
Date of Contract	July 7, 1925
Date of Delivery of Contract	July 31, 1925
Contract Time	11 months
Contract Bid Price	\$298,166.00
Estimated Value of Contract to Date	

This contract provides for the furnishing and delivering, but not installing of the power transformers for transforming the high tension current supplied by the power companies to the voltages required for the various motor units, and for the oil switches for the main control system.

The current which is to be provided by the power companies will be delivered at a nominal voltage of 13,200 volts. The transformers to be furnished under this contract will reduce this incoming pressure to the nominal operating voltages of 2,200 and 440. The oil switches included in the contract will be used to control the distribution of this current both before and after transformation.

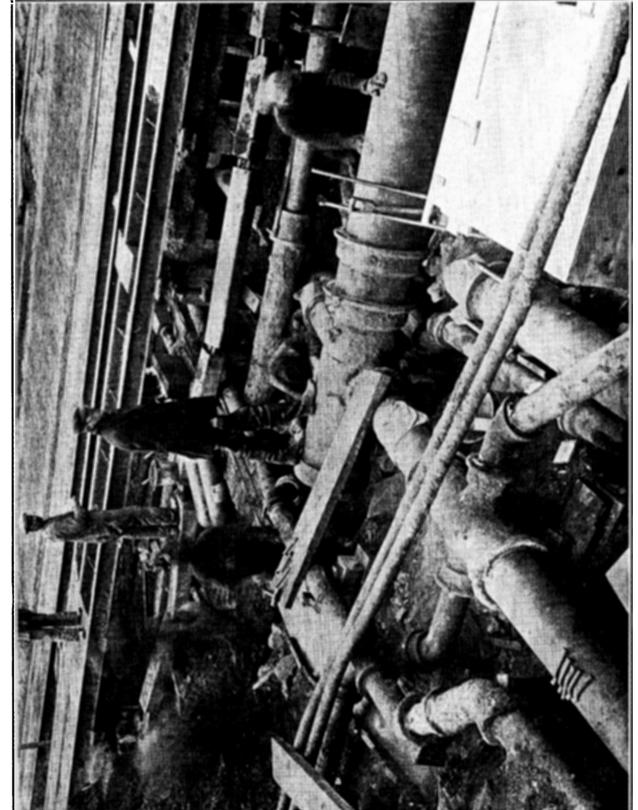
The Contractor has begun to assemble material for the manufacture of this equipment, and shop drawings have been submitted by him for approval. These have been checked and returned to him. To date, no payments have been made on this contract.

CONTRACT No. 10

Contractor	William J. Fitzgerald
Date of Contract	May 19, 1925
Date of Delivery of Contract	June 4, 1925
Contract Time	14 months
Contract Bid Price	\$329,655.00
Estimated Value of Contract to Date	\$141,323.10

This contract covers the paving of both tunnel roadways, including the approach sections, and comprises a total area of about 44,500 square yards.

The qualities of granite block pavement, as regard durability, minimum amount of maintenance and quick repair governed the choice of surfacing. Existing granite block pavements long subjected to continuous heavy traffic were carefully studied, and data were



collected from various sources, of actual experience in use and maintenance of several standard types of road surfacing. Finally, the experience of the United States Bureau of Roads was also drawn upon and studied and conference was held with that Bureau's best qualified personnel, early in the year.

The chief limitation in the size of the block adopted was that of depth. A limit was necessary in this dimension, so that sufficient depth of cushion could be provided between the block and the concrete floor and still not encroach upon the limited vertical clearances of the tunnel. Further study was made in the proportion of the block to minimize breakage due to impact on the surface of the pavement and to conform as far as possible with standard dimensions followed in cutting at the quarry. The resulting dimensions adopted were as follows: length 7 to 11 inches; width $3\frac{3}{4}$ to $4\frac{1}{2}$ inches and depth 4 to $4\frac{1}{2}$ inches.

The smoothness of the wearing surface of the paving was considered to be of prime importance in reducing the effect of vibration with resulting noise. For this reason the top surface of the block has been specified to be somewhat smoother than that required in ordinary paving block practice.

The blocks are laid in the usual sand cement cushion layer, about one inch thick.

For filling the joints between blocks, asphalt is applied hot, after being mixed with heated sand. The mixture is poured in between the blocks and the joints completely filled. Then, by means of squeegees, a thin coating, later sprinkled with sand, is left upon the surface. The resulting pavement provides a smooth resilient, long wearing surface, that will help deaden the sounds due to traffic and at the same time can be more quickly repaired than a concrete road.

With the lack of ventilation in the tunnels while this paving proceeds, it is necessary to heat the asphalt and sand outside, to avoid the smoke and fumes. The hot asphalt is delivered in motor truck tank wagons to the site of the work, where it is kept at the required temperature in a 500 gallon heating kettle. An oil burner furnishes sufficient heat for this kettle with but little or no smoke. A portable mixer is used to mix the hot sand and asphalt immediately before it is applied to the paving block. As the work of filling the joints takes but a small part of the time in laying the block, the heating kettle with its attendant fumes, needs to be kept going only at infrequent intervals.

The granite block is obtained through J. Leopold & Co., Inc., from quarries at Vinalhaven, Hurricane Isle and Long Cove, Maine, where it is cut to size and shipped by barge to New York City. Sufficient space is allowed the Contractor to store a whole shipment of block at a time, so that no delay can occur from lack of material. The first shipment of block was received about August 15th, and the placing of the block was started on September 14th in the north tunnel just west of the open approach section of the New York side. Work was started October 27th on the paving of the south tunnel at the New York end. By the end of the year the paving was completed from the eastern limits of both open approaches to a distance of about 1,700 feet west of the New York river shaft in the north tunnel and to the east side of the New York river shaft in the south tunnel. Sufficient block is stored to supply the work to be carried on throughout the winter season, mainly in the under-river stretch between the river shafts.

Contract No. 12

Contrac	tor	B. F. Sturtevant Company
Data of	Contract	September 22, 1925
Date of	Delivery of Contract	September 26, 1925
Date of	t Time	14 months 2 weeks
Contrac	t Time	\$571.631.00
	t Bid Price	φ3/1,031.00
Estimat	ed Value of Contract to Date	

This contract provides for the furnishing and installing of the ventilation and transformer blower fans and the motors, transmission and control for same.

The fans to be provided under this contract are of the backward curved blade type. Under different conditions, one, two or three ventilation fans may be operated on one tunnel duct at any one time and the fans must have characteristics that will insure their satisfactory operation when run in parallel without the danger of any one fan assuming more than its share of the load and thereby overloading the motor. They must also maintain satisfactory efficiency for any stage of loading from 35% to full load.

The motors for driving the ventilating fans are to be of the wound rotor, 3 phase type, the larger ones to operate at 2,200 volts and the smaller at 440 volts. This type was chosen because of the possibility of speed variation inherent therein. Further flexibility is obtained by the use of a chain drive instead of direct connection between motor and fan.

The smaller fans to be used for cooling the power transformers will be direct connected to 440 volt 3 phase squirrel cage motors, the load on these units being uniform.

The Contractor has begun to assemble material for this equipment, tests have been made on sample fans to check up performance data submitted with the proposal and shop drawings have been submitted for approval. These have been checked and returned to the manufacturer.

Work on the actual fabrication of the fans is scheduled to begin shortly after the first of the year.

To date no payments have been made on this contract.

CONTRACT No. 13

Contractor	ReRiso Construction Company
Date of Contract	October 20, 1925
Date of Delivery of Contract,	October 24, 1925
Contract Time	14 months
Contract Bid Price	\$1,277,953.00
Estimated Value of Contract to Date	

This contract provides for the construction of the two buildings on the New York side of the river in which the ventilation equipment is to be housed and also for the finishing of the interiors of the New York ventilation shafts.

The buildings to be constructed under this contract will be of steel frame construction, five stories in height, with brick curtain walls, granite base, granite and limestone trim, reinforced concrete floors with steel beams and girders and reinforced gunite and hollow tile partitions.

