A record of war activities

Turner Construction Company

TURNER CONSTRUCTION COMPANY

REINFORCED CONCRETE CONSTRUCTION

244 MADISON AVENUE

NEW YORK

BRANCH OFFICES
BUFFALO, N.Y.
BOSTON, MASS.

H. C. TURNER,
PRESIDENT

May 29, 1919.

Library of Harvard University,
Harvard University,
Cambridge, Mass.

Gentlemen:-

We have published a book entitled "A Record of War Activities" illustrating the work which we were privileged to construct for the Government during the war. We have in our employ a number of graduates of Harvard University and a number of them have suggested the sending of a copy of the book to you. We believe you will find it of great interest.

Very truly yours,

President.

HCT.S

A
RECORD
of
WAR ACTIVITIES

ONE OF THE REINFORCED CONCRETE WAREHOUSES OF THE U. S. ARMY SUPPLY BASE, BROOKLYN, N. Y.

A RECORD of WAR ACTIVITIES

1918

TURNER CONSTRUCTION COMPANY
244 MADISON AVENUE
New York
Buffalo *Boston*
Pittsburgh
Philadelphia

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INDEX

HENRY C. TURNER

PREFACE

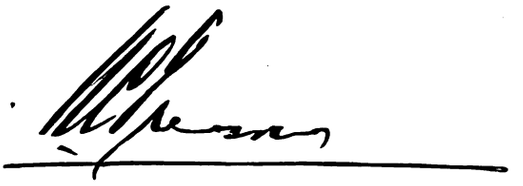
DURING the great war, now ended let us hope for all time, every man of heart and soul earnestly desired to do a man's part in its successful prosecution. This spirit of service to Country was practically universal.

The young men who crossed the seas into the "valley of death," prepared to make the supreme sacrifice, will always be accorded first place on the honor roll of our Country. Many more men, however, were required to remain at home to compose the great army of industry to supply the guns, the munitions, the clothing, the food, and to create the wealth to support the fighting men.

Many men and many groups of men of this industrial army rendered distinguished service. Many of them subordinated their personal wishes and ambition to continue in the industrial army instead of volunteering for the greater service overseas.

This problem of how best to serve our Country was earnestly considered by the Turner Construction Company in the early days of the war and the decision was reached, which I believe subsequent events have justified, that by acting in concert, the men managing the Company could give a more valuable service in the successful conduct of the war than through individual effort in the Army or the Navy.

This book of our war activities is a record of the war work done for the Government. It was our good fortune, as a result of our experience in construction of large projects, to be selected by the Government to build many of the permanent buildings of the war, and it is a source of great satisfaction to know that these buildings are suitable to serve the needs of peaceful commerce and industry.



LOCATION OF WAR WORK BY THE TURNER CONSTRUCTION COMPANY IN NEW YORK HARBOR SHOWN IN RED

U. S. Navy Supply Storehouse

MEDICAL SUPPLY STOREHOUSE

CHEMICAL LABORATORY

New York Navy Yard

U. S. NAVY SUPPLY STOREHOUSE, NEW YORK NAVY YARD

U. S. NAVY SUPPLY STOREHOUSE
MEDICAL SUPPLY STOREHOUSE
CHEMICAL LABORATORY
New York Navy Yard

THE erection of the Supply Storehouse at the New York Navy Yard gave the Turner Construction Company its first opportunity to aid in the "Win the War" programme.

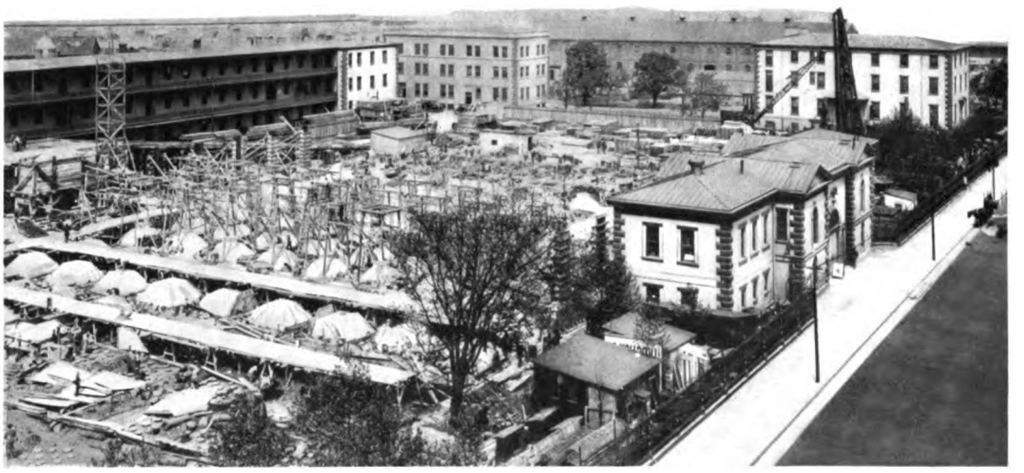
Rumors that German gun emplacements were being built in a certain Brooklyn factory indirectly led to the consideration of the Turner Construction Company as contractors for this work. The Navy Yard officer assigned to investigate these rumors found that the supposed gun emplacements were large engine foundations being installed by this contractor. The inspection of the building and subsequent investigations convinced the Navy Yard officials of the high reputation in concrete building work enjoyed by the Turner Construction Company.

For some years it had been recognized that the New York Navy Yard was inadequate for the growing needs of the department—that some storage space was necessary and that the new shipways contemplated would compel the transfer of existing storage to another point. Shortly before the United States entered the war, Commander Leonard M. Cox called in the Turner Construction Company for conferences on the design of two large storehouses.

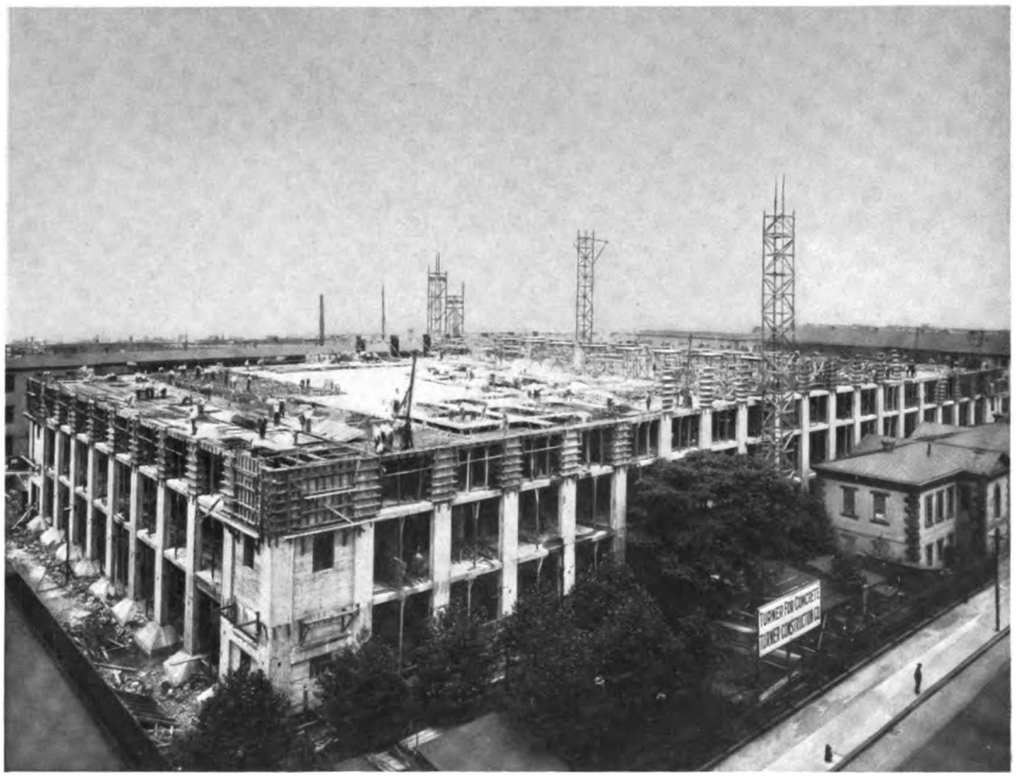
The breaking of diplomatic relations with Germany determined the Department to complete the plans with all speed and to proceed with the project as soon as approval could be obtained. After some negotiation, a contract was prepared and executed by Rear Admiral Frederick R. Harris, Chief of the Bureau of Yards and Docks, on April 28th, 1917, for a ten-story warehouse, on a cost-plus-percentage basis. The site chosen was the parade ground in front of the marine barracks in the eastern end of the Navy Yard and work was started without delay.

The plans provided for a reinforced concrete building 360 x 180 feet in plan, designed for live loads of 400 pounds per square foot on the second and third floors, 300 pounds per square foot on the fourth floor, 250 pounds per square foot on the fifth, sixth and seventh floors, and 150 pounds per square foot on the remaining floors. Two fire walls divided the building into three distinct sections on all floors except the first. Shipping facilities were provided by a covered platform on all four elevations. Railroad tracks adjoin those on the side and the rear, while the front platform is for truck service. The building is equipped with complete plumbing, lighting, heating, elevator and sprinkler systems.

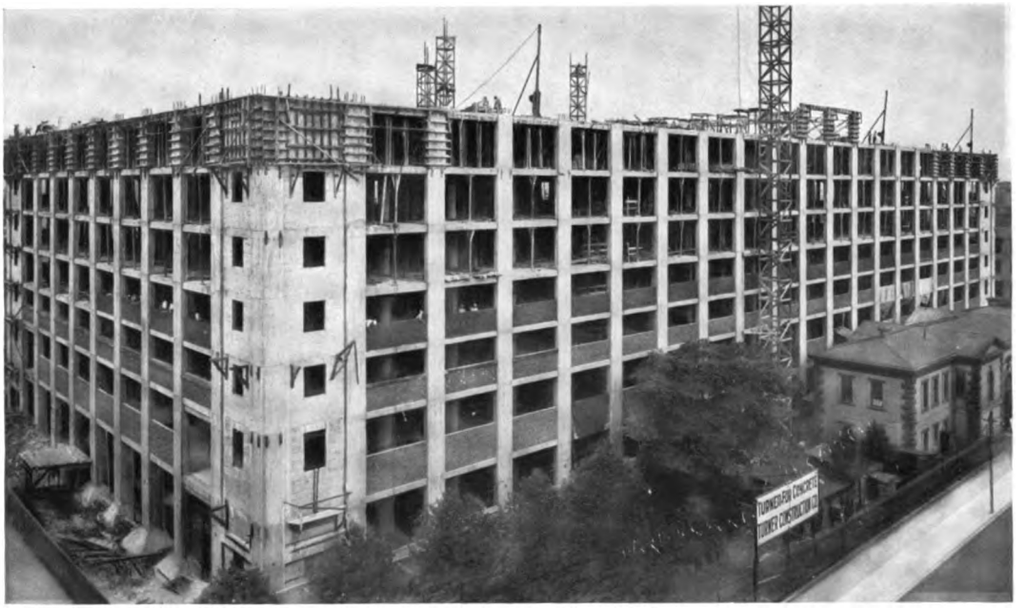
The first work to be started was the concrete pile foundations of the Raymond type. On May 2nd, four days after the contract was signed, the first pile driver was being assembled at the site, and within one month the pile foundations were in place. Meanwhile it had been decided to make the building eleven stories in height in place of ten and plans were completed on that basis. On June 11th, the concreting of the first



JUNE 1st—*One month after contract was signed*
3800 piles driven and footings practically complete



JULY 5th—*One month later*
Fourth floor concreted



AUGUST 2nd — *One month later*
Eighth floor concreted

SEPTEMBER 12th — *4½ months after contract was signed*
Eleven stories complete, roof finished. Concrete work for 712,800 square feet of floor completed and put under cover in eleven weeks — a floor a week

TYPICAL UPPER FLOOR

HIGH FIRST STORY

self-supporting floor was started and from that date the floors were poured at intervals of 6½ working days with almost clock-like regularity. The roof with some special saw-tooth construction was completed on September 12th.

This schedule shows an average of one and one-quarter acres of floor, with the granolithic finish in place, completed each week. The sub-contractors kept the installation of their respective work close behind the structural work and on October 1st the Navy commenced moving in on four floors of the building. The entire building, having about

REAR VIEW OF STOREHOUSE. NOTE CONCRETE LOADING PLATFORMS AND CONCRETE BRIDGES OVER TRACKS

MEDICAL SUPPLY STOREHOUSE, BROOKLYN, N. Y.

16.35 acres of floor space, was ready for the Navy's use on November 15th. The contract date for the occupancy on the ten-story building was December 9th, so that the Navy Department was able to fully occupy the eleven-story building some three weeks before the date set for initial occupancy of the ten-story building originally planned.

This contract, which amounted to about $1,300,000.00, for the main building, including adjacent paving and railroad track work, was carried out under the supervision of Lieut.-Com. Allen, Public Works Officer, with Lieut. Seaton Schroeder, Jr., as officer in charge. Howard Chapman, of Timmis & Chapman, was retained for the architectural design of the elevations.

R. C. Wilson was engineer and W. T. Anderson was superintendent for the Turner Construction Company.

The major sub-contractors were as follows:

Elevators	Otis Elevator Company
Heating	Jas. H. Merritt
Plumbing	J. S. Murphy Company
Electrical Work	Hatzel & Buehler
Pile Foundations	Raymond Concrete Pile Company

MEDICAL SUPPLY STOREHOUSE

•

CHEMICAL LABORATORY

At the time this contract was awarded, another contract was given to the same contractor for the construction of a Provisions and Clothing Warehouse to cost about $600,000.00, to be located on the Cob Dock, New York Navy Yard, but before actual construction work had proceeded further than the uncovering of the soil conditions at the site, it was decided that the space could be more profitably used and the needs for this warehouse were taken care of in another manner—so this contract was cancelled in July, 1917.

As the Supply Storehouse was nearing completion, a supplemental contract was given the Turner Construction Company for the erection of the Medical Supply Storehouse, shown in the illustration on page 17. This building was designed by the Bureau of Yards and Docks, Lieut.-Com. Kirby Smith, project manager, in accordance with the requirements of the Bureau of Medicine and Surgery, Capt. R. P. Crandall, Medical Corps, U. S. N., in charge. The building is eight stories and basement in height and 103 x 103 feet in plan. Authorization was given early in November, 1917, and the construction work proceeded through the winter and the building was occupied in July, 1918. The work, which cost complete about $290,000.00, was carried out under Lieut.-Com. Allen and Capt. R. C. Hollyday, Public Works Officers, successively. George H. Smith was superintendent and R. C. Wilson engineer for the Turner Construction Company.

Another supplementary contract was made covering the construction of the Chemical Laboratory shown on this page, a building two stories in height, at present, but designed to be carried to a greater height in the future. While the size of the building 35 x 60 feet was not large, the provisions to be made for and the installation of the special equipment necessary in a building of this character required much care and study and brought the total cost up to $60,000.00, and required about three and one-half months of work.

The engineering and construction work was handled by the organization employed on the Supply Storehouse.

CHEMICAL LABORATORY, NEW YORK NAVY YARD

DEPARTMENT OF COMMERCE

Bureau of Standards, Washington, D.C.

NORTHWEST LABORATORY, BUREAU OF STANDARDS, WASHINGTON, D. C.

DEPARTMENT OF COMMERCE

Bureau of Standards, Washington, D. C.

THE various programs representing contributions of the United States to the Allies necessitated the testing of many new and special appliances as well as the standardization of items of equipment and the Bureau of Standards was called upon to assist in the perfecting of these appliances and working out the problems involved. The testing and perfecting of the Liberty Motor for aeroplanes was one notable instance.

The Bureau of Standards buildings are located on Connecticut Avenue, beyond the Zoological Gardens, near the Washington City line. Here is maintained an organization of specialists for research and the testing of materials and appliances used by the different Government departments.

The available space soon became seriously crowded and in September, 1917, the Turner Construction Company was awarded a cost-plus-fixed-fee contract to erect the Northwest Laboratory. This building is 60 x 200 feet in plan and four stories high. The floors and frame are reinforced concrete throughout. The closing walls are of brick with Indiana limestone trimmings; the floors have granolithic finish, the partitions are of terra cotta blocks plastered both sides. Interior trim, doors, partitions and partition sash, are stained oak. Windows are of solid steel sections; and it is to be noted that a feature of the exterior design is the continuous steel sash construction extending from the first story sill to the lintels in the top story.

The floors of the building are divided into rooms of sizes as required by the different branches of the Bureau and the building is used entirely for laboratories and offices.

The addition of the Northwest Laboratory Building to the many other buildings of the Bureau of Standards called for an increase in the heating equipment at the Central Power House, and on December 15th, 1917, the Turner Construction Company was authorized to proceed with the extension of the Power House to accommodate additional boilers. This extension is 38 x 42 feet in plan, one story high; walls of brick with limestone trim; ground floor of concrete; roof construction of steel and wood.

The Government's war program increased rapidly, and likewise the work required of the Bureau of Standards. It was decided that another large laboratory building would be required. Plans were prepared by the architects, and early in February, 1918, the Turner Construction Company was authorized to proceed with work on the building to be known as the Industrial Laboratory. An illustration appears on page 22 and a first floor plan of this building is shown on page 24.

The building has a frontage of 351 feet; a depth of 164 feet; a width for main section of 62 feet, and width for extensions of 60 feet. The main section together with the three extensions forms a plan like the letter "E."

INDUSTRIAL TESTING LABORATORY, BUREAU OF STANDARDS, WASHINGTON, D. C.

The columns, floors and roof of this building are of reinforced concrete construction; the floors have a granolithic finish, the walls are of brick with Indiana limestone base and trimmings. The exterior window frames are made up of solid steel and are carried continuously past the second and third floor curtain walls; partitions are terra cotta blocks; floors have terra cotta fillers between concrete joists, thus providing for a flat ceiling.

Interior trim is of stained and varnished oak, including doors and partition sash; stairs are of steel frame with marble treads; all interior exposed brick, terra cotta and concrete surfaces are plastered and finished smooth, except certain areas in the Court, sections of basement and the open space in the center wing.

The entire center wing is of special construction to provide for various testing machines. The central part of this wing is open from basement to third floor, with galleries surrounding the open well at first and second floor levels. The central well will ultimately be occupied by large vertical testing machines, and the galleries by the smaller testing machines. An artist's drawing of this room is reproduced on page 25.

Directly north of the Industrial Laboratory Building, and separated from it by a driveway about 30 feet wide, is the Kiln Building. This building is one story, 50 x 352 feet in plan, with a basement in the west end which will be used for the heating plant for these two buildings. The end walls are connected with the Industrial Laboratory Building by a brick wall which contains an open archway for the driveway so that the two buildings may be considered in effect one large unit.