27:e Cinder 27:4 3 Gun 27:4 3 Gun 27:h 4" 27:h 4" 27:1 4! 27:1 2 Gun 27:1 Gun 27:1 Gun 27:1 Suffi- 10-b Missee 12 Steel 13 Steel 14 Expan 15-h Speck 18 Engin		CUNEL Sq. Ft.	# 4000 550 5000 5000 6500 25000 10000 350	0 27 00 0 11 00 10 1 31 0 1 38 0 1 47 0 1 50 0 92 0 125 00	00 108 000 00 6 050 31 183 400 47 9 553 56 463 51 12 750 95 9 500 00 43 750 00 45 450	00 30 16 10 10 10 10 10 10 1	600 120 00 600 8 80 1 30 182 00 1 40 7 00 1 50 9 73 1 60 48 55 13 73	000 00 800 00 000 00 000 00 750 00 480 00 750 00 000 00	981CE 3675 1975 130 130 146 153 55 194 12600	147 000 00 8 662 50 182 000 00 6 850 00 9 490 00	3100 1600 132 140 149		2800 1900 120 121 129 146		36 00 12 00 1 30 1 40 1 50 1 55 56	144 000 00 6 600 00 182 000 00 7 000 00 9 750 00 465 00 6 14 000 00 9 500 00	0 30 00 0 15 00 0 100 0 120 0 129 0 136 0 50	8 250 00	5 15 15 15 15 15 15 15	AMOUNT 5 204 600 00 0 7 150 00 2 184 800 00 7 1000 00 9 685 00 9 477 00 5 13 750 00	45 00 28 50	180 000 00	0.4100	AMOUNT 96 000 00 8 250 00 140 000 00 5 5 250 00 7 150 00 345 00
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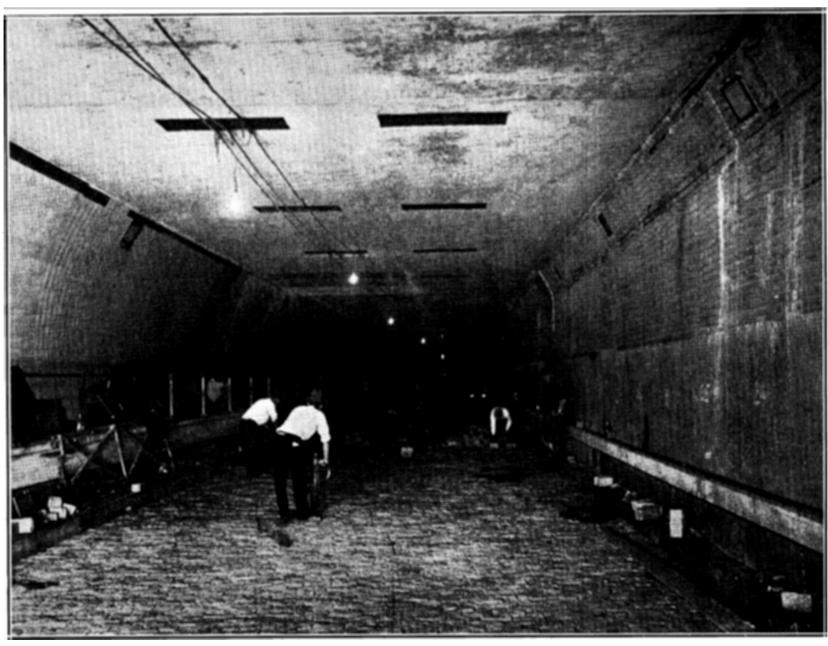


PLATE No. 11—Laying Granite Block Pavement. Contract No. 10.

	Contract Nº14 New York State Bridge and Tunnel Commission And New Jersey Interstate Bridge and Tunnel Commissi The Holland Tunnel Canvass of Bids Received December 15, 1925.		DE I	RISO JCTION CO.	G.DEKII	MPE INC.	THE EN		THOMAS J.	WATERS CO.	george c	OLON & CO.	ENGINEERS	S ESTIMATE	
ITEM	CLASSIFICATION	UNIT	QUANTITY	PRICE	THOCMA	PRICE	AMOUNT	PRICE	AMOUNT	PRICE	AMOUNT	PRICE	AMOUNT	PRICE	AMOUNT
270	Concrete and mortar top course	Cu.Yd.	6000	35 00		3600	21600000	3700	22200000	35 00	21000000	39 78	23868000	28 50	
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27 k	2" Gunite protection	1 -	172 00	150	2580000	165	2838000			140	2408000		2769200	95	
271	Gunité column protection	Cu.Yd.	400	12000		13000	5200000	13200			4800000		51 60000	125 00	
70 a	Built-up steel and tie-rods	Ton	1700		21590000	13500	22950000	Annual regions of	22440000	12000	20400000			125 00	212 500 00
10 b	Miscellaneous steel and iron	ч	12	41500	498000	41000	564000	49500	594000		528000		606000	335 00	
72	Steel beams & channels & connections		700	11000		1 20 00	8400000	13200		9800	68 50000		7434700	100 00	
13.	Steel rods & bars for reinforcing		70	16000	11 200 00	12000	840000	17600	1232500	15000	1030000	16100	11 27000	120 00	
74	Expanded metal and wire mesh	,	150	30000		33000	4950000	35000		29000	43 500 00		45 300 00	254 00	
75h	Special steel structures		125	41500	5187500	47000	5875000	49500	G1 87500	44000	55 000 00	57700	12 125 00	335 00	41 875 00
148	Engineer's field office services	Per Month	1	20000		10000	70000	16500		10000				100 00	
151 6	Completing Interior N. Land Shaft. N.J.	Lump Sum			1000000		555000		800000		4100000		544900		9 000 00
151 f	1 . 5	<u> </u>	·		1000000		555000		800000		4200000		546200		9 000 00
1919	N. River				1800000		1602000		1587200		3100000		1706700		10 000 00
151 h	·	1			21 15800		1602000		2365800		36 000 00		2701900		12 000 00
182	General construction Land Vent. Bidg. H.J.	<u> </u>			255 000 00		23493250		285 14 1 00		33200000		282 000 00		223 562 00
184	General construction River	1			21500000		18585850		18464900		18800000		22800000		167 900 00
216	Plumbing, heating, water supply				31 00000		3900000		3654200		33 300 00		35 500 00		13 500 00
221	Elec. cond. for land Bldg. & Land Shafts	1			37 000 00		3900000		4369000		4150000		42 73000		32 300 00
223	Elec River River	1			33 000 00		3600000		3835000		3785000		3185000		34 400 00
	TOTALS			-	1,577,953.00		1,587,331.00		1,677,131.00		00.000,017,1		1,712,598.50		1,325,000.00

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Sankada (* 1975)

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The buildings are to be erected complete with heating and hot water plants, plumbing, elevators, ash hoists, Evase' stacks, damper equipment, trolley beams, electric conduits with necessary boxes but excluding wiring and fixtures which are to be furnished and installed under Contract No. 19.

The work in the shafts includes the erection of stairs, landings, parts of floors, gunite air duct partitions, gunite wall protection, conduits, piping, reinforced concrete and structural steel.

Work has been begun on the fabrication of the structural steel, some of it has been delivered on the site and erection has been started in the Canal Street shaft. Shop drawings have been submitted by the various subcontractors for approval. These have been checked and returned either approved or with notations of necessary corrections marked thereon.

To date no payments have been made on this contract.

CONTRACT No. 14

Contractor	DeRiso Construction Company
Date of Contract	December 22, 1925
Date of Delivery of Contract,	December 29, 1925
Contract Time	12 months
Contract Bid Price	\$1,577,953.00
Estimated Value of Contract to Date	

This contract provides for the construction of the two buildings on the New Jersey side of the river in which the ventilation equipment is to be housed and also for the finishing of the interiors of the New Jersey ventilation shafts.

The work to be done under this contract is, except for minor details, identical in scope with that called for under Contract No. 13.

Nothing has been done on this contract to date.

CONTRACT No. 20

Contractor	0
Date of Contract	December 22, 1925
Date of Delivery of Contract	
Contract Time	10 months
Contract Bid Price	\$128,670.00

This contract provides for the furnishing and installing, in the tunnels and ventilation buildings, of the cables required for the distribution of the power for the ventilation equipment, pumps and lighting systems.

These cables will convey power furnished by the power companies on both sides of the river to step-down transformers located in the two land ventilation buildings. From these points the cables will carry power through ducts located under the tunnel sidewalk up to the various shafts to the four ventilation buildings where it will be distributed to the ventilating fans, lights and miscellaneous tunnel equipment.

The contract has been let but has not yet been delivered.

CONTRACT No. 24

Contractor	Booth & Flinn, Ltd.
Date of Contract	October 20, 1925
Date of Delivery of Contract	October 26, 1925
Contract Time	6 months
Contract Bid Price	\$37,700.00
Estimated Value of Contract to Date	

This contract provides for the furnishing and installing of the pumping equipment, including motors and control in the various pump chambers at the foot of each shaft and at the midriver sump.

The pumps are of two kinds, drainage pumps, automatically controlled by floats in the sumps, to remove all water finding its way into the tunnel and shafts, and booster pumps which are to take water from the city mains and deliver this water at an increased pressure to high pressure mains extending throughout the tunnels and ventilation buildings.

The Contractor has placed orders for valves and is preparing to begin work shortly after the first of the year 1926.

III. DESIGNS, STUDIES AND INVESTIGATIONS

As in previous years, the work of the Designing Department has consisted of studies, investigations and designs, preparation of contracts and specifications, making of contract, construction and record drawings, checking shop drawings, preparing estimates of cost of the various contracts, preparing condemnation maps and descriptions and making studies of mechanical, electrical and architectural features of the tunnel and its appurtenant structures.

Work has been continued during the year on Contracts Nos. 3, 4, 5, 5-A and 6, furnishing construction drawings of steel and concrete details, water supply and subsurface changes, and checking, correcting and approving drawings submitted by the Contractor. These contracts cover the construction of the tunnels and the approaches thereto.

Surveys of the tunnel air ducts were completed and previous calculations of power requirements for the ventilation fans were medified to meet the actual duct areas available.

Curves for the adjustment of the fresh air and exhaust air ports are in course of preparation. Air measuring apparatus which will be installed in the ducts will serve as a check on the amount of air flowing, thus insuring the correct setting of the ports to provide proper distribution of air throughout the tunnel.

Specifications were prepared and contract drawings made for Contract No. 7, Glazed Tile, Bronze and Other Interior Finish; Contract No. 9, Furnishing Transformers and Oil Switches; Contract No. 10, Tunnel Roadway Pavement; Contract No. 12, Fans, Motors and Control; Contract No. 13, Ventilation Buildings, New York; Contract No. 14, Ventilation Buildings, New Jersey; Contract No. 20, Power Cables, and Contract No. 24, Pumping Equipment. The above contracts, a total of eight, have all been let. Construction drawings were made for Contracts Nos. 7, 12 and 13.

The preparation of contract drawings for the ventilation buildings involved an unusually large amount of work, there being 140 drawings required for Contract No. 13 and 144 drawings for Contract No. 14. Changes in the ventilation equipment, to meet

*			

•	CONTRACT N° 24 NEW YORK STATE BRIDGE AND TUNNEL COMMISSION AND NEW JERSEY INTERSTATE BRIDGE AND TUNNEL COMMISSION THE HOLLAND TUNNEL CANVASS OF BIDS RECIEVED, OCT. 6, 1925		i	BOOTH & FLINN LTD.		SHEVLIN ENG. CO. INC.		PEERLESS ENG. CO.		WAGNER ENG. CO. INC.		ERICKSON ENG. CO.INC.		HART & EARLY CO. INC.		JOHN W. HOOLEY		FOX REYNOLDS CO.INC.		ENGINEER'S ESTIMATE.	
ITEM	CLASSIFICATION	UNIT	QUANTITY	PRICE	AMOUNT	PRICE	AMOUNT	PRICE	AMOUNT	PRICE	THUOMA	PRICE	AMOUNT	PRICE	THUOMA	PRICE	AMOUNT	PRICE	AMOUNT	PRICE	AMOUNT
27	Conc. floor & pedestals, incl. mortar finish	Cu. Yd.	50	25 00	1 250 00	55 00	Z 750 00	22 00	1 100 00	18 00	900 00	108 00	5 400 00	65 00	3 250 00	30 00	1 500 00	40 00	. 2,000.00	40 00	2 000 00
86	Galv. miscl. steel work, incl. wire screen enclosure.	66.	3000	30	900 00	368	1104 00	25	750 00	40	120000	35	1 050 00	20	600,00	200		40	1,200,00	20	600 00
100	C.I. Pipe & specials, incl. placing but not furnishing valves & strainers	Ton	30	250 00	7 500 00	3 25 00	9 750 00	3 20 00	9 600 00	396 00	11 880 00	500 00	15 000 00	300 00	9 000 00	60000	18 000 00	3 00 00	9,000,00	350 00	10 500 00
108	Brass pipe & fittings valves	L6.	2000	60	1 200 00	575	1 150 00	65	1 300 00	56	1 120 00	100	2 000 00	90	1800 00	45	900 00	50	1,000.00	50	1 000 00
140	23 pumps furnished and installed complete	Lump			26 850 00		26 875 00		28 882 00		27 635 00		ZZ 400 00	,	37.000,00		31 600 00		51 000.00		27 000 00
	TOTALS				37,700.00		41,629.00		41,632.00		42,735.00		45,850.°°		51,650.00		58,000.00		64, 200,00		41,100.00

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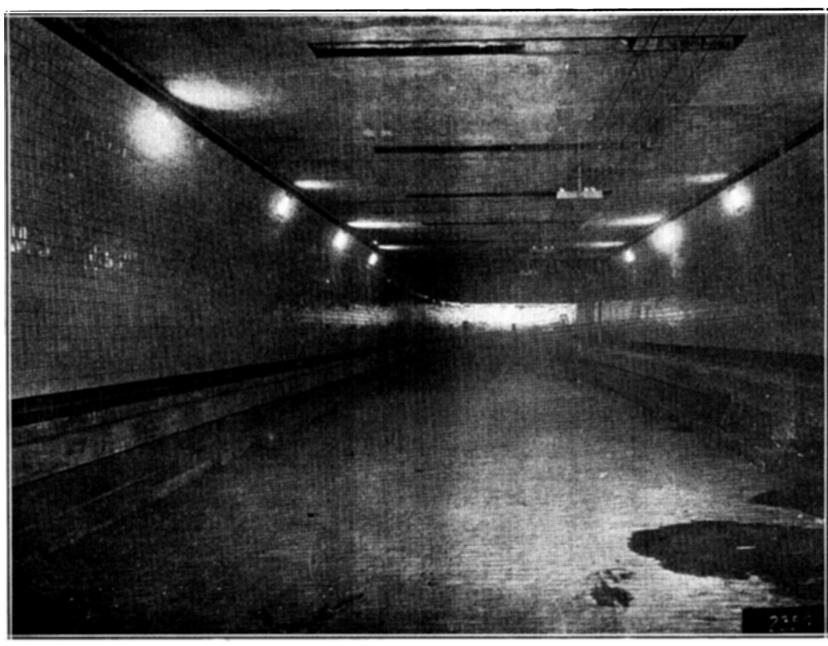


PLATE No. 12—Completed Tiling in North Tunnel, New York Approach. Contract No. 7.



PLATE No. 13-Tiled Refuge Niche, North Tunnel, New York. Contract No. 7.

the requirements of the manufacturers necessitated revision of the structural steel with its attendant changes in not only the steel drawings but of all related drawings as well. Suggestions of the Fine Arts Commission of the State of New York, to whom the drawings of the buildings were submitted for criticism, also resulted in a number of revisions. The drawings for the ventilation buildings, New York, as finally issued, received the approval of the Fine Arts Commission. Contracts Nos. 13 and 14 also include, in addition to the buildings proper, the completion of the interiors of the ventilation shafts and certain items of ventilating equipment such as flue dampers, motors for operating them and the control for the motors.

Estimates and studies are being made and specifications are in course of preparation for Contract No. 15, Architectural Work at Entrance and Exit Plazas, New York; Contract No. 16, Architectural Work at Entrance and Exit Plazas, New Jersey; Contract No. 17, Emergency Equipment Building, New York; Contract No. 18, Emergency Equipment Building, New Jersey; Contract No. 19, Lights, Traffic Signals and Supervising System; Contract No. 22, Emergency Equipment; Contract No. 23, Plaza Pavement, New York, and Contract No. 26, Plaza Paving, New Jersey. All the remaining contracts, required for the completion of the tunnel, are scheduled to be let during the early part of 1926.

The scope of this work previously listed and to be completed in 1926 may be briefly summarized as follows:

Contracts Nos. 15 and 16, for the architectural treatment of the entrances, exits and plazas will cover the pylons, granite facing of the open approach sections, open plaza railings, together with their footings, foundation walls and granite bases, and include the installation of light fixtures around the open approaches.

Contracts Nos. 17 and 18, for the Emergency Equipment Buildings in New York and New Jersey, will provide for their complete construction and equipment. These buildings, besides housing the emergency trucks and their equipment, to be furnished under Contract No. 22, will contain the offices for the executive heads of the tunnel's operating force, locker, rest and lunch rooms for employees, showers, carbon monoxide recording apparatus, and electrical and telephone equipment necessary.