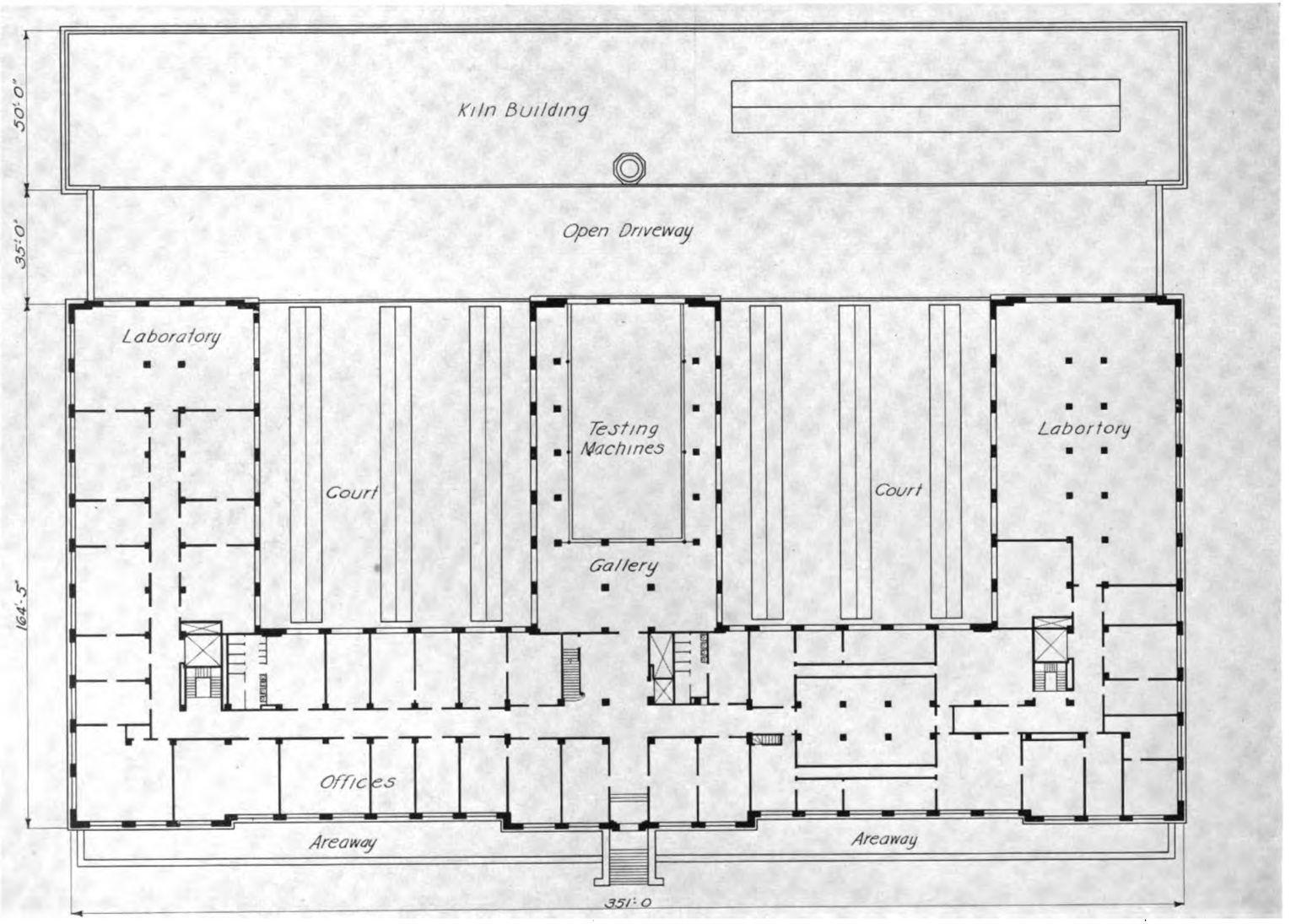
The Kiln Building, shown on page 25, is to be used for the manufacturing, testing and studying of various clay products, and many types of furnaces have been installed in this building by the Government for this purpose.

One of the most important items of work by the Bureau during the war was the testing of aeroplane motors and parts of aeroplane equipment. This testing during 1917 and 1918 was done in temporary buildings, but the need for additional space for this work became urgent late in the summer of 1918, and a Dynamometer Building was started.

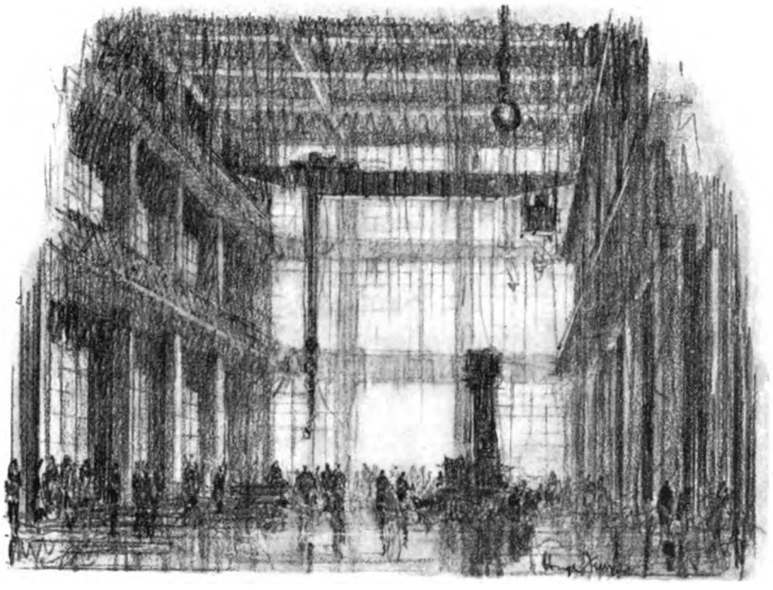
This building is 50 x 150 feet, one story high, except for a section of the east end, where there is a basement 50 x 50 feet. In the first story there is a mezzanine floor of the same area. The columns, floors and roof are of reinforced concrete; the walls of brick with Indiana limestone trimming. In the west end of the building there is a large reinforced concrete chamber, airtight, insulated and provided with cooling equipment. Here the carburetors for aeroplane motors will be tested at various temperatures and under various air pressures.

REAR OF INDUSTRIAL TESTING LABORATORY

When the Industrial Laboratory and Kiln Buildings were authorized, it was expected that there would be



FIRST FLOOR PLAN, INDUSTRIAL TESTING LABORATORY



ARTIST'S DRAWING OF THE TESTING MACHINE ROOM AS SHOWN ON PLAN ON OPPOSITE PAGE

considerable difficulty in obtaining materials as required, and designs were rushed, materials ordered and scheduled for prompt delivery. By carefully following all orders, there was very little delay in the work from lack of materials.

The serious problem encountered was the shortage of workmen. Due to the very large construction program of Washington and the insufficient housing facilities, the shortage of workmen for building construction became very acute early in 1918. This condition was even more serious for the work at the Bureau of Standards because of the lack of housing facilities near the work, and it finally became so serious that it was necessary to construct living quarters. Barracks were constructed for one hundred men, a mess hall, with kitchen and equipment, and a lavatory building.

After these quarters were provided, with the assistance of the Labor Department, men were employed in various cities and brought to Washington to work upon these buildings.

The reinforced concrete work on the Northwest Laboratory for the floors, columns and roof was placed during the month of October, and the first half of November, 1917. The Bureau occupied the building in April, 1918.

The site chosen for the Industrial Laboratory was a knoll higher than the street level which sloped down to ravines on either side and required a large amount of excavation and grading. Clearing of site and the excavation work was started in February, 1918, and the reinforced concrete work, except for the special work in the center wing, was completed on July 24th.

The center wing, which has steel trusses over the open well and special construction by which the second floor is suspended from these steel trusses, followed the work on the main building, and the last of the concrete for the roof over this area was placed September 10th.

KILN BUILDING AT THE REAR OF THE INDUSTRIAL TESTING LABORATORY

There remained after the reinforced concrete construction was in place a large amount of work to construct the enclosing walls, interior partitions and to complete the large amount of plaster work. Strikes of workmen during the fall and winter after the signing of the armistice seriously delayed the work, but by March, 1919, satisfactory progress was again being made.

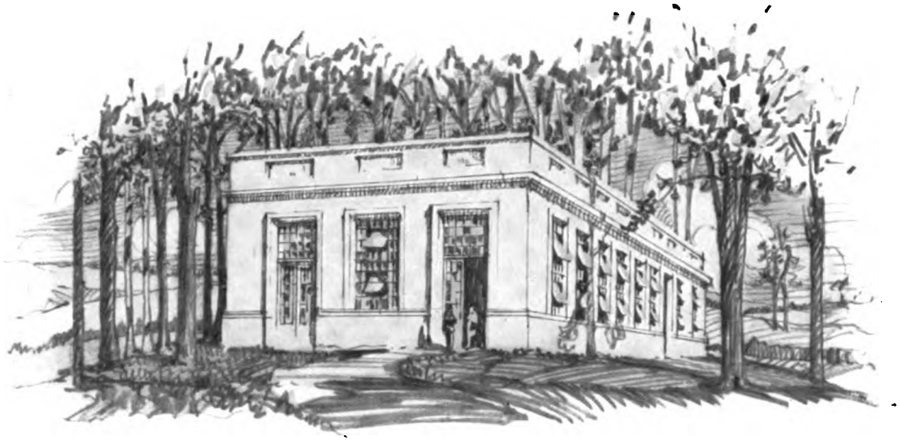
Work on the Dynamometer Building was started in October, 1918, the roof was in place on December 10th, 1918, and the building enclosed late the following month.

All of the several buildings described, which cost a total of about $1,200,000.00, were designed by Donn & Deming, architects, of Washington, D. C. The designs in general follow the architecture of the other Bureau of Standards buildings and are exceedingly pleasing and indicate possibilities of a new type of design for industrial buildings.

Dr. S. W. Stratton, Director of the Bureau of Standards, realizing the enlarged work which would fall upon the Bureau after the war in solving reconstruction and industrial problems, has had the foresight to plan and construct permanent fireproof buildings instead of temporary war buildings.

These buildings were constructed under the supervision of R. J. Wig and J. C. Pearson, of the Bureau, assisted by a corps of engineers and inspectors.

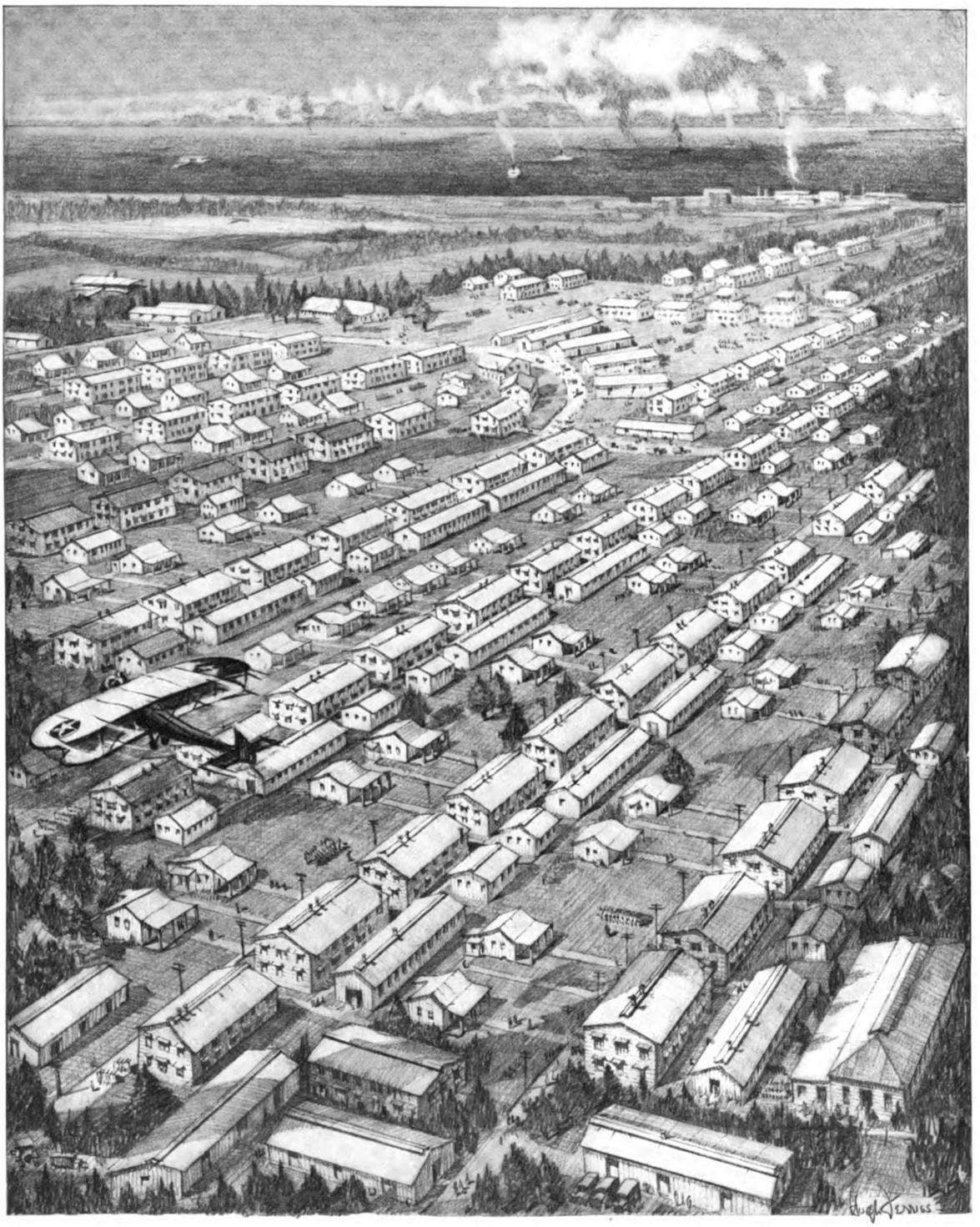
The Turner Construction Company's organization on this work was as follows: J. C. Grady, superintendent in general charge; H. A. Ward, engineer; W. J. Harrington, purchasing agent; G. H. Plant, auditor.



DYNAMOMETER BUILDING

Coast Artillery Barracks

New York Harbor



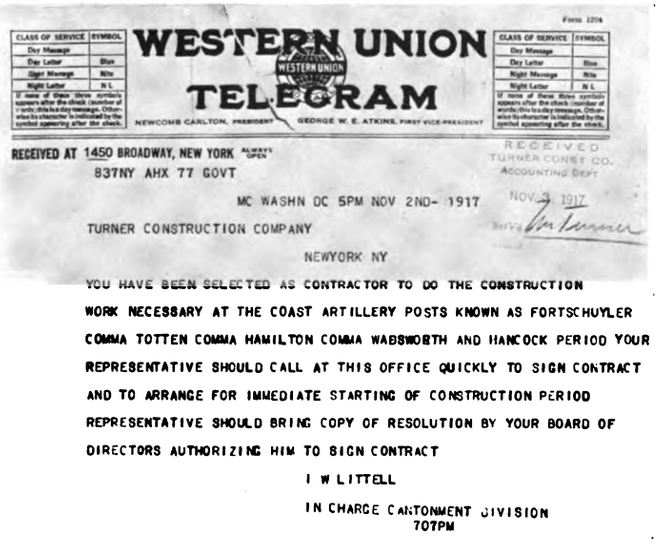
ARTIST'S DRAWING REPRESENTING CANTONMENT BUILDINGS BUILT IN NEW YORK HARBOR
THIS COMPOSITE DRAWING EMBRACES THE WORK DONE AT FIVE FORTS

See map of New York Harbor, page 10

COAST ARTILLERY BARRACKS

New York Harbor

SATURDAY morning, November 3rd, 1917, the Turner Construction Company received an unexpected telegram from Brig.-General I. W. Littell, chief of the Construction Division of the War Department, reading as follows:



WESTERN UNION

TELEGRAM

NEWCOMB CARLTON, PRESIDENT — GEORGE W. E. ATKINS, FIRST VICE-PRESIDENT

RECEIVED AT 1450 BROADWAY, NEW YORK

837NY AHX 77 GOVT

MC WASHN DC 5PM NOV 2ND 1917

TURNER CONSTRUCTION COMPANY

NEWYORK NY

YOU HAVE BEEN SELECTED AS CONTRACTOR TO DO THE CONSTRUCTION WORK NECESSARY AT THE COAST ARTILLERY POSTS KNOWN AS FORTSCHUYLER COMMA TOTTEN COMMA HAMILTON COMMA WADSWORTH AND HANCOCK PERIOD YOUR REPRESENTATIVE SHOULD CALL AT THIS OFFICE QUICKLY TO SIGN CONTRACT AND TO ARRANGE FOR IMMEDIATE STARTING OF CONSTRUCTION PERIOD REPRESENTATIVE SHOULD BRING COPY OF RESOLUTION BY YOUR BOARD OF DIRECTORS AUTHORIZING HIM TO SIGN CONTRACT

I W LITTELL

IN CHARGE CANTONMENT DIVISION

707PM

RECEIVED TURNER CONST. CO. ACCOUNTING DEPT NOV 3 1917

Sunday, a party of four officials of the contractor visited the various forts referred to, to see what the construction problems were. Two officers spent Monday and Tuesday in Washington negotiating the contract, which was of the usual cantonment type, and getting plans and other necessary data together. In the meantime, the New York office was trying to locate lumber and assemble a construction organization. Wednesday, November 7th, work was started in the field.

The problem was to get nearly two hundred buildings of the standard cantonment type up and in livable shape before snow came. The Coast Artillerymen had been living under canvas all summer and were in a most exposed location at each of the forts.

Had all the buildings been at one point, as was the case with nearly every other cantonment, the problem would have been relatively simple. This task, however, was really five jobs in one, each at a relatively inaccessible place. Sandy Hook, Fort Schuyler and Fort Totten were especially difficult points to persuade labor to go to.

The following materials had to be purchased, delivered and assembled:

Lumber	Approximately 4,000,000 feet
6 x 8-inch Creosoted Posts	19,702 lineal feet
Wood Windows	8,794 or 75,747 square feet
Wood Doors	1,986 or 34,630 square feet
Wall Board	590,450 square feet

Tar Paper for Insulation	853,200 square feet
2-ply Roofing	6,347 squares or 634,700 square feet
1-ply Roofing	3,490 squares or 349,000 square feet
Liquid Roofing Cement	3,673 gallons
Nails	1,530 kegs (does not include roofing nails)
16-mesh Wire Screening for Roof Vents	31,147 square feet
2½-inch Fire Hose	6,850 lineal feet
Hose Carts	14
Fire Pails	745
Hand Pump Tanks	150
Kitchen Ranges	69
Cannon Stoves	448
Room Heaters	176
Tank Heaters	36
Hot Water Tanks for Showers	38
Total Stoves of all kinds	729
Coal Cans	624
Coal Scoops	624
Electric Lamps	2,073

On Thanksgiving Day, the boys at Fort Wadsworth were able to eat their dinners under cover, and by Christmas Day, all the barracks buildings were completed.