Contract No. 19, provides for the installation of the power transformers and oil switches furnished under Contract No. 9; lighting of the tunnel plazas and buildings complete, including reflectors, receptacles for lights and distribution wiring, except for the lighting of the open approaches as noted above; secondary wiring for lighting the plazas and lighting fixtures for the same; traffic signals complete, telephone and fire alarms, complete; supervisory system, complete, including control boards and connections at the various shafts; and a central control board and apparatus for recording continuously the amount of carbon dioxide in the tunnel.

Contracts Nos 23 and 26, for the paving of the plazas, will include provision for razing of buildings, changing necessary pipes and subsurface structures, resetting old pavement and curb to new grades, new paving and curbing, modification of buildings to conform with new grades, together with regrading and possibly some electrical conduit installation for lighting on the New Jersey side of the river.

Contract No. 25 includes the furnishing and placing of fire extinguishers in the niches provided in the tunnel and miscellaneous fire extinguishing equipment, such as fire hose and racks for each fire hydrant in the tunnel and buildings, as well as flushing hose, buckets and shovels for sand niches, trolley hoists and electric hoists in all buildings.

Negotiations have been initiated with the power companies, one in New York and one in New Jersey, for the power supply required for operating the ventilating and auxiliary equipment. The principal items of the electrical equipment have been decided upon and most of them are under contract. Step-down transformers of the air blast type will be used to reduce the high tension power supply to the voltages required for operating the motors and lights. Motors of the wound rotor type will drive the fans and pumps, permitting variations of speed where required. The switches controlling the power are to be of the oil immersed truck type, insuring maximum safety of operation and ease of replacement when repairs are necessary. The layout of the power cables has been planned to provide maximum flexibility and assurance of continuity of the power supply. Power is to be furnished by the power companies through three independent cables from each side of the river, there being at least two different sources of supply on each side, and the cables will be operated radially, each bus being sectionalized into three parts, one for each cable. The various groups will be operated by control apparatus operated from a central switchboard situated in each building and ultimately a single control board may be used for controlling all the equipment from one place.

The investigation of the tile to be used for lining the tunnel was continued during the early part of the year, for the purpose of determining the most suitable size and a specification for this important item which would insure the permanence of the tile finish. After this work was placed under contract, studies were made of decorative ceramics, also other details of the tile, bronze doors and trim.

An understanding was reached with the Erie Railroad Company extending and clarifying the Commission's right to the use of the new pier as it was conferred under the original Erie Agreement, and a lease was entered into with the Railroad Company for the use of certain portions of the railroad yard, all for the purposes of the construction of the ventilation buildings.

Negotiations are now under way with the City of Jersey City and the Erie Railroad Company in connection with the regrading and paving of the areas to be included in the New Jersey entrance and exit plazas. The purpose of these negotiations is to insure that the work to be done by the Commissions will conform to the contemplated operations in the vicinity of the plazas by the above named parties.

Similar negotiations are also under way with the City of New York regarding the New York plazas.

During the year maps and descriptions were drawn up covering all the parcels of land needed for the purpose of constructing the tunnel, buildings and plazas, both in New York and New Jersey, which had not been acquired in previous years, and an agreement negotiated with the Delaware, Lackawanna and Western Railroad Company covering the temporary and permanent easements required for the North Tunnel and approach which are being constructed under Contract No. 6.

IV. MISCELLANEOUS INVESTIGATIONS AND SPECIAL STUDIES

During the year, studies previously begun were continued, including seawater tests on cement, protection coatings for steel, daily record of weather, air temperatures and the temperature of Hudson River water, investigations of earth pressures upon the tunnel lining and caissons, including the physical properties of silt and other phases of the subject which aid

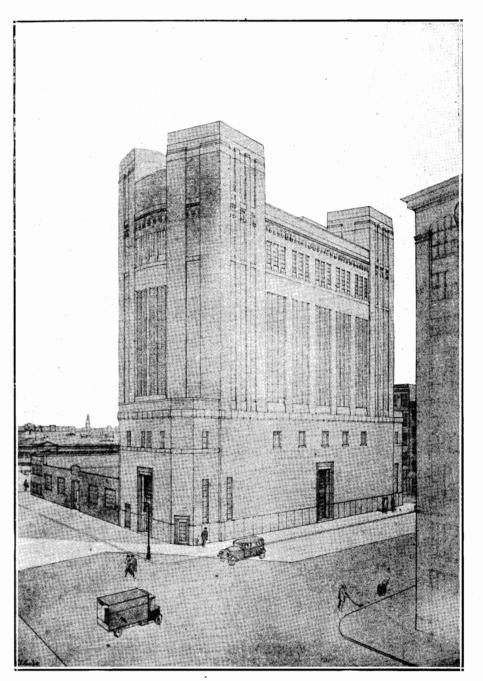


PLATE No. 14-Land Ventilation Building, New York. Contract No. 13.

in explaining tunnel movement phenomena. In addition to this many other tests and studies were conducted primarily to determine the quality and physical properties of the materials used and proposed for use in the works. The more important of these investigations were:

- (a) Determination of the strength and deflection of tunnel ceiling slab in order to fix the minimum time that should elapse before stripping the forms.
- (b) An investigation of the physical properties of Lumnite cement concrete to determine the advisability of its use in the ceiling slab, because of its early strength developing properties. These were demonstrated, but the time interval for stripping the forms was shortened sufficiently with the use of Portland cement, by lengthening the forms for each concrete pouring section.
- (c) Finishing a portion of the tunnel for the purpose of determining a suitable size and color of tile, width of border, type of handrail, effectiveness of lighting system, etc.
- (d) Investigations of strength and deflection of gunite concrete slabs for the purpose of determining safe unit stresses and other data for the design of the air ducts of the ventilation buildings.
- (e) A study of the effect on the tunnel of dredging and the driving of piles for the new Erie Railroad Company Pier No. 9, in Jersey City. This study included the measurement of pressures, against the New Jersey river shafts, caused by the pile driving, to forestall possible movement of the shafts by properly controlling the pile driving accordingly.

The operation of dredging over the tunnel in the slip was also carefully supervised to prevent possible rising of the tunnel due to insufficient cover.

- (f) Exhaustive tests were made and are still under way to determine a suitable paint for coating the tunnel ceiling. The conditions of alkali and moisture which obtain in the ceiling slab have subjected the paints to a severe test and most of them have, under these conditions, proven unsatisfactory for the purpose.
- (g) Tests to determine the adhesion of the different makes of tile used to the setting mortar specified for the work.
- (h) Determination of the correct percentage of moisture to be used in the sand cement cushion of the granite block roadway pavement, and tests of the physical properties of mixtures, containing different percentages of moisture.
- (i) Miscellaneous and routine tests on asphalt, cement, cementing materials, expansion joint material, lime, liquid waterproofing materials, sand and tile.
- (j) Investigation of the earth pressures on the outside of the tunnel structure have been continued.

Photographs were taken during the year of the various phases of the construction work for record purposes and also of all features having special interest.

V. INSPECTION OF MATERIALS

The quantities of the principal materials required for work now under contract as supplied by the subcontractors and the approximate quantity manufactured during 1925 and the quantity manufactured to date are listed herewith:

Total % Com-Subcontractor During Mfd.pleted Unit Approx. Material 1925 to Date 12/31/25 Quantity 37,852 Davies & Thomas Co., Cast-iron tunnel lining, Ton 37,852 100 Catasaugua, Pa., Bethlehem Steel Co., Cast-iron tunnel lining, Ton 69,140 100 Bethlehem, Pa., Bethlehem Steel Co., Cast-steel tunnel lining, Ton 100 Bethlehem, Pa., 4.507 Bethlehem Steel Co., Structural steel for caissons, Ton 100 4.507 Steelton, Pa., Structural steel for cut and cover American Bridge Co., section. Contract No. 5, Ton 4,315 100 Trenton, N. J., Structural steel for cut and cover American Bridge Co., section, Contract 5-A, Ton 121 121 100 Trenton, N. J., Structural steel for cut and cover McClintic-Marshall Co., section and air ducts, Contract No. 6, Ton Pottstown, Pa., 3,300 92 3 300 Structural steel for New York ventilation buildings and shafts, Contract Phœnix Bridge Co., No. 13, Ton 2,130 Phœnixville, Pa., Tunnel bolts, Contracts Nos. 3 and 4, No. Pittsburgh S. & B. Co., Pittsburgh, Pa., 2,380 Bethlehem Steel Co., 439.623 Tunnel bolts, Contracts Nos. 3 and 4, No. 100 Reading, Pa., 2,829 439,623 H. E. Fletcher Co., 401 Granite facing, Cu. Yd. W. Chelmsford, Mass., 100 Granite curbing, Contracts Nos. 3, 4 and 6, L. Ft. 31,430 H. E. Fletcher Co., 87 W. Chelmsford, Mass., 2,604 Granite curbing, Contracts Nos. 5 and 5,339 J. Leopold & Co., 5-A, L. Ft. 100 W. Sullivan, Maine, ... 2,682 5,339 Villeroy & Boch, Glazed tile and enamels, Contract No. 7, foreign, Sq. Ft. 182,500 Rakovnik, Czecho, 78,000 78.000 Glazed tile and enamels, Contract No. Amer. Encaustic Tiling Co., 7, domestic, Sq. Ft. 182,500 Zanesville, Ohio, 80.100 80,100 Bronze work, Contract No. 7, Pcs. 5.400 The Gorham Co., 10 Providence, R. I., Granite block pavement, Contract No. 10, Sq. Yd. 44,500 J. Leopold & Co., Vinalhaven, Maine, 29,943

The manufacture of steel and cast iron necessary for the river tunnels is practically completed.

The inspection of the ordinary items of iron and steel, such as tie-rods, tunnel bolts, sheet metal air flues, copper steel plates, floor beams, ceiling angles, caisson connecting rings, cast-steel shackles and structural steel for the cut and cover section, with the exception of rolling of steel and also the tile and bronze work and granite block, was done by the engineering staff of the Commissions. A ceramic expert has been on inspection

duty for the Commissions at the tile manufactories in Mettlach, Germany and at Rakovnik, Czechoslovakia and another at Zanesville, Ohio.

Sand and gravel, washers for tunnel bolts, rolling of steel, lead for caulking, grommets, cast-iron water pipe for tunnel service lines, waterproofing fabric and asphalt, non-corrosive metal, brick and paints have been inspected through the Materials Inspection Department of the Transit Commission and Board of Transportation of the City of New York as in 1924.

The sampling and testing of cement have been continued through the State Engineer's office at Albany. Approximately 146,794 barrels of Portland cement, of which 6,504 barrels were inspected by the Board of Transportation, and 2,007 barrels of mixed cement have been tested and received to date.

The continuation of the arrangement for inspection by the forces of the Board of Transportation of the City of New York and the State Engineer's office has placed the services of these experienced organizations at the disposal of the Commissions and avoided the duplication of facilities already available at a considerable saving to the Commissions.

VI. ACCIDENTS AND DECOMPRESSIONS

During the year, three fatal accidents occurred on the work and a fourth man died of bronchial pneumonia while in the hospital under treatment for partial paralysis brought on by work in compressed air. This last fatality is the only one, to date, traceable to compressed air illness, which in this case was the secondary cause of death. A certain number of accidents, while much to be regretted, seems unavoidable on a work of such magnitude in spite of the most careful supervision and attention as to safeguards and preventative measures. Minor accidents, usual in work of this character, occurred, but, having received prompt and adequate medical attention, no serious after effects resulted.

The total number of decompressions that have occurred to date is 745,882 with 528 cases of "bends." Of these, there were 27,499 decompressions with 19 cases of "bends" on all compressed air work during the year 1925; 4,899 decompressions with five cases of "bends" were on the foundation caisson work for the New Jersey land ventilation building, under Contract No. 6. Plate No. 7 presents decompression data in detail.

VII. TRAFFIC

Study of the vehicular traffic over the ferries crossing the Hudson River has been continued. No count was made this year, the figures given below being based on data obtained from the operating companies. Distribution and classification have been determined from these data where applicable, but where the necessary figures were not available, estimates were made using percentages determined from the Commissions' counts made in previous years modified to agree with the data which were furnished.

In making summaries, the ferries have been grouped as in previous reports, namely:

FIVE FERRY GROUP

(Nearest the Holland Tunnel)

Ferry Pennsylvania R. R. Pennsylvania R. R. Erie R. R. D., L. & W. R. R. D., I. & W. R. R.	New Jersey Terminal Exchange Place Exchange Place Pavonia Avenue Hoboken Hoboken	New York Terminal Desbrosses Street Cortlandt Street Chambers Street Barclay Street Christopher Street
	SIX FERRY GROUP	
(Re	maining Ferries South of 42d Street)	
Central R. R. of N. J. Central R. R. of N. J. Erie R. R. D., L. & W. R. R. D., L. & W. R. R. West Shore R. R.	Communipaw Communipaw Pavonia Avenue Hoboken 14th St., Hoboken Weehawken	Liberty Street West 23d Street Cortlandt Street
	FOUR FERRY GROUP	•
(1	Serries at and North of 42d Street)	
P. S. Corp. of N. J. West Shore R. R. West Shore R. R.	Edgewater Wechawken West New York*	130th Street 42d Street 42d Street

The volume of traffic for 1925 as compared with that of previous years is shown in the table following. In this table the traffic for the months of November and December, 1925, has been estimated, as complete data for these months are not yet available.

Englewood

Dyckman Street

TRAFFIC

FIVE FERRY GROUP

		Hor	se Drawn	Moto	or Driven	Total	Percent
	Total Yearly		Percent of		Percent of	Daily	Annual
Y car	Traffic	No.	Total	No.	Total	Traffic	Increase
1914,	2,839,055	7,655	86.9	1,159	13.1	8,814	
1915,	, ,	7,137	82.7	1,497	17.3	8,634	2.0
1916,		7,218	78.0	2,038	22.0	9,256	7.1
1917	2.207.010	6,785	68.7	3,093	31.3	9,878	6.7
1918,	2.406.620	6,270	59.9	4,193	40.1	10,463	5.9
1919,	2 524 022	5,093	50.9	5,484	49.1	11,177	6.8
1920,	2052502	4,904	43.4	6,509	56.6	11,503	2.9
1920,		4,532	39.3	7,098	60.7	11,540	0.3
1922,	1 220 515	4,575	37.2	7,727	62.8	12,302	6.6
1923,		4,053	31.2	8,951	68.8	13,004	5.7
1924,		3,332	26.9	9,058	73.1	12,390	-4.7
1925,		3,019	23.6	9,792	76.4	12,811	3.4

^{*} Not operating.

Dyckman St. and Englewood

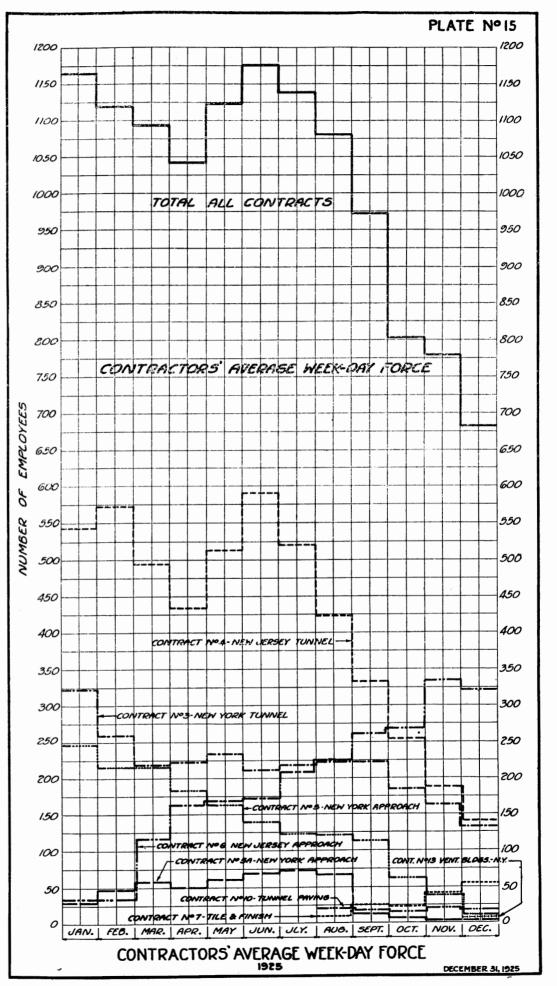


PLATE No. 15-Contractors' Average Week-day Force.