Sixteen hundred men worked to accomplish this progress divided thus:1000 carpenters, 100 plumbers and helpers, and 500 laborers, working ten hours a day seven days a week.

The operations were directed by four Turner superintendents: L. H. Usilton at Fort Hancock, C. H. Marsh at Fort Wadsworth, D. M. A. Salls at Fort Hamilton, and H. B. Snell at Forts Totten and Schuyler; and under the supervision of G. F. Floyd, who acted as general superintendent; E. C. Epple as engineer; and B. M. Fowler, Jr., as purchasing agent. All of the work was done under the direction of Capt. Wesley King, Constructing Quartermaster.

The Construction Division of the War Department with Major Lockett and Major Coleman in immediate charge of all the Coast Artillery barracks on both coasts, gave every possible support and assistance. Materials were bought out of stock whenever it was necessary to keep the jobs going. Approximately $1,250,000.00 were spent in two months to get these buildings up and ready for occupancy.

The artist's drawing on page 28, is an attempt to show all the buildings comprised in the undertaking as they might look if built at one camp. Actual representation is impossible—photographs of New York Harbor forts being impossible to obtain.

ARTISTS' DRAWING OF TYPICAL CANTONMENT BUILDINGS, INCLUDING MESS HALL, OFFICERS' BUNGALOW, BARRACKS BUILDING, LATRINE AND STOREHOUSE

Odd Jobs for the Navy

New York Harbor and Kittery Point, Me.

FORT LAFAYETTE, NEW YORK HARBOR

ODD JOBS FOR THE NAVY

New York Harbor and Kittery Point, Me.

FOLLOWING the completion of the Supply Storehouse in the Brooklyn Navy Yard in the Fall of 1917, the Turner Construction Company was commissioned by the Navy Department, Bureau of Yards and Docks, Com. A. L. Parsons, Acting Chief of the Bureau, to carry out several projects, which, though of smaller magnitude, called for careful planning and rapid execution. These operations are shown in the accompanying illustrations and are briefly described herewith.

PORTSMOUTH NAVAL PRISON BARRACKS

This contract was awarded the Turner Construction Company by Com. A. L. Parsons, Acting Chief of the Bureau of Yards and Docks, during the first week of January, 1918, to enable Lieut.-Com. Thomas Mott Osborne, Superintendent of the Naval Prison at Portsmouth, to carry out his welfare programme at that point.

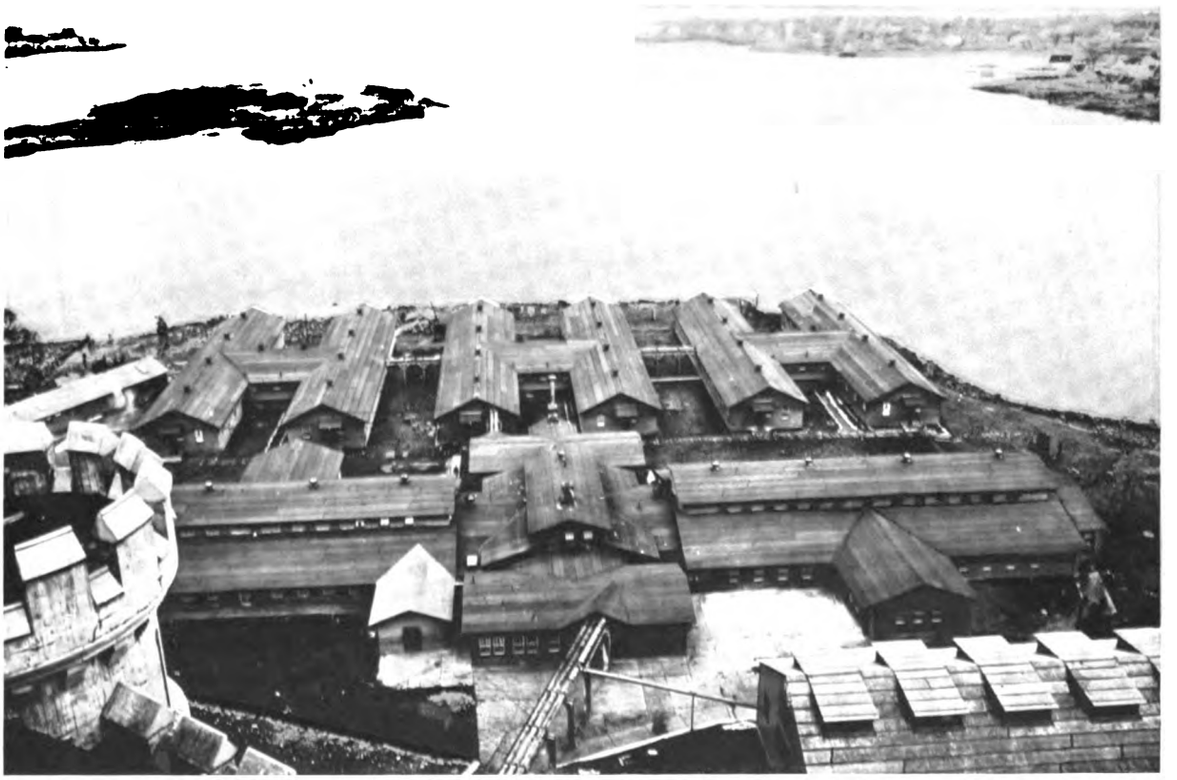
It comprised in its final form, five barrack buildings, a mess hall and kitchen, a tunnel, small pump and hose houses and miscellaneous other work. The barracks were H-shaped in plan, consisting of two wings 27 x 120 feet, connected by a section 25 x 32 feet, containing the lavatories. The mess hall was irregular in plan, having over-all dimensions of 106 x 292 feet, the central portion being utilized as a galley and bake-shop, with mess rooms in either wing.

The exposed location of these buildings close to the shore at Kittery Point, Me., led to the adoption of a more substantial construction than usual in cantonment structures, although frame buildings one story high were called for. Work was started on January 7th and the barracks and mess hall were ready for occupancy March 12th. The weather during the winter months was extreme, with sweeping winds from ocean and bay, the thermometer registering at times 26 degrees below zero. Portsmouth was some three miles away, and difficult of access by ferry, and the trolley lines were nearly two miles distant, so that the labor problem was a most discouraging one.

The tunnel connecting the main prison building with the mess hall to be used as a passage way for men and supplies, and containing the steam lines from new boilers installed in the existing boiler room, had to be blasted in places from solid rock to a depth of 20 feet below the ground level; and the excavation for the sewer lines to the bay through the frozen and rocky ground was particularly difficult. Only the dogged perseverance and enthusiasm on the part of those in charge of the work enabled the required speed schedule to be maintained.

The project was under the supervision of Lieut.-Com. Frederick H. Cook, as Public Works Officer, and was completed at a cost of about $305,000.00. Densmore & LeClear were retained as consulting engineers on the heating, plumbing and electrical

BARRACKS BUILDINGS AT PORTSMOUTH NAVY YARD, KITTERY POINT, ME.
Looking north from the old prison tower



BARRACKS BUILDINGS AND MESS HALL AT PORTSMOUTH NAVY YARD, KITTERY POINT, ME.
View to the east from the old prison tower

work. A. C. Tozzer was executive in charge for the Turner Construction Company, assisted by G. Larson, superintendent, and H. B. Larned, engineer.

U. S. NAVAL PIER, NEW YORK. HUDSON RIVER AT NINETY-SEVENTH STREET

NINETY-SEVENTH STREET PIER IMPROVEMENT

The necessity of improving the Naval Pier at Ninety-seventh Street, North River, so as to provide a suitable office for Rear Admiral Gleaves, Chief of the Convoy Service, and accommodations for other officers and enlisted men, caused the Navy Department to commission the Turner Construction Company to erect a group of buildings under the direction of Lieut. J. S. Myler, and according to plans prepared by Ewing & Allen, architects. This group comprised a gate house with driveway in the center and guard rooms on either side, a boiler house complete with an Ideal boiler and a two and one-half story administration building with enclosing fence.

These buildings while of frame construction were of a more permanent nature and architecturally pleasing. The administration building was of the English timbered type and finished throughout. On the second floor, were the Admiral's quarters with beamed ceilings and paneled walls, all finished in silver gray. The furniture was oak and the hangings harmonized with the general scheme. The Officers' quarters and other principal rooms were wainscoted and finished in similar taste. Steam heating, a complete plumbing system with hot and cold showers and electric lights were installed. In spite of the severe winter weather, the work was pushed to completion and accepted about 60 days after the work was started and over two weeks before the date called for in the contract. Otto Lindberg was superintendent and H. C. Paddock was engineer on this project, the total cost of which was about $65,000.00.

THE GALLERY FLOOR AND ROOF AT FORT LAFAYETTE

This work was constructed under the direction of Lieut. Seaton Schroeder, Jr., U. S. N., and called for the erection of a reinforced concrete gallery platform 30 feet in width in the interior court of the fort. Above the gallery, a wooden roof was placed with wooden trusses spanning the central opening. As Fort Lafayette is situated in New York Harbor some distance from the shore, it was necessary to assemble all material and equipment on barges and transport it through the harbor nets to the island. A motor boat was also procured to carry workmen and small supplies to and from the work. The storage of mines and other high explosives in the fort necessitated the

mixing of all concrete and the assembling of much material on the pier outside the fort proper; and the utmost and incessant care had to be exercised in carrying out all phases of the work, including the choice of loyal workmen. The total cost of this project was over $60,000.00.

PROVISIONS AND CLOTHING DEPOT No. 1

This contract, likewise carried out under Lieut. Schroeder's direction, called for the finishing up of a large building 200 x 320 feet, seven stories in height, which had been leased by the Navy Department from the American Can Company as it was nearing completion; and adapting the building to its new requirements. Special machinery required for the manufacture of clothing was installed and changes in the electrical, mechanical and power layouts became necessary. By turning over this work to the Turner Construction Company, many officers were released for urgent duty elsewhere. While the task of the Company's construction forces in altering work already in place and erecting new partitions, shelving, etc., was proportionately small, the following up and co-ordinating of all the sub-contract work demanded much time and thought on the part of the executive and engineering forces. The work as carried out exceeded $110,000.00 in amount and extended over a period of two months.

CITY PARK CAMP ALTERATIONS

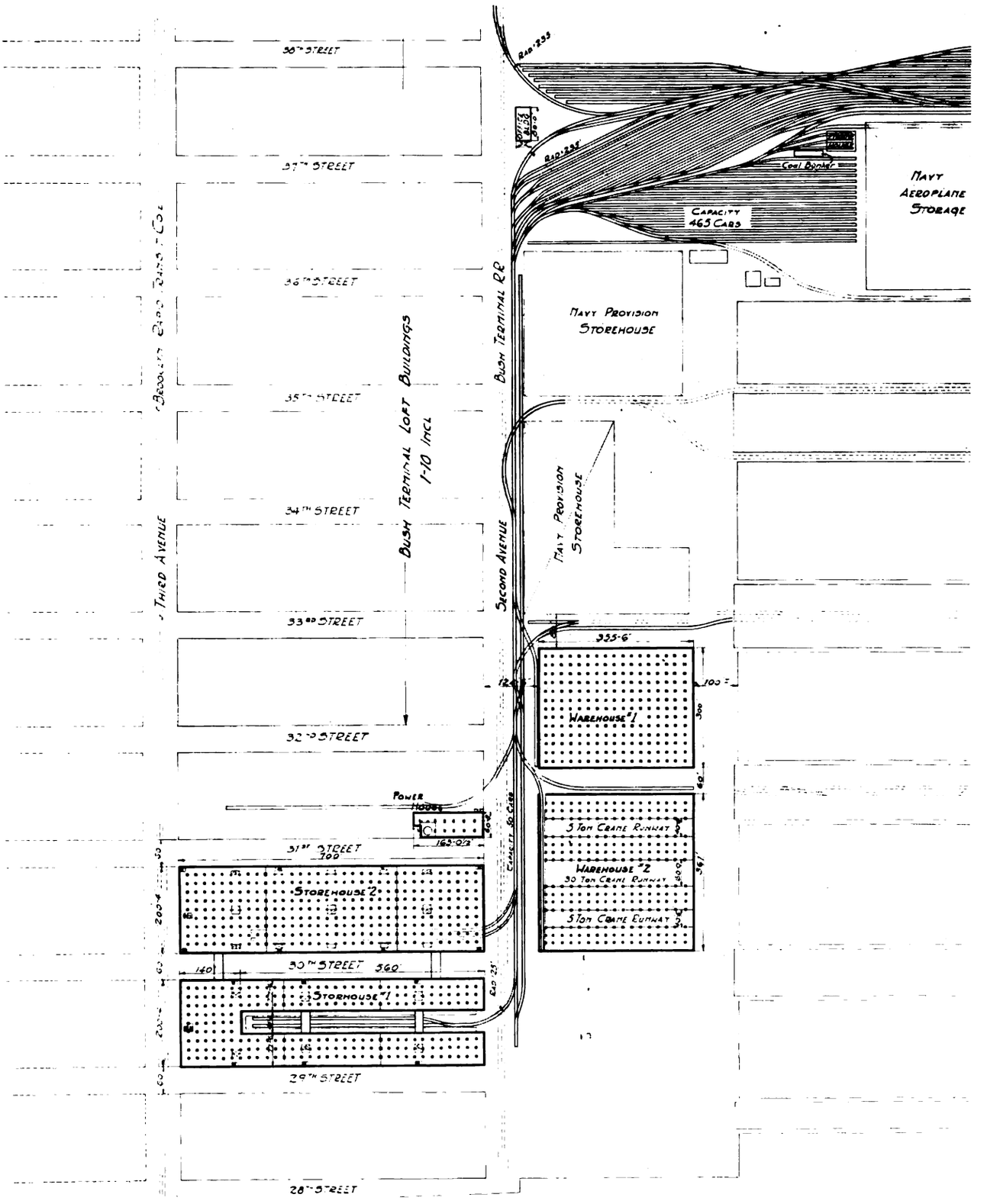
During the summer of 1917 a camp with accommodations for 3000 sailors had been erected at City Park, Brooklyn, adjoining the Navy Yard, to serve as receiving barracks. In February, 1918, some alterations in the administration and other buildings became necessary. The work consisted of extensions to the buildings, the installation of partitions, counters, railings, lockers, cabinets, and changes in the plumbing, heating and electrical systems.

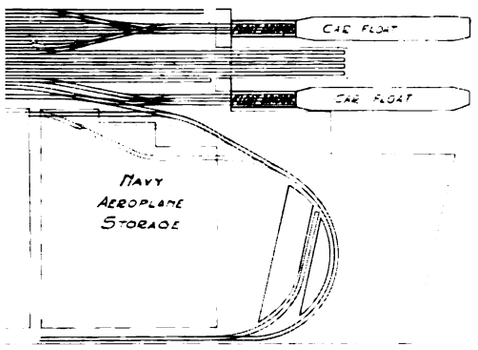
The Turner Construction Company was directed to proceed with the work and completed same within three weeks, without interrupting the activities of the camp in any way.

U. S. NAVY PROVISIONS AND CLOTHING DEPOT, BROOKLYN, N. Y.

U. S. Navy Fleet Supply Base

Brooklyn, N. Y.





GENERAL PLAN FLEET SUPPLY BASE U.S.NAVY BROOKLYN N.Y.

35TH ST. PIER

33RD ST. PIER

31ST ST. PIER

30TH ST. PIER

29TH ST. PIER

NEW YORK HARBOR

U. S. NAVY FLEET SUPPLY BASE

Brooklyn, N. Y.

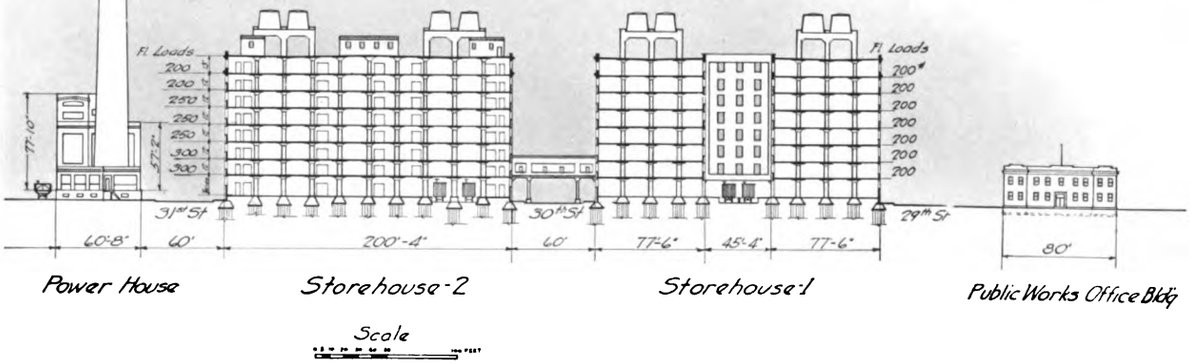
THE primary object of the U. S. Navy Fleet Supply Base in Brooklyn, New York, is, as the name implies, to furnish supplies to the fleet, which includes not only the men-of-war, but the train including fuel ships, colliers, transports and other auxiliary vessels. In addition to being designed for this purpose, it was decided, after the construction of the Base was well under way, to add to its duties by using it for supplying the naval overseas transportation service which, it was expected, would constitute a fleet of some 700 vessels.

The location of the Base was determined after mature study by representatives of the various interested bureaus of the Navy Department as being the most suitable for the Third Naval District. Its proximity to the Bush Terminal and the existence of three new and large city piers which could be commandeered together with vacant land and the nearness of big labor markets, made its serviceability to both warships and transports of assured satisfaction.

In designing the Brooklyn Base, it was not alone the vast bulk of supplies to be handled that made the layout difficult so much as the extreme range and kind of supplies, for no great mail-order house would find within its walls a greater variety of materials, the normal stock to be carried covering six to eight months' supplies and representing a value of $25,000,000.00 to $40,000,000.00. This stock is made up of more than 30,000 items ranging from a giant crank shaft or propeller down to a shoemaker's awl or a can of peas.