SIX FERRY GROUP

			Hor	se Drawn	Moto	r Driven	Total	Percent		
	Total	Yearly		Percent of		Percent of	Daily	Annual		
Year	T_r	raffic I	No.	Total	No.	Total	Traffic	Increase		
1914,	2,08	9,311 5,	,346	81.2	1,233	18.8	6,579			
1915,	2,09	0,519 4,	,936	75.1	1,636	24.9	6,572			
1916,	2,25	6,501 4,	,875	69.1	2,184	30.9	7,059	7.4		
1917,		0,803 4,	,755	62.5	2,855	37.5	7,610	7.8		
1918,		9,003 4,	,594	55.1	3,739	44.9	8,333	9.5		
1919,		6,042 3,	,884	47.2	4,344	52.8	8,228	—1.3		
1920,		1,727 2	,972	42.0	4,099	58.0	7,071	-14.1		
1921,	2,49	8,457 2,	,629	36.9	4,498	63.1	7,127	0.8		
1922,		3,881 2	,842	32.5	5,903	67.5	8,745	22.7		
1923,		9,119 2	,617	27.4	6,929	72. 6	9,546	9.2		
1924,		9,052 2	,097	23.6	6,787	76.4	8,884	6.9		
,	3,57	0,302 2	,116	20.3	8,323	7 9. 7	10,439	17.5		

FOUR FERRY GROUP

		Hor	se Drawn	Moto	or Driven	Total	Percent
	Total Yearly		Percent of		Percent of	Daily	Annual
Year	Traffic	No.	Total	No.	Total	Traffic	Increase
1919,	. 2,036,421	444	8.5	4,780	91.5	5,224	
1920,	. 2,089,035					5,400	3.4
1921,	. 2,584,691	455	6.7	6,329	93.3	6,784	25.6
1922,	. 3,007,538	313	4.0	7,474	96.0	7,787	14.8
1923,	. 3,353,190	274	3.0	8,790	97.0	9 ,0 64	16.4
1924,		265	2.6	9,994	97.4	10,259	12.5
1925,	. 4,334,676	239	2.1	10,877	97.9	11,116	8.4

The decrease in horse-drawn and increase in motor-driven traffic continues as was to be expected. The average weekday traffic for all ferries across the Hudson River from Manhattan is now 34,366 as compared with 31,865 in 1924, an increase of 9%, while the total volume for the year for all ferries shows an increase of 10% over the traffic for 1924.

The figures given above show the weekday averages based on the total traffic for the year. The average Sunday and holiday traffic for the year exceeds the weekday average by from 15% for the downtown ferries to 104% for the Dyckman Street-Englewood ferry. In like manner, the peak of the traffic during the summer months is from 25% to about 200% in excess of the minimum which occurs during the winter months, the smaller number applying to the downtown ferries and the larger to the two uptown ferries. These variations are due to a large extent to the ever increasing stream of pleasure motor car travel. An interesting sidelight on this subject is reported by the management of the Dyckman Street-Englewood ferry whose vehicular traffic is practically 100% motor driven, of which about 90% are pleasure cars. They state that concurrent with the increase in vehicular traffic they are experiencing a reduction in pedestrian passenger revenue.

VIII. PROGRAM OF WORK FOR 1926

The program of work for 1926 will include the preparation of contracts, specifications and contract drawings, and the award of the remaining nine construction and equip-

NEW JERSEY INTERSTATE BRIDGE AND TUNNEL COMMISSION

ment contracts and the prosecution of the construction work under these, as well as under the thirteen which are now under contract.

Before the tunnel can be opened for public use, all the twenty-three contracts involved in its construction and equipment must be completed, except Contracts Nos. 15 and 16. These two contracts, for the architectural work at the open approaches and plazas in New York and New Jersey, respectively, could be carried on after the opening of the tunnel with little or no interference with the tunnel traffic.

Contract No. 6 for the construction of the New Jersey approach was originally scheduled to be let in 1923. The letting of this contract was postponed until December, 1924, due to lack of sufficient funds.

Every effort has been made in the prosecution of the work and the letting of subsequent contracts to make up for the lost time on the New Jersey side. Part of the plant site which is now being occupied by the contractor for Contract No. 6, is essential for the prosecution of work under Contract No. 14 on the Land Ventilation Building, New Jersey, and unless this part of the plant site can be turned over to the Contractor for Contract No. 14 early in the spring of 1926, as is anticipated, there will be a corresponding delay in the completion of the tunnel. Barring such delay and other unforeseen occurrences, it is anticipated that at the end of 1926 the construction and equipment of the tunnel will be very nearly completed and, allowing for a reasonable period for testing out and adjusting the equipment, the tunnel should be ready for public use early in 1927.

To carry out this program additional funds, amounting to \$3,283,300.00 will be required. This will make possible the placing of all the remaining contracts. The first of these is scheduled for award about March 15, 1926, and to make this possible the additional funds will have to be made available before that date. Any delay in the award of these contracts, except Contracts Nos 15 and 16, will necessarily result in a corresponding delay in the opening of the tunnel.

IX. ORGANIZATION

Designs were under the supervision of Mr. Ole Singstad, Engineer of Designs, until the end of March, subsequently under Mr. Ralph Smillie, Engineer of Designs; construction under Colonel Frederic A. Snyder, Engineer of Construction; the General Office under Mr. E. Morgan Barradale, Assistant to the Chief Engineer.

Professor William H. Burr, Colonel George L. Watson, Mr. Frederick C. Noble, Mr. Frank M. Williams, Colonel William J. Wilgus, Dr. Edward Levy, Mr. George L. Lucas, Professor Arthur C. Willard, Mr. Lewis B. Stillwell and Professor George H. Brown have been continued as consultants, and Professor C. E. Ferree was retained as special consultant on the lighting of the tunnel and the color effects of the tile and on their interrelated effects in the tunnel. Mr. Sullivan W. Jones, State Architect of New York, has continued to act as consultant on the architectural features.

Being highly sensible of the co-operation and advice received, this opportunity is taken of tendering all these gentlemen expressions of thanks and appreciation for the services in the conduct of the work.

Appreciation of the loyalty and character of service of the entire staff is also expressed.

For the second time within a short period of five months, an irretrievable loss was suffered by the organization when, on March 24, 1925, its second Chief Engineer died. Mr. Milton H. Freeman had quietly assumed his appointed task of completing the work of The Holland Tunnel, when death claimed its first Chief Engineer on October 27, 1924, and was pursuing his course with all of his energy and intense devotion to duty, when he too was compelled to lay down his burden.

His practical experience, training and thoroughness in every detail, his fine sense of justice, his unusual modesty and consideration in his relations with others, his humanity, have made the loss to the organization a keen, personal one to every member with whom Mr. Freeman came in contact.

Respectfully submitted,

OLE SINGSTAD, Chief Engineer.

APPENDIX

TABULATION OF BIDS

CONTRACTS Nos. 7, 9, 10, 12, 13, 14, 20, and 24

CONTRACT NO. 10.

New York State Bridge and Tunnel Commission and New Jersey Interstate Bridge and Tunnel Commission, the Holland Tunnel, Canvass of Bids Received May 5, 1925

Item	CLASSIFICATION Unit	Quantity	W. J. Fitzgerald	John Meehan & Son	Booth & Flinn, Ltd.	Poirier Con- tracting Co., Inc.		E. J. FLAHERTY CONTRACTING CO.	Engineer's Estimate	
			Price Amount	Price Amount	Price Amount	Price Amount	Price Amount	Price Amount	Price Amount	
69 173	Asphalt coatingSq. yd. PavementSq. yd.	5,000 44,500	\$0 16 \$800 7 39 328,855	\$0 22 \$1,100 7 42 330,190	\$0 50 \$2,500 7 55 335,975	\$0 40 \$2,000 7 94 353,330	\$0 39 \$1,950 7 98 355,110	\$0 40 \$2,000 8 25 367,125	\$0 20 \$1,000 7 00 311,500	
	Totals		\$329,655	\$331,290	\$338,475	\$355,330	\$357,060	\$369,125	\$312,500	

CONTRACT NO. 12.