DETAILS OF DESIGN

After the location of the Brooklyn Base had been determined, studies were made by representatives of the Bureau of Supplies and Accounts and of the Bureau of Yards and Docks and the general plan illustrated on pages 38 and 39 adopted. This plan provided for two large reinforced concrete storehouses known as S-1 and S-2, each 700 x 200 feet, eight stories high; two one-story warehouses, known as W-1 and W-2, of concrete, tile and heavy timber construction, each about 350 feet square; a reinforced concrete power house with a capacity of



3000 horse power and a railroad system with two float bridges and a car-storage yard with tracks leading on to the piers and into the buildings. Building S-1 has a central court for additional light to provide for possible future manufacturing purposes, while S-2 was built solid for storage purposes only. These two eight-story storehouses were built entirely of reinforced concrete for the foundations, floors, columns and stairways. The curtain walls were built of Fisklock brick. The floors were finished with cement troweled to give a good wearing surface. All foundations were seated on Raymond concrete piles driven to a firm bottom. The typical construction details with floor loads, story heights and column sizes are given in the drawing on page 40.

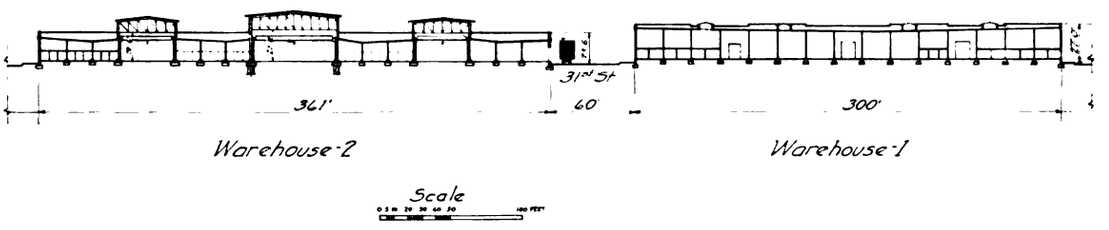
To obtain some idea of the magnitude of these great eight-story storehouses, one should watch the office boys of the Supply Officer race down the halls on rubber-wheeled roller skates. Each floor in building S-1 has about 2.6 acres of floor space and each floor in building S-2 about 3.25 acres with a total floor area of 47 acres in the two buildings. The entire top story of S-1 has been fitted up for the offices of the Supply Officer.

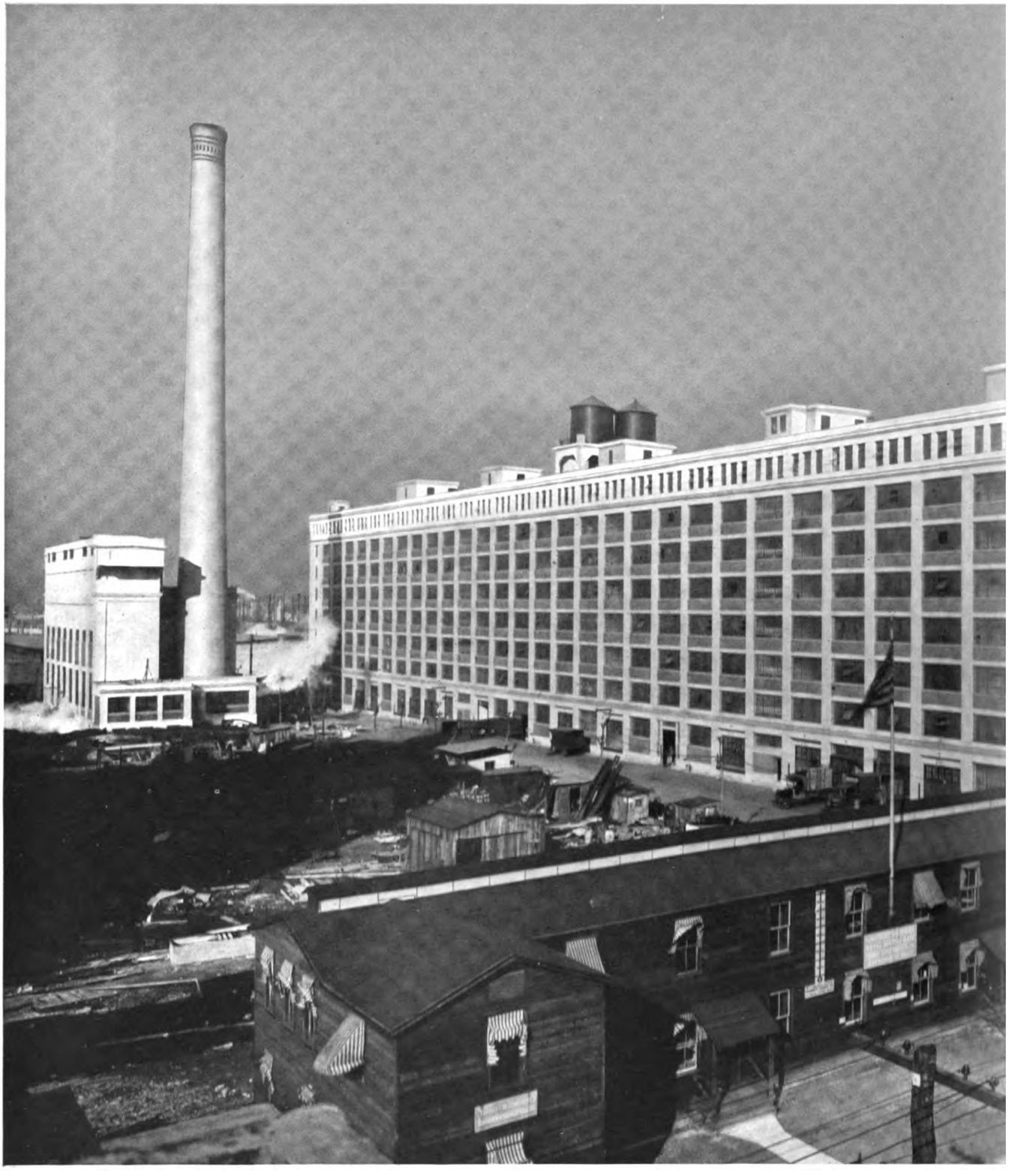
The arrangement of elevators and lowerators and spiral chutes, shown on the floor plans on pages 38 and 39, was determined after a mature study by the Supply Officer as to just how the contents expected to be stored in the buildings would be received, handled, stored, rehandled and shipped out. The capacity of the elevators is greatly increased by the unfailing rule laid down that materials shall remain on wheels from the time they are taken from cars until they reach their final destination and *vice versa*.

The plumbing complies in general with the regulations of the New York City plumbing code, and each fixture is separately trapped and back vented. The main drain and vent lines are extra heavy cast iron; the branch lines galvanized wrought iron. The water supply lines are genuine wrought iron Reading galvanized pipes. The heating system is of the vacuum type. In general, the first floors are heated by overhead coils, the upper floors by wall coils, and the offices, toilet rooms and stairways by radiators. Over 500 radiators are installed.

The automatic sprinkler system, which complies with the regulations of the National Board of Fire Underwriters, has about 25,000 sprinkler heads, 42 alarm valves, 36 fire department connections, and four electric pumps. The electrical work, also, is installed in accordance with the National Board of Fire Underwriters requirements. The conduit is loricated steel; all wire is in conduit, and all conduit is exposed, supported from inserts set in the concrete when poured. There are about 85,000 such inserts, and over 25,000 outlets. This is the first work of magnitude in which the Duplexalite lighting fixtures were used for general illumination of office floors. They have been most satisfactory.

Warehouse W-2 of the two one-story buildings is of particular interest because of the construction of three very heavy craneways necessitating timber roof trusses, two





U. S. NAVY FLEET SUPPL

BASE, BROOKLYN, N. Y.

APRIL 5th—*One Month's Work*

Contract signed March 5th. Forms for first self-supporting floor are being erected

MAY 29th—*Three Months' Work*

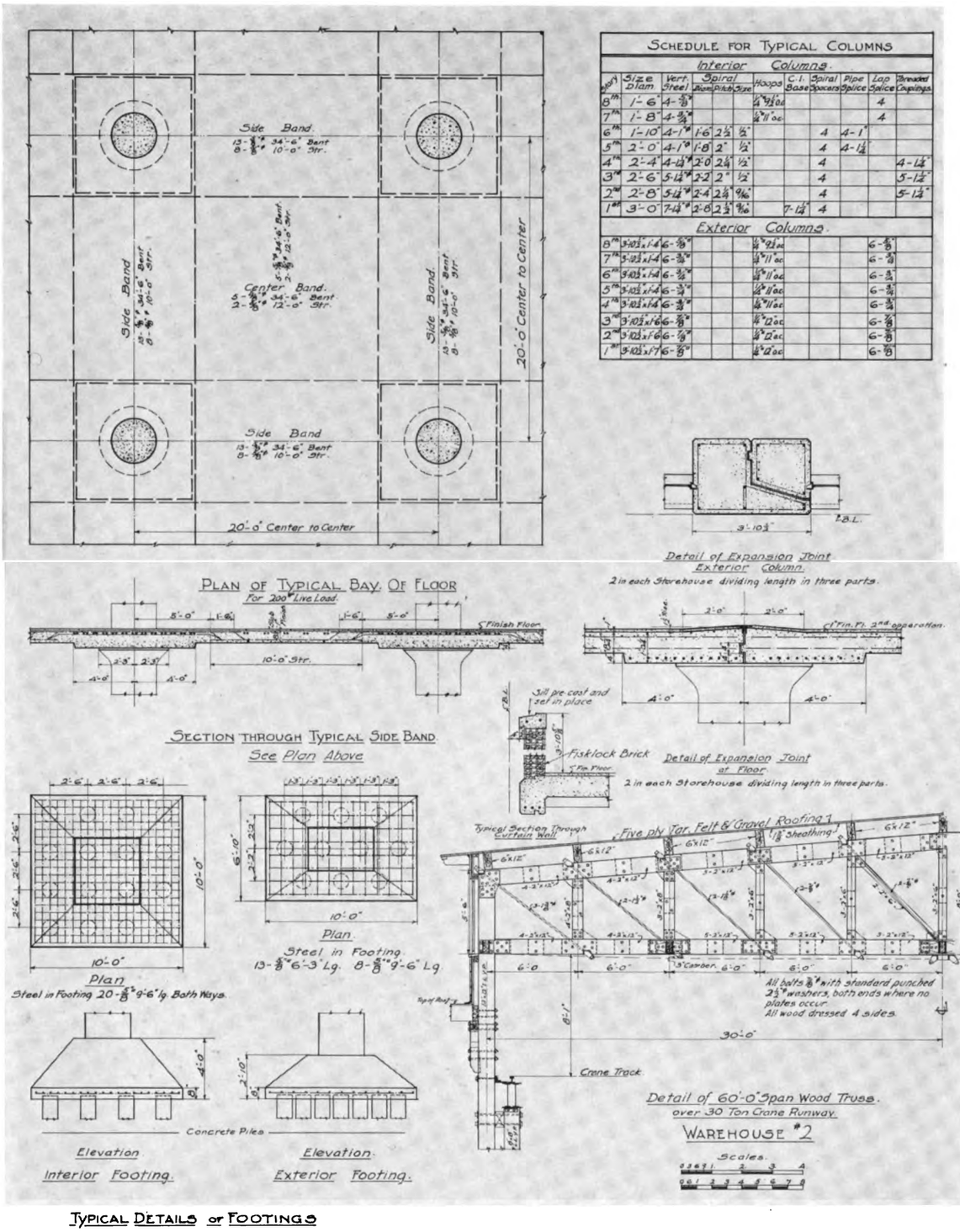
The last of 12,253 piles was hammered down May 3rd

JUNE 26th — *Four Months' Work*

On July 16th, three weeks later, the roof on S-1 (the farther building) was concreted
The concrete work from footings to roof was completed in 84 working days

AUGUST 3rd — *Five Months' Work*

The roof on the nearer building (S-2) was concreted one week later — August 10th
The concrete work from footings to roof on this building also was completed in 84 working days



SCHEDULE FOR TYPICAL COLUMNS

Interior Columns.

Story	Size Diam	Vert. Steel	Spiral Diam.	Spiral Pitch	Spiral Size	Hoops	C.I. Base	Spiral Spacers	Pipe Splice	Lap Splice	Threaded Couplings
8th	1'-6"	4-⅝"				¼"@12"c.c.				4	
7th	1'-8"	4-⅞"				¼"@11"c.c.				4	
6th	1'-10"	4-1"	1'-6"	2½"	½"			4	4-1"		
5th	2'-0"	4-1⅛"	1'-8"	2"	½"			4	4-1¼"		
4th	2'-4"	4-1¼"	2'-0"	2¼"	½"			4			4-1¼"
3rd	2'-6"	5-1¼"	2'-2"	2"	½"			4			5-1¼"
2nd	2'-8"	5-1¼"	2'-4"	2¼"	9/16"			4			5-1¼"
1st	3'-0"	7-1¼"	2'-8"	2½"	9/16"		7-1¼"	4			

Exterior Columns.

Story	Size Diam	Vert. Steel	Spiral Diam.	Spiral Pitch	Spiral Size	Hoops	C.I. Base	Spiral Spacers	Pipe Splice	Lap Splice	Threaded Couplings
8th	3'-10½"x1'-4"	6-⅝"				¼"@9"c.c.				6-⅝"	
7th	3'-10½"x1'-4"	6-¾"				¼"@11"c.c.				6-¾"	
6th	3'-10½"x1'-4"	6-⅞"				¼"@11"c.c.				6-⅞"	
5th	3'-10½"x1'-4"	6-1"				¼"@11"c.c.				6-1"	
4th	3'-10½"x1'-4"	6-1⅛"				¼"@11"c.c.				6-1⅛"	
3rd	3'-10½"x1'-6"	6-⅞"				⅜"@12"c.c.				6-⅞"	
2nd	3'-10½"x1'-6"	6-1⅛"				⅜"@12"c.c.				6-1⅛"	
1st	3'-10½"x1'-7"	6-1⅜"				⅜"@12"c.c.				6-1⅜"	

TYPICAL DETAILS OF FOOTINGS

TYPICAL STRUCTURAL DETAILS

SUPPLY OFFICER'S GENERAL OFFICE—TOP FLOOR
STOREHOUSE No. 1

spanning 40 feet for 5-ton cranes and one spanning 60 feet for 30-ton crane. The cranes in this warehouse will pick up and handle the heaviest pieces of machinery and the bulky stores.

The power house was constructed entirely of reinforced concrete; including a 2000-ton coal bunker over the boilers and the flue connecting the boilers with the stack. In preparing the design for the power house the use of structural steel was avoided, owing to the great demand for steel for strictly war needs. It is believed, however, that the power house, as designed, has some distinct advantages over the usual steel and brick construction. The power house, which cost, including equipment, about $600,000.00, in addition to providing heat for the buildings described, was designed to heat the two Navy piers at Thirty-third and Thirty-fifth Streets under lease from the City, the Navy aircraft buildings and other miscellaneous structures on adjoining properties.

The railroad work involved the design and construction of two timber pontoons to support the float bridges, heavy structural steel bridge trusses, dredging and dock work, and 10 miles of complicated track work and 115 switches with stands, targets and lamps.

2,275,000 SQUARE FEET OF FLOOR SPACE READY FOR OCCUPANCY IN 7½ MONTHS

The preliminary studies for this project were begun late in December, 1917, and were completed and a contract drawn early in February, 1918. The contract, however, was not signed until March 5th, 1918. Preliminary work at the site had gone forward and pile drivers were set up ready to start work the moment the order was given by the Navy Department.

The selection of the Turner Construction Company as contractors for this work was largely the result of the records made by it in the construction of the supply storehouse, shown on page 12, in the Navy Yard, Brooklyn, N. Y., during the summer and fall of 1917. The contract was a cost-plus-percentage contract, but with a clause limiting the fee which the contractor might earn.

The driving of concrete piles was started on the site of S-1 March 5th, 1918, and completed April 2nd, 1918; and on the site of S-2 on March 29th, 1918, and

OFFICES NORTH WING STOREHOUSE No. 1

JULY 12th—*POWER-HOUSE SITE*
Three weeks after the plans were started

AUGUST 13th
Seven weeks after the plans were started

completed on May 3rd, 1918. The roof of S-1 was concreted complete on July 16th, 1918, and of S-2 on August 10th, 1918. A total of 12,253 concrete piles were hammered down, averaging 25 feet in length and totaling approximately 310,026 feet or 58.8 miles.

Preliminary occupancy of the second floor of storehouse S-1 was given to the Supply Officer on July 19th and this storehouse was turned over officially and the keys accepted by the Navy Department on September 22nd. S-2 was accepted on October 23rd. These two dates were the original contract dates for beneficial occupancy.

SEPTEMBER 16th
Two and one-half months after work was authorized

Power House (3000 horse power with 275-foot stack). Authorized, with no plans in existence, June 22nd, 1918
Steam turned on November 12th, or in less than five months

2000-TON CONCRETE COAL BUNKER OVER THE BOILERS

Nearly six weeks extension of time was tentatively agreed to by the Officer in Charge of the work for the Navy due to the delays resulting from changes made in the plans and to difficulties encountered in obtaining materials by the Government. This extension of time was not required by the contractor.

The speed of construction was equivalent to half an acre of floor per 10-hour day. The maximum record was 8140 yards of concrete placed in the week ending July 19th, 1918, which was equivalent to 37.35 yards per man employed on concrete; 284,610 square feet of forms were erected in the week ending July 19th, 1918; 191,903 square feet of forms removed in the week ending June 5th, 1918; and 486.3 tons of steel put in place during the week ending August 16th, 1918.

The total floor area of the two storehouses and two warehouses constructed between March 5th and October 24th, or within seven and one-half months, including the driving of the concrete piles and installation of the sub-trades so that the buildings were complete for beneficial occupancy, was 2,275,000 square feet, which is about one and one-half times the area of the Equitable Building at 120 Broadway, New York City, hitherto known as the largest office building in the world.

While the eight-story buildings were going forward, work was also progressing on the two one-story warehouses. Building W-1 was ready for occupancy in seven weeks from date of contract or three weeks ahead of the date required in the contract. W-2, with its large craneways, took fourteen weeks to complete. Concrete piles had to be driven under some of the crane runway columns to support the 30-ton loads it was expected the crane would swing.

Work was started on July 12th, 1918, for the float bridges and slips, and orders were placed for the structural steel bridges, the timber pontoons and the special track work required for the complicated railroad layout. The first bridge was ready for use on November 8th, 1918.

The power house was not authorized until June 22nd, and on this date no plans were available. General specifications only were provided by the Navy Department. The plans and detailed specifications for a concrete 3000 horse-power boiler plant with stokers, economizers and the other equipment for a modern heating plant, including a radial brick stack of 12 feet in diameter at top and 275 feet high were then to be prepared and the plant made ready for use before extreme cold weather.

FORCED AIR DRAFT DUCT, ENTIRELY OF CONCRETE

The mechanical plans were prepared by the technical aide to the Officer in Charge for

WAREHOUSES No. 1 AND No. 2
Each approximately 355 feet square

the Navy. Work was promptly started and steam actually turned on the first battery of boilers on November 12th, or in less than five months after the date when the first plan was started.

MATERIALS REQUIRED

To accomplish these results, it was necessary to purchase, expedite, receive and incorporate into the work the following materials:

221,289	barrels of cement or 1,100 car-loads
104,754	cubic yards of stone or 4,180 car-loads
65,454	cubic yards of sand or 2,618 car-loads
6,100	tons of steel or 135 car-loads
3,812,000	feet of form lumber or 190 car-loads
1,033,000	brick or 55 car-loads
224,000	square feet sash or 15 car-loads
1,000	tons of steel (for concrete piles) or 50 car-loads
75	miles of conduit
300	miles of wire
25,000	outlets
85,000	inserts
300,000	pounds of cast-iron pipe and fittings or 10 car-loads
32,000	feet of cast-iron pipe
6	tons caulking
1,350	valves
800	plumbing fixtures
41	elevators
16,000	feet of guide cables for elevators
50,000	feet of wire rope for elevators
500	magnetos
60	miles of pipe for sprinklers
44	alarm valves for sprinklers
36	fire department connections

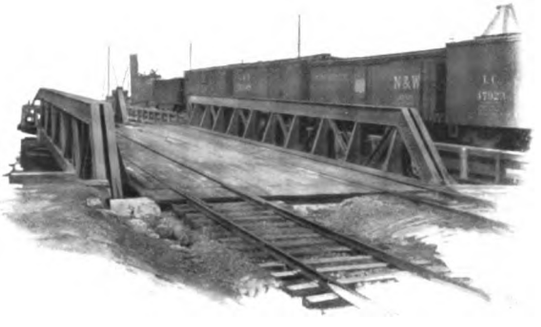
These two photographs show the type of construction used on the two one-story warehouses—concrete foundation and floor, slow-burning mill construction columns and roof, hollow tile stuccoed on exterior for walls

CRANEWAY
Spanning 60 feet for 30-ton crane in Warehouse No. 2

4	electric pumps
6,000	feet (7 feet high) wire fence
55	gates
700	posts
50	time clocks
235,500	square feet of Solite glass which would cover a road of 15 feet wide and over 3 miles long, making 10 car-loads
510	elevator doors
17,000	feet of guide rails
76	miles of pipe for heating equipment
501,000	square feet of roofing or 59 car-loads
1335	metal, wooden and fire doors
2,300,000	square feet of cold water paint
360,000	square feet lead and oil paint on sash
13,000	square yards of linoleum
1,624	feet of spiral chutes or about 52 stories
14,600	square feet of slate
5,350	square feet of marble

HANDLING OF MATERIALS

To handle these huge quantities of building materials promptly, required very careful planning of the construction plant and the sequence of operations. Storage space adjacent to the Base was scant and congestion would be fatal to the speed schedule. The problem was solved by erecting an elevated runway 20 feet above the street between storehouses S-1 and S-2. Underneath this trestle were provided large storage bins for sand, gravel, grits and cement. These bins were filled by motor trucks hauling from the bulkhead or from railroad cars. Traffic over the trestle was in one direction only and was so regulated and controlled that there was no difficulty or delay in sending *a truck a minute* over this trestle.



RAILROAD FLOAT BRIDGES FOR THE THIRTY-EIGHTH STREET YARDS

AVERAGE FORCE OF 2150 MEN

To erect these great concrete storehouses within the time set required an average force

WEST VIEW, SHOWING COURT IN STOREHOUSE No. 1 AND RAILROAD FACILITIES CONNECTING WITH YARDS AND FLOAT BRIDGES AT THIRTY-EIGHTH STREET

See general plan, pages 38 and 39

TYPICAL FLOOR
Note sprinklers

of 2150 men, which reached a maximum including all workmen of the Turner Construction Company, general contractors and the various sub-contractors of 2480 men on July 10th.

Considerable attention was given to the problem of building up an *esprit de corps* and mass meetings, honor flags and job newspapers were availed of, as described on page 111.

SUB-CONTRACTORS

The general contractor was aided in the construction of this entire project by a number of able and experienced sub-contractors who, like the general contractor, brought to the work experienced superintendents, experienced foremen and a good following of skilled and dependable mechanics and workmen in each trade.

The major sub-contractors were:

Fencing and Gates	Anchor Post Fence Company
Sprinklers	Automatic Sprinkler Company
Painting	Barker Painting Company
Fire Alarm System	Bates & Company
Plumbing	Cornell Company
Sash	Detroit Steel Products Company
Glazing	Elias & Company
Roofing	Fordham Cornice Works
Marble and Slate	Friedman Marble and Slate Company
Electric Wiring	Hatzel & Buehler
Pneumatic Tubes	Lamson & Company
Lowerators	Lowerator Company
Spiral Chutes	Minnesota Manufacturing Company
Special Floor and Glazed Wall Tile	McLaurey Tile Company
Heating	James H. Merritt & Company
Elevators	Otis Elevator Company
Elevator Doors	Peelle Doors Company
Concrete Piles—Raymond Concrete Pile Company	
Linoleum—W. & J. Sloane Company	
Time Clocks — Stromberg Electric Company	

MEN WHO DIRECTED THE WORK

The field office erected by the general contractor was of frame construction, two stories high, of sufficient size to house the Officer in Charge for the Navy and his staff of engineers, inspectors and clerks and the executive staff, auditing, purchasing,

SOME OF THE 30,000 DIFFERENT KINDS OF SUPPLIES
STORED IN THESE BUILDINGS

construction, employment and timekeeping departments of the contractor. The engineering work of the contractor was done at its main office in New York, but all other departments were centered at the field office, under the direction of the executive manager.

The contract was negotiated for the Bureau of Yards and Docks of the Navy Department by Com. A. L. Parsons, Acting Chief. Lieut.-Com. E. S. Nugent located the property and aided the Bureau in all of the preliminary work. The plans were prepared and the Base constructed under the general direction of Capt. R. C. Hollyday, U. S. N., Public Works Officer, New York Navy Yard. Lieut. Seaton Schroeder, Jr., Officer in Charge at the Base, had the immediate direction of all the work, assisted by Palmer C. Gallup and F. A. Phelps, and a corps of engineers and inspectors and clerks. Howard Chapman, architect, prepared the studies for the architectural treatment of the buildings. Henry C. Meyer, Jr., was consulting mechanical engineer and prepared the general plans for the mechanical equipment. Capt. T. W. Leutze, who had been appointed Supply Officer for the Base, kept in close touch with the work and gave valuable assistance. Rear Admiral C. W. Parks, Chief of the Bureau of Yards and Docks, gave general supervision to the design and execution of this project.

The organization assigned to the project by the Turner Construction Company consisted of: R. C. Wilson, executive manager; H. H. Fox and John R. Monaghan, auditors; John Condon, purchasing agent; H. C. Paddock, engineer; John Nelson, general superintendent; R. E. Fall and N. L. Kennedy, superintendents; A. E. Hansen, superintendent in charge of sub-contracts.

ACTUAL OPERATION OF THE BASE

The completed Base has been operating under the actual working conditions in a manner which is a compliment to the foresight of the representatives of the Navy who conceived it. Some idea of the serviceability of this Base can be had when it is known that a car-load of nails was unloaded from a car to its permanent storage on one of the upper floors in 40 minutes.

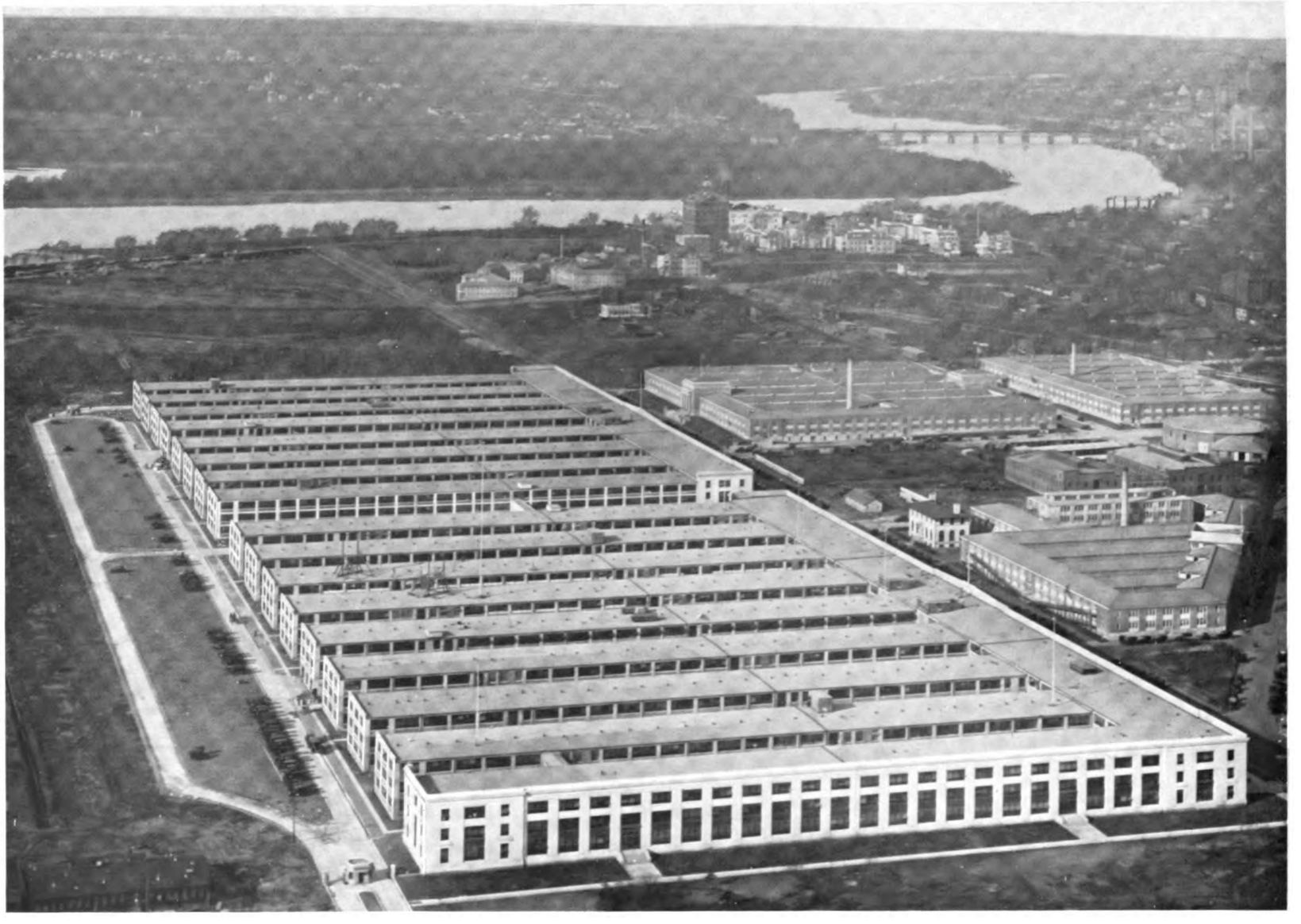
When the storage areas for the various items were laid out for the buildings, interesting information was gleaned from the Supply Officer's notebook. For instance, it was found necessary to arrange storage space for about 6,000,000 pounds of ropes, 2,500,000 yards of canvas, 4,000,000 each of sheets and pillow cases. In another section, storage was provided for 600,000 assorted plates, 400,000 each of knives, forks, spoons and other eating utensils. Down in the warehouses there was storage for 5,000,000 pounds of soap and acids.

The total cost of this project including buildings, power house and railroad work, but not including the land, was approximately $7,400,000.00.

COURT IN STOREHOUSE No. 1
Showing loading platforms and connecting bridge

Navy and War Office Buildings

Washington, D. C.



NAVY AND WAR OFFICE BUILDINGS, WASHINGTON, D. C.
As seen from the Washington Monument

NAVY AND WAR OFFICE BUILDINGS

Washington, D. C.

IN January, 1918, the Navy Department determined, if possible, to centralize its offices into a compact group. The expansion of its various Bureaus had been so great that the Department occupied space in some twenty-one different buildings, many of them widely separated. This made inter-communication very difficult and expensive, and unavoidably caused many delays in the conduct of the departmental business. The ideal solution of the problem was to house all the Bureaus under one roof, provided it could be effected in a reasonable time.

The emergency type of building, namely, of wood, lath and plaster, which had been so extensively used in Washington, was deemed undesirable as there were maps, plans, codes, charts and other papers of vital importance and value to be preserved. The building, therefore, should be fire-proof and panic-proof. Reinforced concrete met the requirements, provided sufficient speed in erection was attainable.

Com. A. L. Parsons, Assistant Chief of the Bureau of Yards and Docks, was selected by the Navy to confer with the Appropriation Committee of the House, Hon. Swagar Sherley, Chairman, to determine if funds could be allotted for the project. The necessity for the building was realized at once and the project was enlarged to include a building for the War Department containing nearly as much space as that required for the Navy. The combined floor area of the two proposed buildings was 1,885,000 square feet or approximately 42 acres—nearly one and a half times that of the Equitable Building, in New York City, previously known as the largest office building in the world. The exterior walls were nearly *four miles* in perimeter.

A site was found on the public lands bordering Potomac Park, the buildings were limited to three stories in height and were to be in keeping architecturally with other public buildings nearby. The general plan, shown on pages 59 and 60, having been agreed upon and the time for construction determined, the appropriations were approved by the Senate and House Committees, having the matter in charge, and on February 25th, the contract for the work was prepared with the Turner Construction Company on a cost-plus-percentage basis with a limited maximum fee and was executed by Hon. Franklin D. Roosevelt, Assistant Secretary of the Navy.

PRINCIPAL FEATURES OF THE PLAN

The architectural plans were prepared under the direction of a committee from the Bureau of Yards and Docks, consisting of Lieut.-Com. F. W. Southworth, Chas. H. Stratton, George P. Hales and H. J. Briggs. Each structure consists of a series of wings each 500 x 60 feet connected by a head house 60 feet in width fronting on B Street. The Navy Building located to the east of Nineteenth Street contains nine wings with total frontage of 860 feet on B Street while the War Building to the west of Nineteenth Street contains eight wings with a frontage of 780 feet on B Street. Intermediate bridges

afforded communication between adjacent wings other than that afforded by the head house. A bridge has also been constructed spanning Nineteenth Street to connect the two buildings.

A beam and girder form of floor construction with absolutely uniform column and beam spacing throughout aided greatly in the rapid execution of the work.

FIRST WING OF NAVY BUILDING ON SEVENTEETH STREET

The photographs on pages 61 to 64 indicate the appearance of the buildings. The elevations, low in proportion to the enormous length, are relieved by heavy pilasters and the introduction of pavilions at the centers and ends of the buildings.

The equipment of the buildings, on account of their size, involved careful study and planning. No passenger elevators were required in a building of this height, two small freight machines in each building filling all needs in this direction. The drainage system, including a 42-inch storm sewer, however, involved long lines of excavation and many connections, to take care of the ample and conveniently located toilet rooms. The vacuum steam-heating system supplied from an outside source was likewise an extensive operation. Included in the electrical equipment were not only the necessary wiring for lights, the fixtures and bulbs, but conduits for a complete telephone system with a central station, and an annunciator or call bell installation costing over $180,000.00 were added.

A hung ceiling in the upper story had to be provided to furnish the insulating air space necessary in extreme temperatures.

A large portion of the floors are covered with linoleum, a total area of 1,287,000 square feet being laid. The dividing partitions are wood studs covered with Gypsum boards finished with plaster. At intervals, fireproof tile partitions with standard automatic fire doors are installed, to confine possible fires to small areas.

As the buildings are located away from the business center of Washington, a large cafeteria, fully equipped, was installed in each building. Each occupies one floor of an entire wing and can comfortably accommodate 1300 persons at one time without confusion.

MATERIALS USED

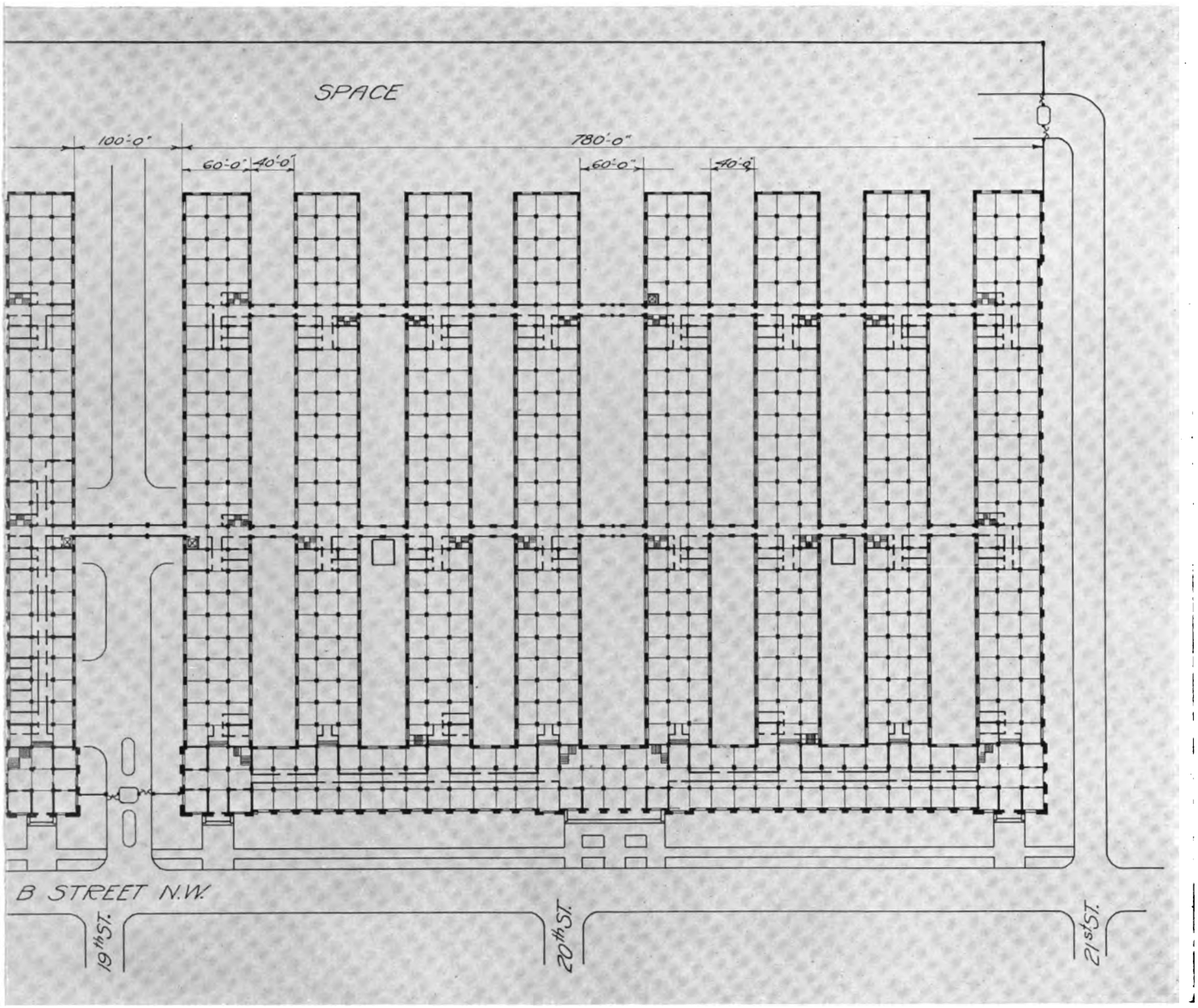
A few statistics will show the vast amount of material required in an operation of this magnitude. 120,000 barrels of cement, 550 car-loads, were purchased from the Lehigh District of Eastern Pennsylvania. 50,000 tons of sand, and 88,000 tons of gravel were dredged from the Potomac River and delivered by auto trucks to the mixing plants. The reinforcing steel, 4507 tons, 100 car-loads, came chiefly from Ohio and excellent deliveries were made.