New York State Bridge and Tunnel Commission and New Jersey Interstate Bridge and Tunnel Commission, the Holland Tunnel, Canvass of Bids Received September 8, 1925, for Fans, Motors, Transmission and Control

Item	Item CLASSIFICATION Unit (Quantity	B. F. STURTEVANT COMPANY		Wagner Engineer- ing Co., Inc.		Buffalo Forge Company		GREEN FUEL ECONO- MIZER COMPANY		Engineer's Estimate	
rtem	CLASSIFICATION	Omt	Quantity	Price	Amount	Price	Amount	Price	Amount	Price	Amount	Price	Amount
70- b	Miscellaneous steel	Lb	45,000	\$ 0 08	\$3,600	\$0 08	\$3,600	\$0 10	\$4,500	\$0 55	\$2,475	\$0 12	\$5,400
70-c 70-d 70-e 7 0-f 70-g	Trans. chain 0.75 to 0.89 pitch	Per ft. per in. of width	1,000 1,000 4,000 2,000 8,000	67 84 86 88 105	670 840 3,440 1,760 8,400	80 95 97 1 00 1 10	800 950 3,880 2,000 8,800	96 1 01 1 10 1 30 1 56	960 1,010 4,400 2,600 12,480	67 84 86 90 1 05	670 840 3,440 1,800 8,400	1 30 1 38 1 50 1 70 1 90	1,300 1,400 6,000 3,400 15,200
70-h	Transmission guards	L b	30,000	15	4,500	22	6,600	156	4,680	1 45	4,350	30	9,000
185	Ventilating fans with spare parts	Lump sum	84		317,041		464,000		402,150		463,820		507,000
186	Transformer fans	Lump sum	6		2,155		4,500		5,500		4,750	• • • • • •	2,800
190	Motors and control	Lump sum	90		229,225		160,000		245,815		286,430		210,000
7 :	Bid amount				\$571,631 1,565,100 2,136,731		\$655,130 1,565,100 2,220,230		\$684,095 1,780,500 2,464,595		\$776,975 1,853,325 2,630,300		\$761,500 1,481,550 2,243,050
	Brai horsepo												
B. F. S	turtevant Company 6,2	260.4											
Wagne	r Engineering Co., Inc 6,2	260.4											
Buffalo	Forge Company	122.0											
Green	Fuel Economizer Company 7,4	113.3											
Engine	er's Estimate 5,9	26.2											

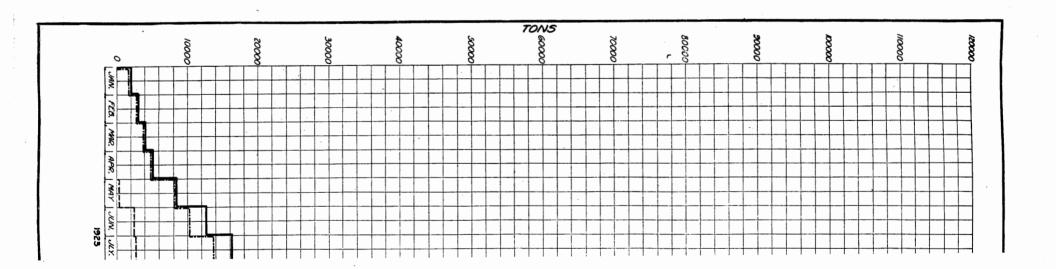
New York State Bridge and Tunnel, Commission and New Jersey Interstate Bridge and Tunnel, Commission, the Holland Tunnel, Canvass of Bids Received July 7, 1925, for Furnishing Power Transformers and Oil Switches

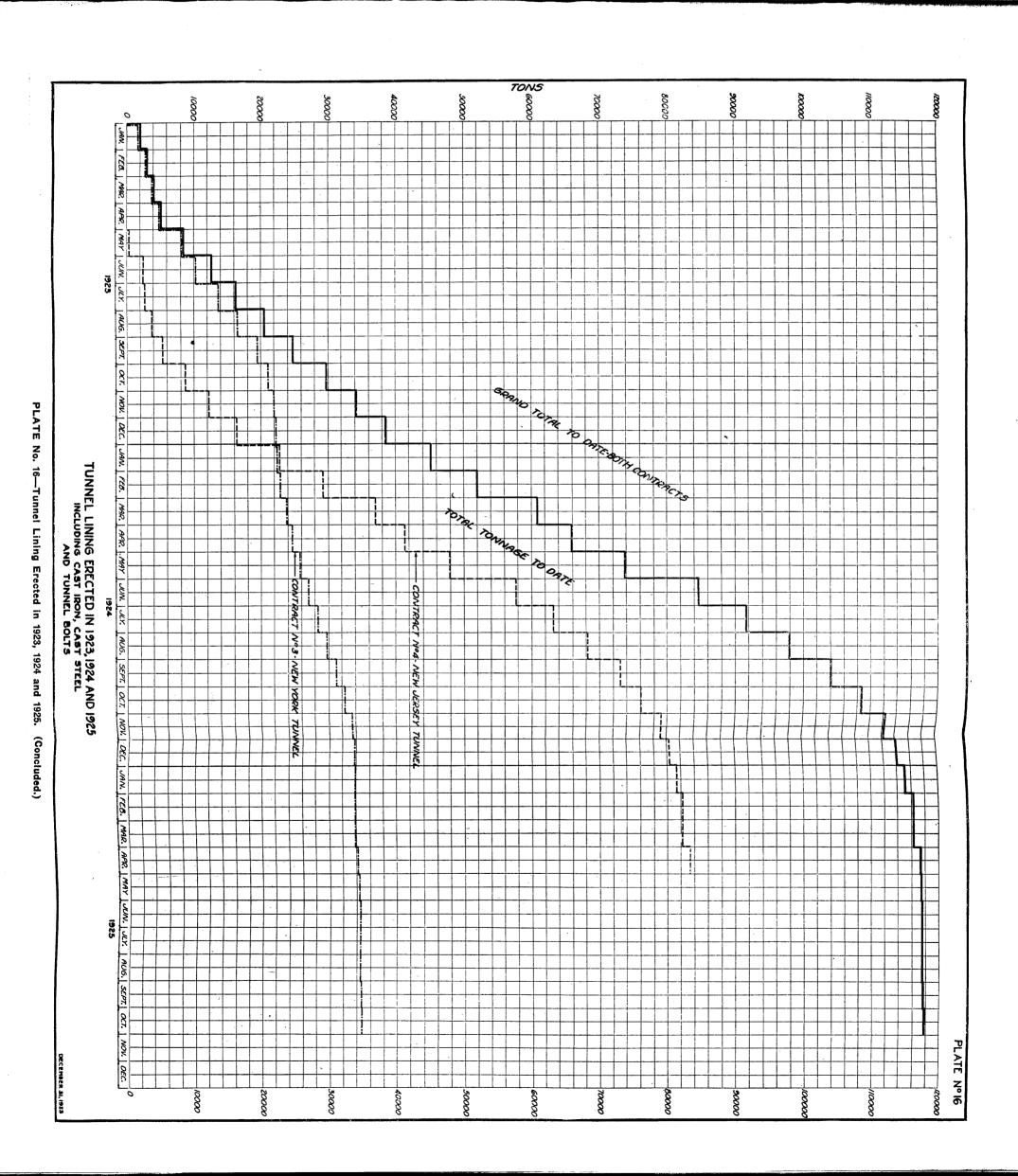
	:				AL ELECTRIC OMPANY	Westingho Mfg. Co	use Elec. &	Engineer's Estimate		
Item	CLASSIFICATION	Unit	Quantity							
				Price	Amount	Price	Amount	Price	Amount	
205 210	Transformers and switches	Lump sum	1	\$287,200 00	\$287,200 00	\$298,000 00	\$298,000 00	\$297,800 00	\$297,800 00	
210a 210b	Excess 2,300-volt, 800-Amp. oil switches Excess type E housing Excess type G housing	Each	6 4 2	1,112 00 563 00 1,021 00	6,672 00 2 252 00 2,04 2 00	1,250 00 630 00 1,100 00	7,500 00 2,520 00 2,200 00	1,500 00 800 00 1,000 00	9,000 00 3,200 00 2,000 00	
	Totals				\$298,166 00		\$310,220 00		\$ 312,000 00	