Thirty car-loads of electric equipment and over 200 car-loads of plumbing and heating

TYPICAL BRIDGE CONNECTING WINGS
As shown on plan, page 59

FIRST FLOOR PLAN NAVY AI

items, such as 3200 radiators were received. The lumber for forms, barracks, etc., 7,000,000 feet, over 300 car-loads, presented one of the most difficult problems, with nearby stocks practically exhausted and the car shortage preventing prompt shipment from Southern stocks. The window order, 396,000 square feet of steel sash, was one of the largest orders ever placed for this material. If the window shades used were made into two single shades and attached to the roof of each building, they would cover entirely each front, or 1640 feet, three stories high, with three thicknesses. The partition blocks, plaster, and plaster board totaled 240 car-loads. Some 4000 wood doors and 6000 squares of roofing material are other items of interest.



ID WAR OFFICE BUILDINGS

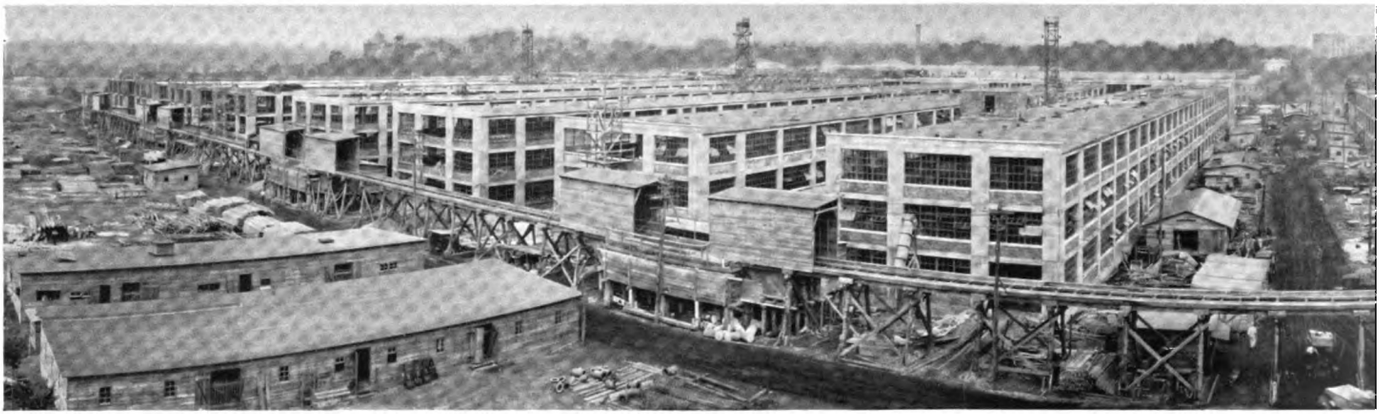
The following of production, the tracing of shipments, the switching of cars to the siding and the unloading and distribution of the material called for hard work and careful record keeping. In all, over 2000 cars were unloaded, besides the material which was delivered by the auto trucks.

Not counting the trucking time required to handle the sub-contractors' materials, the total job required over 35,000 hours of trucking.

The Gypsum blocks which were used only in the fireproof partitions, if placed end to end, would stretch from Washington to Baltimore and back again as far as Annapolis —a distance of 60 miles. 26,350 gallons of liquid floor hardener and 6000 gallons of

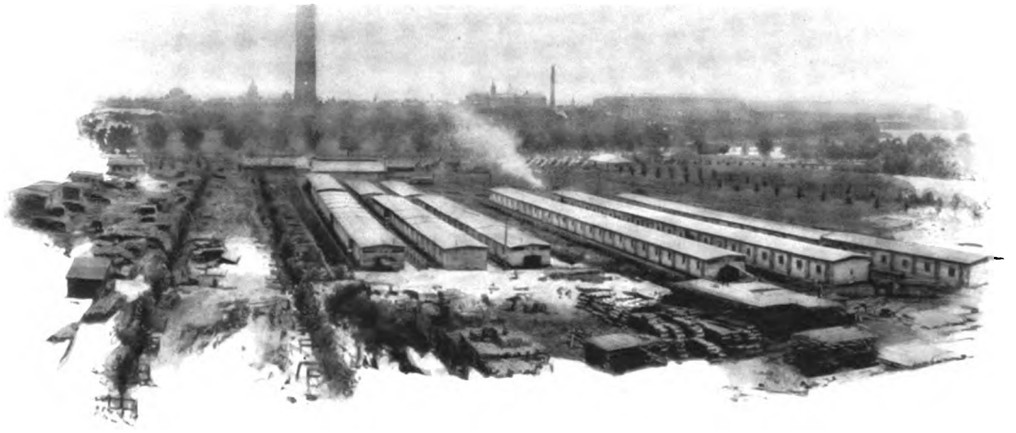
APRIL 29th—*Two mo*

Unexpected foundation conditions made piles necessary. Machines were rushed to the site and driving began March



JULY 26th–

In three more days, July 29th, the last roof was concreted, making the time for concrete work above ground approximately three months. 1,



BARRACKS AND MESS HALL FOR 1200 WORKMEN WHO COULD NOT FIND HOMES IN WASHINGTON

hs after signing of the contract

5th. Forms for first self-supporting floor were erected April 20th and can be seen in this photograph at the extreme right

Three months later

5,000 square feet, or 42 acres, of floor space erected and under cover in three months, with the brick curtain walls and sash following close behind

floor filler and finish were used for the concrete floors. There are approximately 800 registers in the hung ceiling and about 500 sheet-metal ventilators in the roof. Nearly 3½ miles of gutters and nearly 2 miles of leaders or downspouts were installed. The 89 miles of 32-inch plaster board would make a partition 11 feet 6 inches high and 10½ miles long, using two thicknesses of board as it was erected in the building. 5,000,000 square feet of paint was put on the interior walls.

PLANT LAYOUT

A job office building was first erected, a frame structure, two stories in height 40 x 200 feet, housing the complete organizations of the Navy and contractor assigned to the work. All business, including the construction, engineering, purchasing, expediting, accounting and auditing was handled in this office.

Barracks had to be provided for workmen, accommodating in their final form 1200 men, with mess halls, amusement pavilions, etc. Order was maintained by a marine guard of about 100 men for whom quarters were also constructed, as shown in the photograph on page 65.

PRIVATE OFFICE OF HON. JOSEPHUS DANIELS
Secretary of the Navy

The plant layout to handle the project was an interesting study. On account of expected labor shortage, it was determined to keep the number of men handling the raw materials down to a minimum. So a trestle, about one-half mile in length, shown in the progress pictures on pages 65 and 66, was erected at the rear of the buildings. Distributed under this trestle at eight different points were bins, where cement, sand and gravel were dumped from motor trucks above. Narrow gauge side dumping cars conveyed the materials from the bins to the eight mixing plants located in alternate courts near the center of the wings. The mixed concrete was hoisted in the usual towers and delivered to hoppers from whence it was wheeled in concrete buggies to the required point.

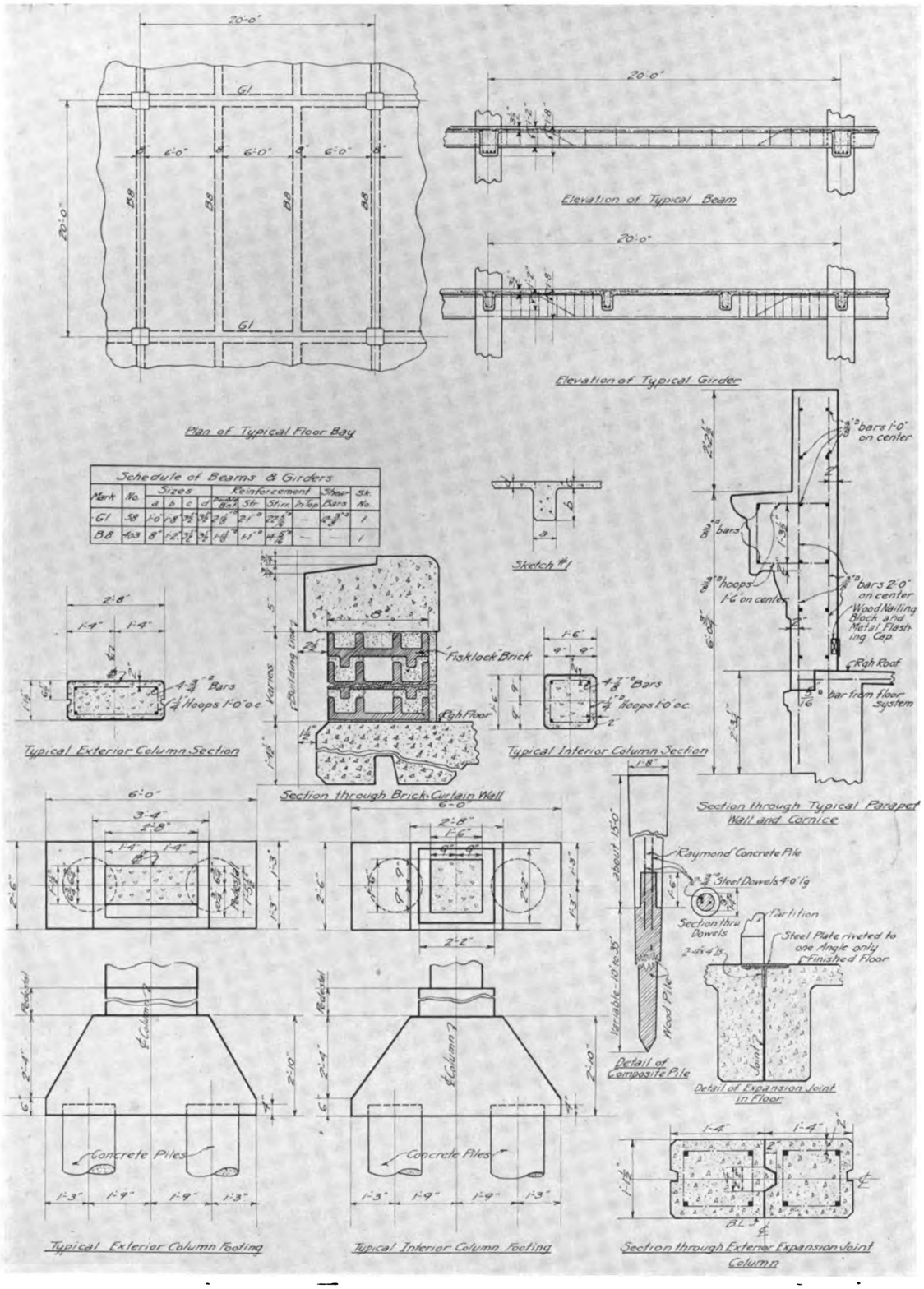
CONCRETE WORK ABOVE GROUND. COMPLETE IN APPROXIMATELY 3 MONTHS

The preliminary speed schedule contemplated the occupancy of the first four wings of the Navy Building four and one-half months after excavation was started or about July 15th, and the complete occupancy of both buildings September 15th. As soon as excavation was started, however, it became apparent that the character of the soil was such that even the light loads of a three-story building could not be safely placed upon it, and it became necessary to provide another type of foundation. This work was sublet to the Raymond Concrete Pile Company, their equipment was rushed to the job with all possible speed and the first pile driven on March 25th, 1918. Work was carried on continuously, three shifts being used, and 5052 piles were driven, including 1073 composite wood and concrete piles, varying in length from 20 to 52 feet. The piling was completed May 28th, 1918. As soon as a sufficient area of footings was ready, forms were erected, the first section of self-supporting (the second) floor of the first Navy wing being placed April 20th, 1918. No time was lost in concreting after the reinforcement was in place, as high as 1700 cubic yards being poured in a 10-hour day. On July 29th, 1918, the last section of the roof was concreted. (See progress pictures on pages 65 and 66.) Meanwhile the placing of cement floor finish, installing of windows, partitions, etc., were pushed.

The Navy Department on March 15th, after the change in foundations had been considered, fixed the dates of occupancy as follows:

First half of Navy Building	August 15th
First half of War Building	September 1st
Second half of Navy Building	September 15th
Second half of War Building	October 1st

As the work progressed, a large amount of extra partitions and equipment was added, and an extension of time of two weeks was granted, applying to each of the above dates.



TYPICAL STRUCTURAL DETAILS

The actual time the Bureaus started to move into the several sections and the dates on which they were accepted for occupancy are given herewith.

	Started Moving	Occupancy Accepted	Revised Contract Date
First half Navy Building	August 17th	August 23rd	August 29th
First half War Building	August 31st	September 8th	September 15th
Second half Navy Building	September 7th	September 26th	September 29th
Second half War Building	September 24th	October 7th	October 15th

ONE OF THE LARGE OFFICES
Showing the excellent lighting conditions

So that credit may therefore be taken for the completion of the work within the time allotted by the Navy Department.

SCARCITY OF LABOR A PROBLEM

Everyone knows of the scarcity of labor in many parts of the country during the summer of 1918, and the maintaining of an efficient working force at the buildings was one of the gravest problems to be solved.

Washington, with no industrial population and with living quarters practically unobtainable, was a most difficult place in which to assemble a satisfactory organization. Practically all workmen were procured from other cities and many of these were mere transients, leaving the work after a short stay. Fortunately, the weather in June, the period when the outside work was heaviest, continued cool, which alone prevented many desertions. During one period of three weeks, 2800 men were sent to Washington and this number was barely sufficient to compensate for the losses suffered. In all, 9000 workmen were employed. The average force of men was 2778, which reached a maximum of 3260 on July 24th. The amusements, such as moving picture shows, boxing contests and the like, held at the barracks, and the mass meetings, parades, job newspaper and other labor stimulation (see page 111), undoubtedly served to hold the force together.

The contractor's organization consisted of 7 superintendents, 35 foremen, 40 time-keepers and material men, and an office force of 72 men and women. The average in the trades was about as follows: bricklayers 62, cement finishers 48, carpenters 488, laborers 1398, engineers and mechanics 28, toolhouse men, porters, waterboys, etc., 43. The sub-contractors had, in addition, about 846 men at the time the total job force was at its maximum. As the total number of men began to decline, the sub-contractors' forces increased.

ONE OF THE LONG CORRIDORS
BETWEEN PRIVATE OFFICES

MEN WHO DIRECTED THE WORK

The project which was completed at a cost of about $7,250,000.00 was carried out under the direction of the

Bureau of Yards and Docks, Rear-Admiral C. W. Parks, Chief of the Bureau, with Com. A. L. Parsons in direct charge, and Lieut.-Com. O. A. Mechlin as officer in charge, assisted by a force of over 100 Navy men.

For the Turner Construction Company, Wm. E. Lyle was in charge of construction; H. E. Plumer, engineer; B. M. Fowler, Jr., purchasing agent; J. R. Turner and S. W. Johnson, auditing and accounting; R. F. Egelhoff, general superintendent; J. G. Davison, B. Hotchkiss and H. B. Snell, superintendents.

MAJOR SUB-CONTRACTORS

The following firms were sub-contractors on the work:

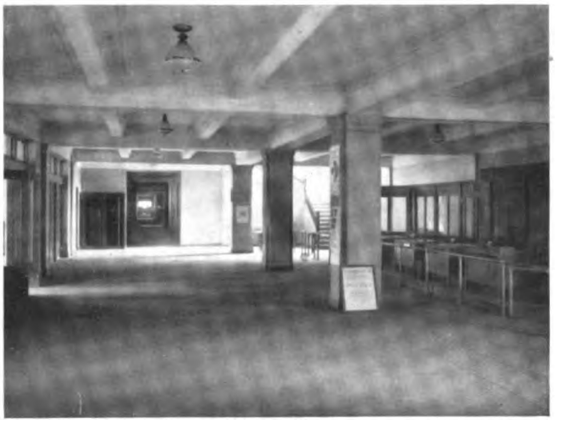
SPECIAL WINDOW SHADES ADOPTED FOR THESE BUILDINGS

Plumbing and Heating	W. G. Cornell Company
Sash	Detroit Steel Products Company
Roofing	Ehret Roofing Manufacturing Company
Ornamental Railings and Grilles	Hecla Iron Works
Shades	Geo. C. Jennings
Electric Wiring	Lord Electric Company
Plastering	McNulty Brothers Company
Trestles	Miller Daybill Company
Painting	Wm. P. Nelson Company
Elevators	Otis Elevator Company
Glazing	Pittsburgh Plate Glass Company
Piling	Raymond Concrete Pile Company
Linoleum	Strawbridge & Clothier
Hung Ceiling	U. S. Gypsum Company
Pipe Railings	Vulcan Rail and Construction Company

APPROPRIATE ADDITION TO OFFICIAL BUILDINGS IN WASHINGTON

The buildings house nearly 15,000 Navy and War Department clerks, and as can be seen from the interior view on page 69, provide ideal working accommodations. They are light and airy and suited to the particular needs of the Bureaus and Departments occupying them.

It can be truthfully said that these buildings form a notable addition to the official buildings in Washington, and, quoting from remarks of the Hon. Swagar Sherley, Chairman of Committee on Appropriations, on the floor of the House of Representatives, October 18th, 1918, "will supply a very great need." Hon. Mr. Sherley also remarked: "The size of these buildings is simply amazing. You could take the Arlington Building and put it into the Navy Building and not know it was there at all as far as space goes. And when you consider that these are two of the largest office buildings in the world, and consider the time within which they are erected, I think it is quite an achievement."



MAIN LOBBY OF NAVY BUILDING WITH INFORMATION DESKS

U. S. Navy Emergency Hospitals

Washington, D. C.

OCTOBER 11th—*The site of the Navy Emergency Hospital*

Four days after contract was signed

NOVEMBER 8th—*One month's work*

One ward building ready for occupancy

TYPICAL WARD BUILDING

U. S. NAVY EMERGENCY HOSPITALS

Washington, D. C.

ON October 2nd, 1918, Commander A. L. Parsons, Asst. Chief of the Bureau of Yards and Docks, U. S. Navy Department, telephoned to the Turner Construction Company and asked how quickly a group of six buildings could be erected on the grounds of the Naval Hospital, Twenty-third and B Streets, Northwest, Washington, D.C., to be used as a 300-bed Emergency Hospital for the care of influenza and pneumonia patients.

These buildings had to be equipped with screens, water and drainage systems, plumbing and electric fixtures and a steam-heating system supplied by a boiler house and were to be furnished throughout with shades, beds, tables, chairs, sterilizers, ranges and other kitchen equipment, even down to pepper shakers, dishes, cutlery, etc.

A period of sixty days was fixed as the date for occupancy and the contract was signed by Secretary of the Navy, Hon. Josephus Daniels, on October 3rd.

The group comprised three ward buildings, one subsistence building, a storehouse and a brick boiler house. In the monument view of the Navy and War Department office buildings, shown on page 56, these hospital buildings appear in the central background. The largest ward building was H-shaped in plan, consisting of two wings each 173x25 feet, connected by a central portion 40 x 25 feet. It was two stories in height, giving a total floor area of 19,300 square feet with verandas of 2300 square feet added. The other ward buildings were likewise two stories and were irregular in plan. The total length, including wings, was 242 feet in one ward and 293 feet in the other, with a uniform width of 23 feet. The combined floor area of these two buildings was slightly over 25,000 square feet with additional verandas of 6000 square feet. The subsistence building was 250 feet in length, 25 feet wide in the wings with a central portion 45 feet in width. It also contained a basement 41 x 26 feet and had a total floor area of 7800 square feet.

The frame work was of timber construction with a stucco on metal lath exterior and furred in the interior with plaster board. The boiler house was of brick 42x34 feet with a radial brick chimney adjoining and the storehouse a one-story frame building 23x60 feet.

As the buildings were located on a side hill considerable excavation was required and to obtain the proper foundation for the chimney, it was necessary to sheet pile a pit 32 feet deep to the underlying rock.

The Navy and War Office Building job of the contractor, which was nearing completion, furnished the force, already organized, to push the work from the start, so that the great problem, aside from the difficulty of holding the mechanics and laborers, was to obtain materials as rapidly as the construction force could place them.

Most of the rough lumber was procured from nearby points, but five carloads of heavy timbers, unobtainable locally, were shipped from Poughkeepsie, N. Y., and delivered within one week. Doors, glazed sash and much of the mill work were purchased in Richmond, Va., excellent deliveries being made. Metal lath, a full carload, was shipped by express from Ohio. It was found that the stock size of plaster board was too

short for the requirements, but a manufacturer agreed to make the special size promptly. To accomplish this, it was necessary for the expediting force to trace a shipment of raw materials to the manufacturer and then a few days later, follow seven carloads of finished plaster board from Michigan to Washington. Express shipments were necessary for the boilers, plumbing fixtures and nearly all the kitchen equipment. The master-keyed hardware, generally a difficult item to procure, was secured in two weeks, packed in trunks and shipped to Washington in record time.

Meanwhile, the construction forces worked tirelessly in assembling and placing the material on arrival. Twelve hours every week day and ten hours on Sunday was the rule. The storehouse was completed in a few days, and thirty calendar days after the contract was signed ward No. 1 was ready for occupancy, the steam heat being supplied from the existing boiler house, the plans calling for a connection to this as well as to the boiler house under construction. Two weeks more saw the completion of a second ward and the subsistence building completely equipped.

On November 13th, came the order that all government work was to be put on an 8-hour basis, the contractor giving a 44-hour week instead of 82 hours for the last 20 days allotted for the work, with the resulting letting down on the part of labor. In spite of this handicap, the entire group was turned over for occupancy and accepted by the Navy Department on December 4th—60 days after the construction work started.

The work, which cost about $365,000.00, was carried out under the direction of the Bureau of Yards and Docks with Lieut.-Com. O. A. Mechlin, U. S. N., in charge, in accordance with plans prepared by Lieut.-Com. Southworth, U. S. N. Wm. E. Lyle was executive for the Turner Construction Company, assisted by R. F. Egelhoff, as superintendent; B. M. Fowler, Jr., purchasing agent, and E. R. Bear, engineer.

ONE OF THE WARDS FULLY EQUIPPED

U. S. Army Supply Base

Brooklyn, N. Y.

COURT IN BUILDING B, SHOWING THE ARRANGEMENT OF CANTILEVER BALCONIES WHICH ARE SERVED BY TRAVELLING CRANES HANDLING SUPPLIES DIRECT FROM RAIL TO WAREHOUSE

U. S. ARMY SUPPLY BASE

Brooklyn, N. Y.

IN December, 1917, Major General Geo. W. Goethals, Acting Quartermaster General and Director of Purchase, Storage and Traffic, determined to establish five large terminal storage bases on the Atlantic Seaboard and one on the Gulf, for the storage and transshipment of Army supplies to France. Of these the Army Supply Base in Brooklyn is the largest.

To avoid delay, General Goethals, while awaiting appropriation from Congress, directed Irving T. Bush, president of the Bush Terminal Company and at that time Chief Executive Officer of the War Board of the Port of New York and Chief of Embarkation for the War Department, to investigate the available sites in the Port of New York and to advise him as to the design and construction of an Army Supply Base that would be called upon to handle a large percentage of the overseas shipments.

SELECTION OF THE SITE

The location selected after a thorough investigation was a piece of property covering about 100 acres between fifty-eighth and sixty-fourth Streets and between the pier head line and Second Avenue, South Brooklyn, New York.

The pre-eminent advantage of the Brooklyn site was that the property was available for immediate development and of sufficient size to permit of the erection of the very large warehouses and piers which would be required to meet the needs of the War Department at this port. The property fronted on a deep water channel at the pier head line and the underlying soil conditions were such that it would be possible to obtain excellent foundations for the warehouses as well as for the piers. The property furthermore was immediately adjacent to the Bay Ridge Terminal of the Long Island and Pennsylvania Railroads with direct rail connections with the New Haven Railroad over the Hellgate bridge, and also direct connections with the Bush Terminal, which had already been leased by the War Department.

At first it would seem that a great warehouse and shipping terminal in New York Harbor should be located on the New Jersey shore, in order to avoid the heavy movement of cars by floats or the movement of goods by lighters. The force of this argument, however, largely disappears when it is found that at present there is no intercommunicating switching railroad on the outskirts of Jersey City which would make it possible to pick up promptly cars coming in from the several railroads entering the port, all the way from the B. & O. Railroad at Staten Island to the West Shore Railroad at Weehawken. The opinion was held that the cost of moving freight from the various railroad terminals as now constructed, to a Base in New Jersey, would exceed the cost of floating the freight from these terminals in New Jersey to Brooklyn. As someone has said, with reference to floating cars in New York Harbor, "The Almighty has

provided the right of way and there is no interest, depreciation or upkeep; the only investment is in floats and tug boats." The site of the Brooklyn Army Base provides *direct* rail connection with the New Haven, New York Central and Long Island Railroads.

The properties available on the New Jersey shore were also at a disadvantage with respect to prompt development—a prime essential for a War Base. These sites required either extensive dredging operations, and back filling to make the necessary land, or the construction of elaborate railroad connections.

In March, 1918, Congress made the appropriations for the port terminals, and General Goethals gave his personal approval of the general plans which had been prepared by Cass Gilbert, architect, for the Brooklyn Base under Mr. Bush's direction. In April he requested the Emergency Construction Committee of the War Industries Board, Col. W. A. Starrett, chairman, to approve the selection of Cass Gilbert as architect for the Base and the Turner Construction Company as general contractors. These recommendations were concurred in by the Construction Division and later approved by the War Industries Board.

The contract, which was of the standard emergency type, was prepared by the Construction Division, Brig. Gen. R. C. Marshall, Jr., in command, and on approval and authorization by Assistant Secretary of War Hon. Benedict Crowell, was finally signed on May 15th, 1918. Work began at the site the same day. The project as finally designed is estimated to cost about $32,500,000.00.

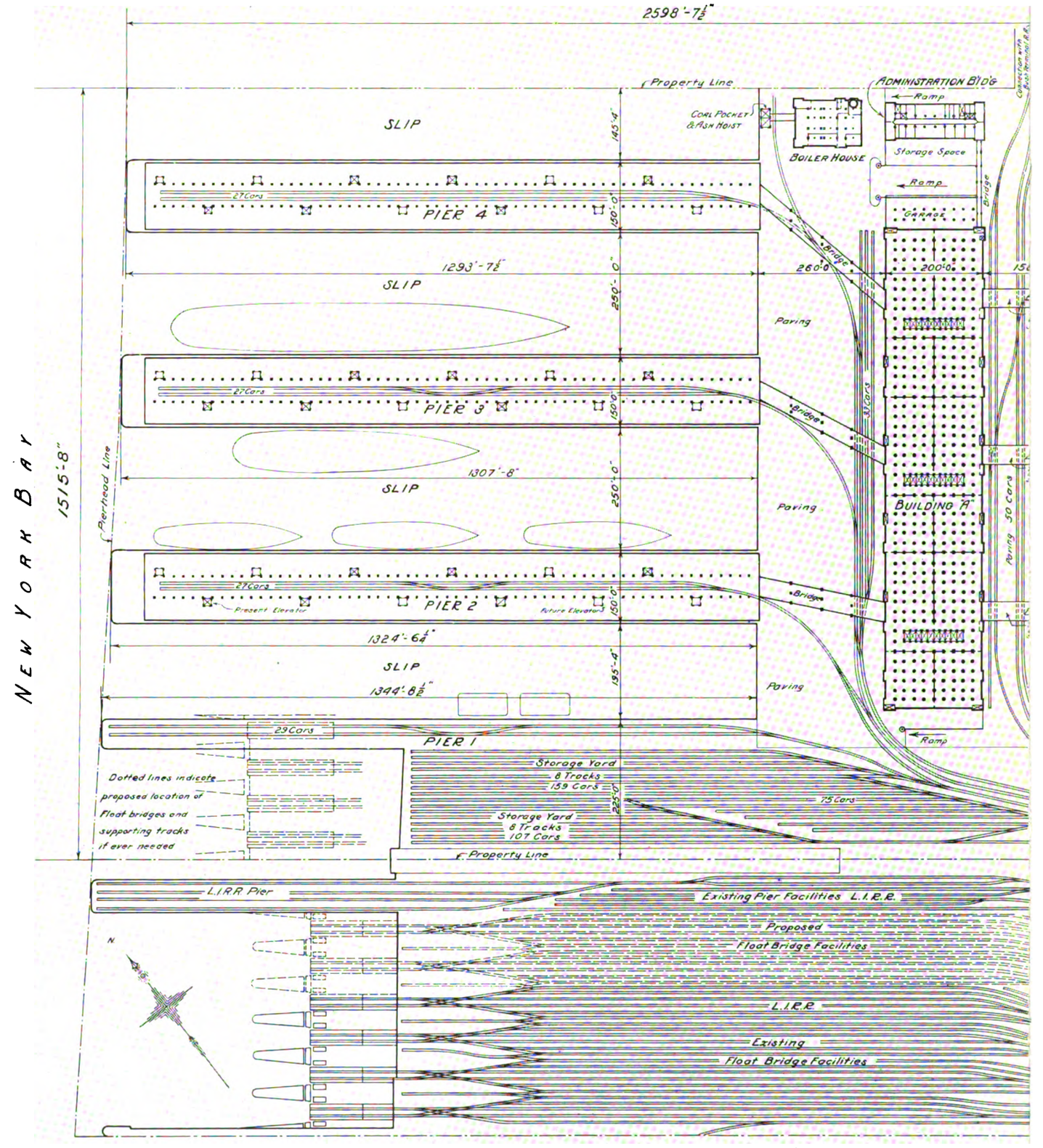
GENERAL PLAN

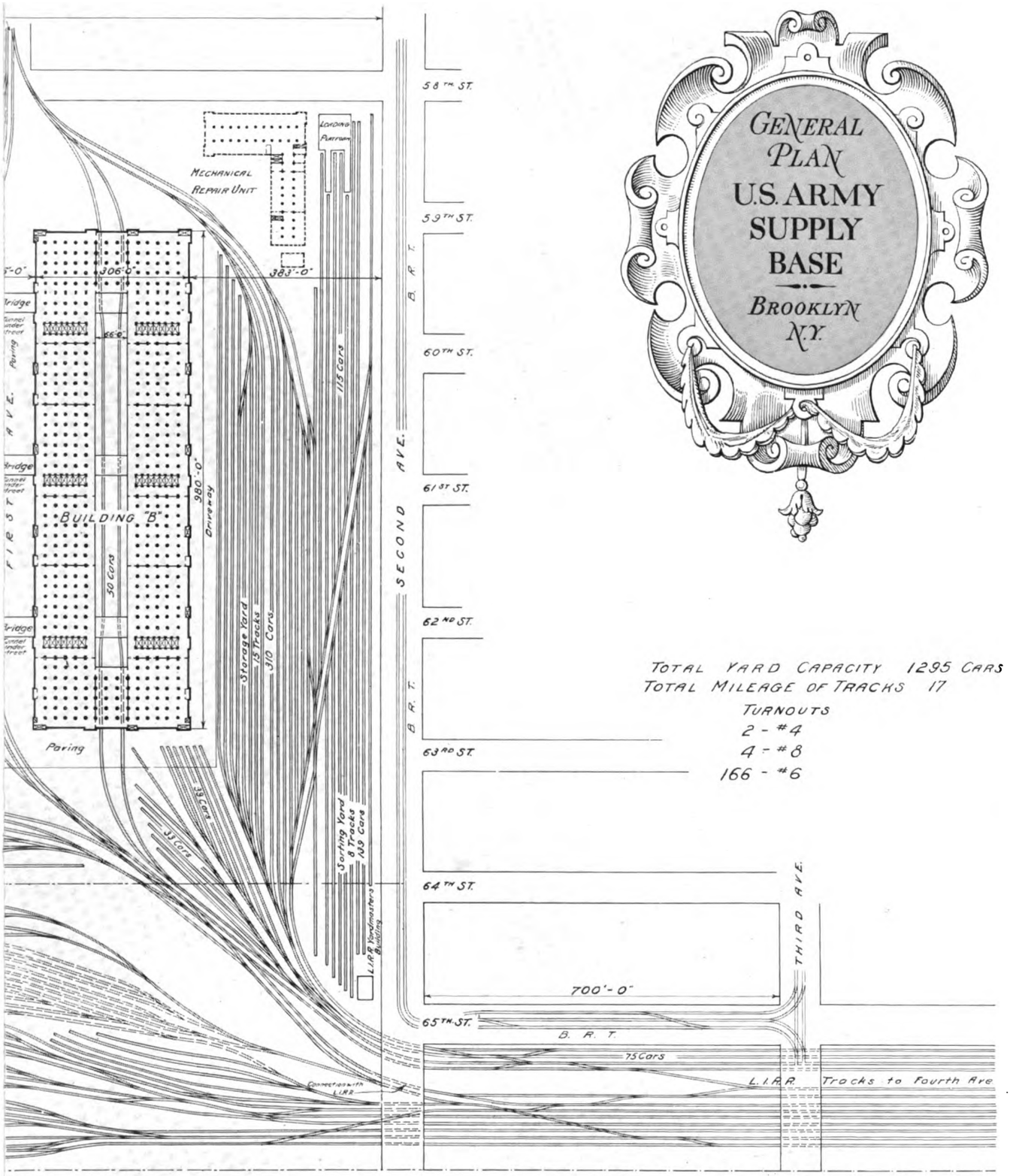
In conceiving this overseas Base, the problem was two-fold: to provide for maximum war requirements of direct rail to ship movement and of storage; and to provide a terminal which could be operated advantageously for commercial purposes.

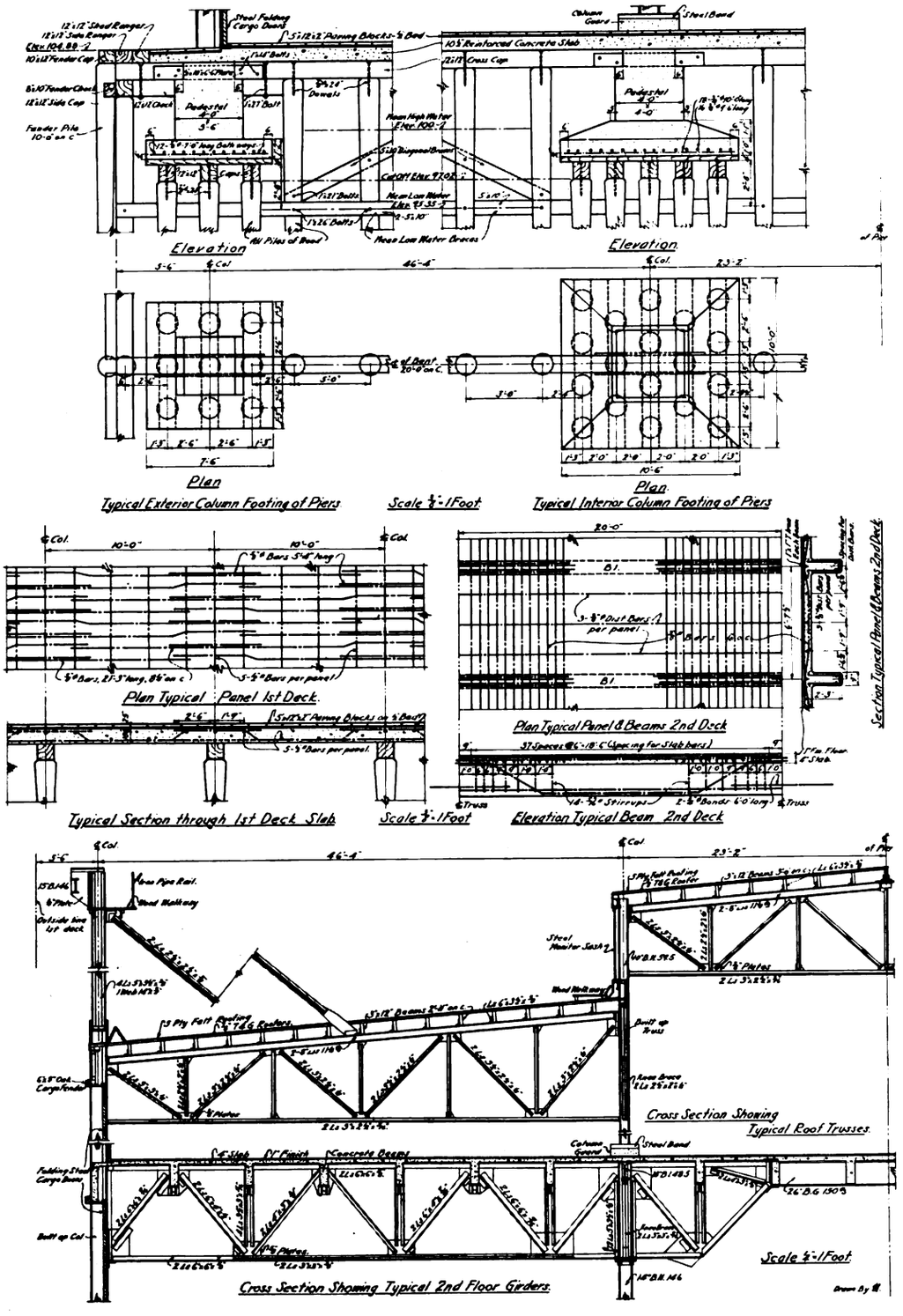
A study of the general plan which appears on pages 79 and 80 will show that there was evolved a scheme which is excellently adapted to either of the above requirements.