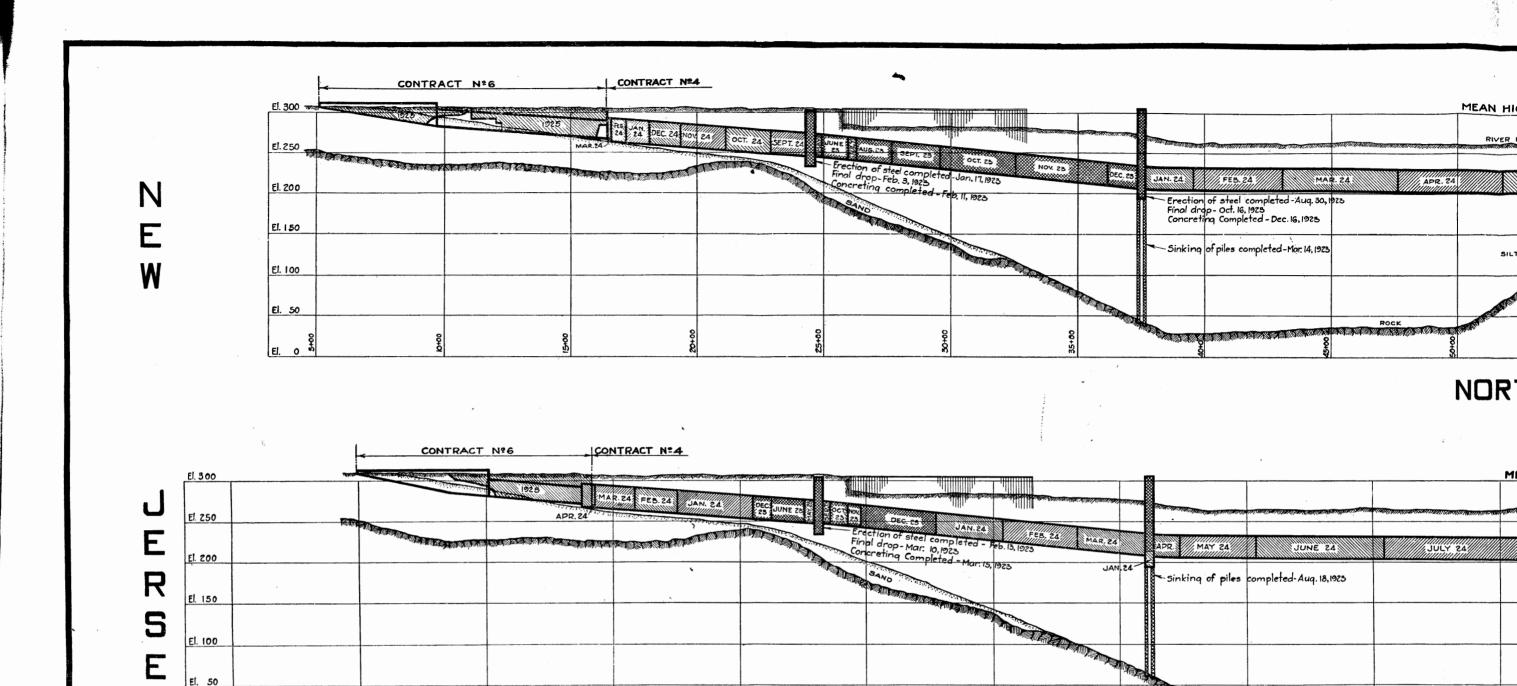
CONTRACT NO. 20.

New York State Bridge and Tunnel Commission and New Jersey Interstate Bridge and Tunnel Commission, the Holland Tunnel, Canvass of Bids Received December 15, 1925

					OF BIDS	KECEIVE	D DECEM	BER 15,	1925								
Item				JAMES SUGDEN ENG. C		ERICSON SAFETY ENG. CO., CABLE INC. COMPAN		CABLE FOX		Fox REYNOLDS COMPANY, INC.		JOHN W. HOOLEY		NEER'S IMATE			
				\mathbf{Price}	Amount	\mathbf{Price}	Amount	Price	Amount	Price	Amount	Price	Amount	Price	Amount	Price	Amount
	For three-conductor, paper insulated, lead covered cable, complete, with racks, hangers, tags, cable supports, joints and cable protection in splicing and pull-chambers, as follows: (a) For 500,000 circular mil, paper insulated, (b) For 167,805 circular mil, paper insulated, For three-conductor, varnished cambric insulated, lead covered cable, complete, with potheads and their supports, racks, hangers, tags, cable supports, bonds, grounds, clamps, joints, cable protection in splicing and pull-chambers and insulators, as follows:	Lin. Ft. Lin. Ft.	37,000 20,000	\$2 13 1 12	\$78,810 22,400	\$2 15 1 20	\$79,950 24,000	\$2 55 1 20			\$86,210 25,000			\$3 19 1 64	\$118,030 32,800	\$2 50 1 40	\$92,500 28,000
	(a) For 500,000 circular mil, cambric insulated	Lin. Ft.	6,000	3 46	20,760	4 10	24,600	3 00	18,000	4 17	25,020	2 94	17,640	4 33	25,980	2 50	15,0 00
	(b) For 167,805 circular mil, cambric insulated	Lin. Ft.	2,000	2 35	4,700	4 67	9,340	3 00	6,000	5 29	10,580	1 91	3,820	3 3 7	6,740	1 40	2,800
	lated	Lin. Ft.	2,000	1 00	2,000	1 13	2,260	1 00	2,000	1 11	2,220	1 42	2,840	1 52	3,040	85	1,700
	Totals	•••••			\$128,670	••••	\$139,750	• • • • • • • • • • • • • • • • • • • •	\$144,350		\$149,030		\$153,410		\$186,590		\$140,000



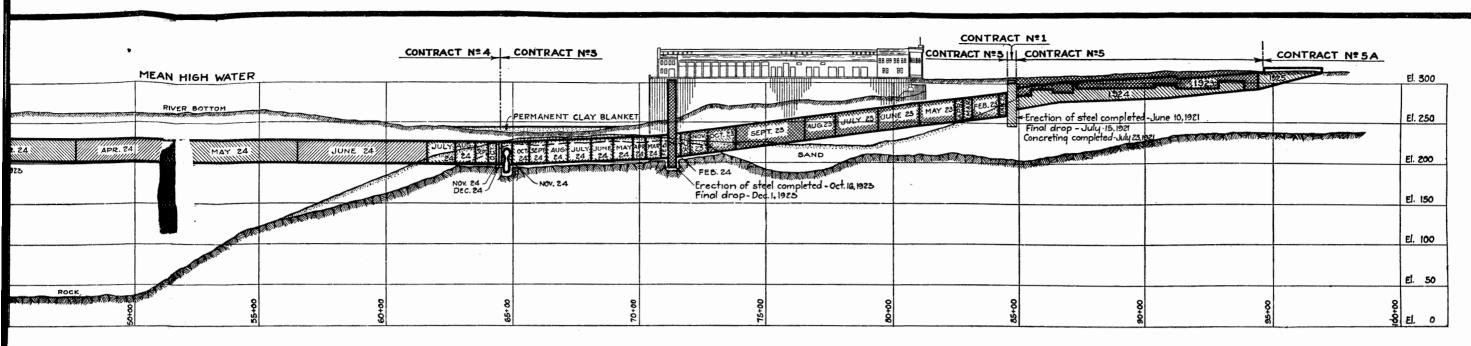




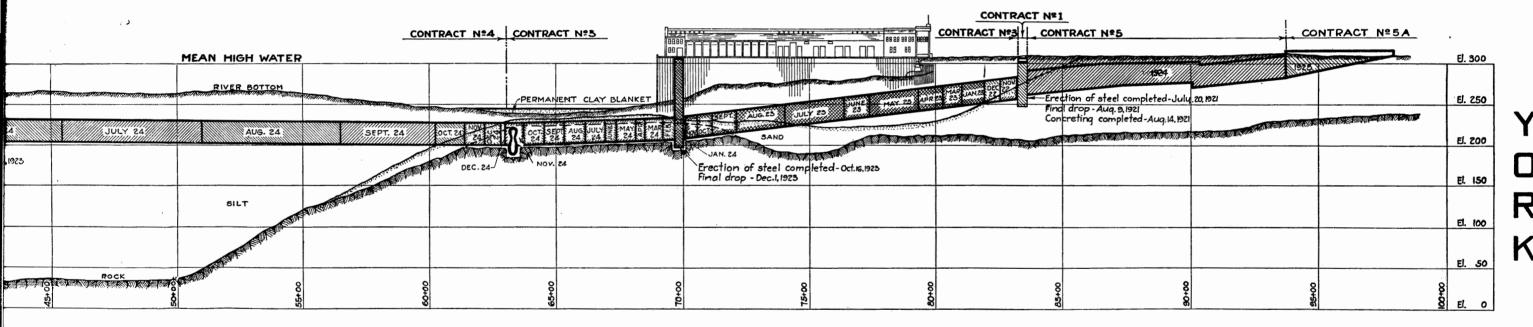
SOU

HUDSON RIVER CONSTRUC

SCALES:



NORTH TUNNEL



SOUTH TUNNEL

NSTRUCTION PROGRESS

SCALES: NO SO SO SO SEET

DECEMBER 31, 1925

NOTE

Tunnel progress shown on Contracts Nºº 3 and 4 is exclusive of concrete lining.

PLATE Nº1

Progress on Contracts NP5, SAKG is excavation only.