The railroad yards could handle 440 carloads, or approximately 11,000 tons of supplies per day at war speed. The warehouses store 500,000 tons when full; the piers accommodate at least twelve ships of 8000 tons dead weight at one time; and the system of elevators,

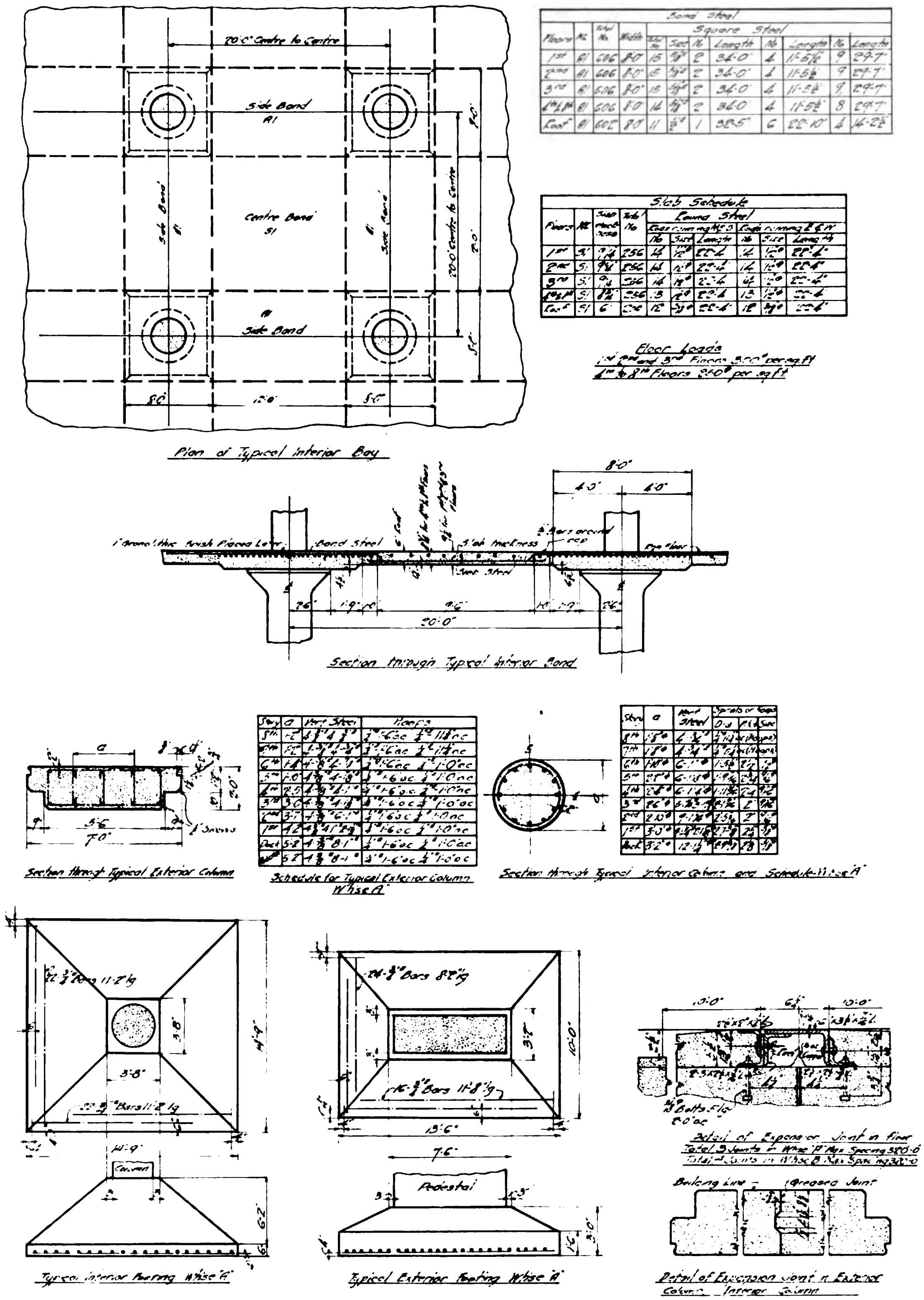
LOOKING DOWN THE EAST SIDE OF BUILDING B







TYPICAL STRUCTURAL DETAILS OF THE PIERS



TYPICAL STRUCTURAL DETAILS OF THE BUILDINGS

TYPICAL FLOOR IN BUILDING A

bridges and tunnels were designed to permit maximum operation.

If used for commercial purposes, the buildings are so arranged as to provide adequate light, elevator service and storage space, and facilities for receiving and shipping goods by motor truck, rail and water—a remarkable combination of favorable factors.

The Base divides itself naturally into three broad features: buildings; railroad yards, grounds and pavements; and piers and bulkheads.

BUILDINGS

The buildings include two main warehouses known as Warehouses A and B, the arrangement of which is shown on the general plan on pages 79 and 80. Warehouse B is 980 x 306 feet, eight stories and basement in height, with a court 66 x 740 feet in the center. Warehouse A is 980 x 200 feet, eight stories and basement in height. Both buildings are entirely of reinforced concrete of the flat slab type. (For details, see page 86.)

Besides Warehouses A and B are a Boiler House of 2640 horse power capacity, and an Administration Building, 206 x 64 feet, four stories and basement in height.

The aggregate floor area of all buildings is approximately 4,280,000 square feet, or 98 acres. Their cubic capacity is 56,200,000 cubic feet, or over *four* times that of the Woolworth Building in New York. Warehouse B is said to be the largest individual building in the world as regards floor area, having 52 acres of floor space, 1.85 times that of the Equitable Building, New York, or 1.78 times that of the new Pennsylvania Hotel, New York. The size of Warehouse B in terms of cubic contents is almost exactly equal to that of the great Pyramid of Cheops.

The mechanical equipment consists in general of:

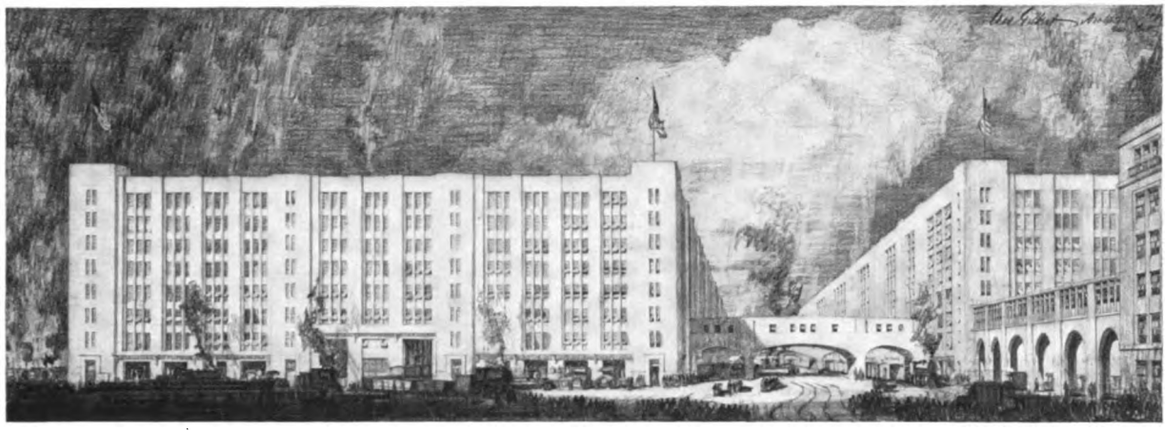
(*a*) A full two-source sprinkler installation with complete fire pump equipment.

(*b*) A system of electric wiring including the necessary transformers capable of furnishing a total of 8500 kilowatts.

(*c*) A plumbing and drainage system with 780 fixtures.

SECRETARY McADOO VIEWING THE PROGRESS OF THE WORK AUGUST 24th, 1918

Left to right—Cass Gilbert, Architect; Oscar A. Price, Assistant to Director-General of Railroads; J. R. Savage, General Manager of the Long Island Railroad; Wm. G. McAdoo, Secretary of the Treasury and Director-General of Railroads; Ralph Peters, Federal Manager of the Long Island Railroad; Lieut.-Col. H. S. Crocker, Constructing Quartermaster; Major George Perrine, Assistant Constructing Quartermaster.



ARTIST'S DRAWING OF WAREHOUSES A AND B
with connecting bridge over First Avenue and the bridge connecting Warehouse A with the Administration Building

(*d*) 96 elevators capable of handling 2200 tons of freight per hour, arranged as shown on the plan on pages 79 and 80.

(*e*) A heating plant to heat the warehouses to 40 degrees and the Administration Building to 70 degrees in zero weather.

Early in the development of the plans, the suggestion was made to ask the advice of the Ford Motor Company as to the best means for quickly handling large quantities of freight into the Warehouses. At the invitation of Mr. Bush, Henry Ford sent C. W. Avery, one of the general superintendents of that Company, to New York. After a careful study of conditions to be met, Mr. Avery suggested the arrangement of cantilever balconies in a central court served by travelling cranes. This is shown clearly in the photograph on page 76.

RAILROAD YARDS AND PIERS

The railroad yards consist of a classification yard south of Pier No. 1 and three storage yards—one along Sixty-fifth Street, one east of Warehouse B and one west of Warehouse A. Tracks run through the court of Warehouse B, in First Avenue and to the end of each pier. Direct connection is made with the Long Island Railroad, the Bush Terminal and the four float bridges immediately south of the property.

The completed yards will include about 17 miles of track, 172 switches and provide storage for about 1300 cars. The streets are paved with granite blocks on a concrete base, and the "farm area" between Warehouse A and the bulkhead with bithulithic.

The water-front development consists of a bulkhead wall along the entire front of the property, three double-deck piers, each 150 feet wide by 1300 feet long and one open lighterage pier 60 feet wide by the same length. The slips between the piers are 250 feet wide, dredged to a depth of 35 feet at mean low water.

The piers have timber substructures with concrete main decks. The pier sheds are structural steel with reinforced concrete second decks and wood roofs. The main decks are paved with asphalt blocks, the second decks with granolithic.

THE CONSTRUCTION PROBLEM

The first great problem in carrying out the plans for the Brooklyn Base was the one of excavation. Approximately 700,000 cubic yards of dirt had to be moved. This is equivalent to the excavation for the Interborough Subway from Brooklyn Bridge to Fiftieth Street.

The cubic capacity of Warehouse A is about equivalent to the yardage of earth excavated. In other words, a glance at the illustration of Warehouse A, on pages 81 to 84, inclusive, reveals the size of the pile of dirt which had to be moved. At one time eleven steam shovels were on the job. The maximum work in one day of 24 hours was 14,000 cubic yards. The material went partly by narrow gauge railroad trains, south from the Base, along the sea wall to Fort Hamilton, three miles away, where new park land was made. Another part of the earth was moved to make the open bulkhead or farm west of Warehouse A and the balance was moved by motor trucks to Dyker Meadows, 3.2 miles from the job.

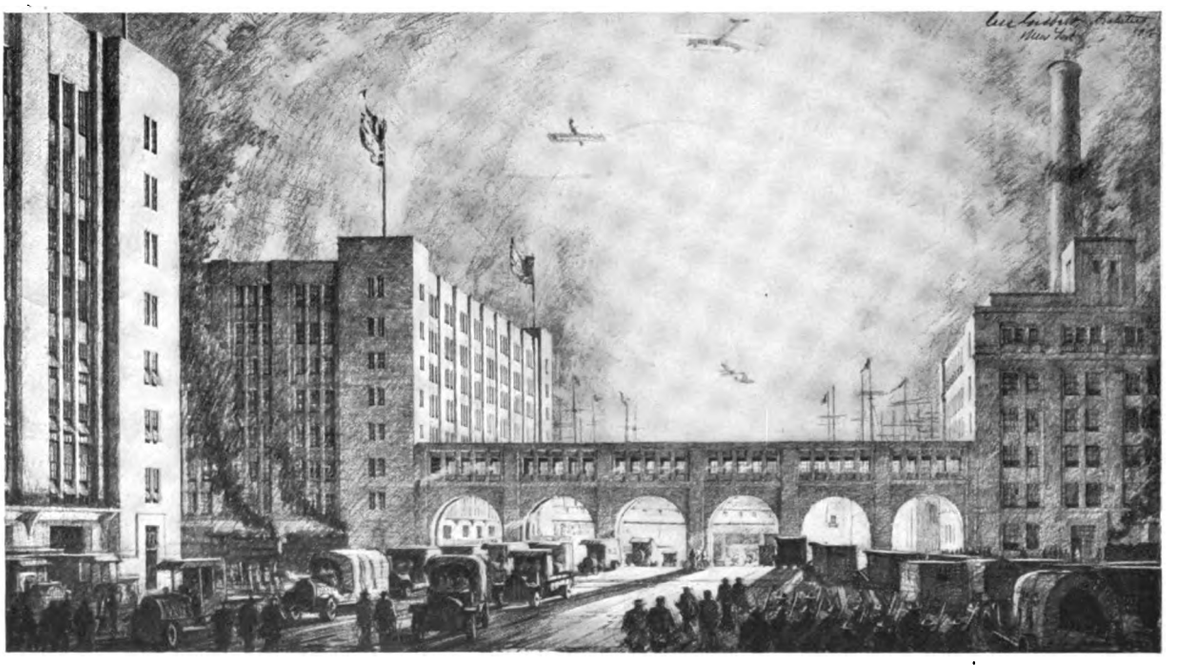
Most of the footings were soil bearing but on account of the nature of the ground it was necessary to use concrete piles under part of Warehouse B. About 5800 concrete piles were used.

An idea of the magnitude of the construction problem can be gained from the tabulated quantities (page 98) of materials required for the work, and a conception of the rate of progress made from the following record figures:

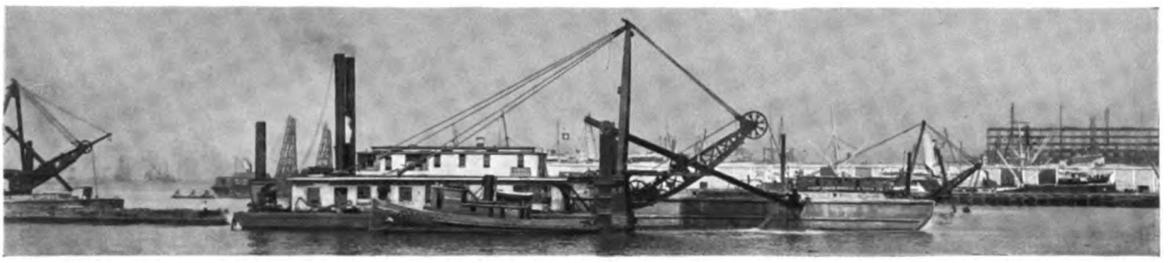
275,000 cubic yards of excavation in the month of June.

67,300 cubic yards of dredged material in one week.

21,381 cubic yards of concrete placed in the buildings in one week.



ARTIST'S DRAWING LOOKING TOWARD THE WATER FRONT AND PIER NO. 4
and including portions of Warehouse A, Administration Building and the connecting bridge



THREE OF THE FIVE DREDGES USED ON PIER WORK
At the left is Napoleon; center, Pan American; right, Dredge No. 51

529,680 square feet of reinforced concrete floor in one week.

615 tons of structural steel erected on Pier No. 4 in one week.

545 piles on the piers in one day.

6,808 barrels of cement and

5,580 cubic yards of sand and crushed stone were unloaded in one day.

Single shifts were worked except on dredging and excavation.

The maximum number of workmen employed was 7,400 of which 4,700 worked directly for the Turner Construction Company and the balance for sub-contractors.

Of the heavy timber required, about 1,200,000 feet B. M. were shipped through from the Pacific Coast in solid train loads.

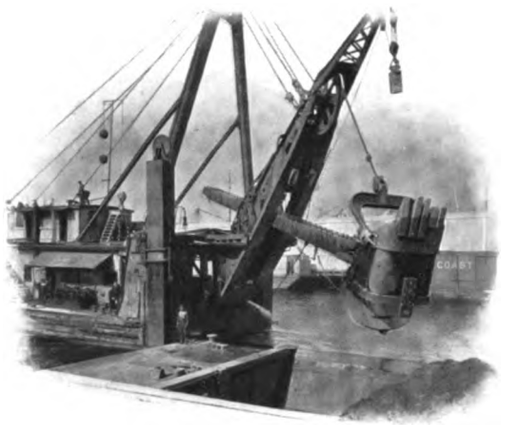
In the construction of Warehouses A and B, it is remarkable that the concreting of the roofs of Warehouse B east, Warehouse A and Warehouse B west was completed on successive days, namely, on September 24th, 25th and 26th, testifying to orderly management and all within four months and eleven days after the signing of the contract on May 15th. Stated another way, 100 acres of floor were concreted in 100 days.

HANDLING MATERIALS

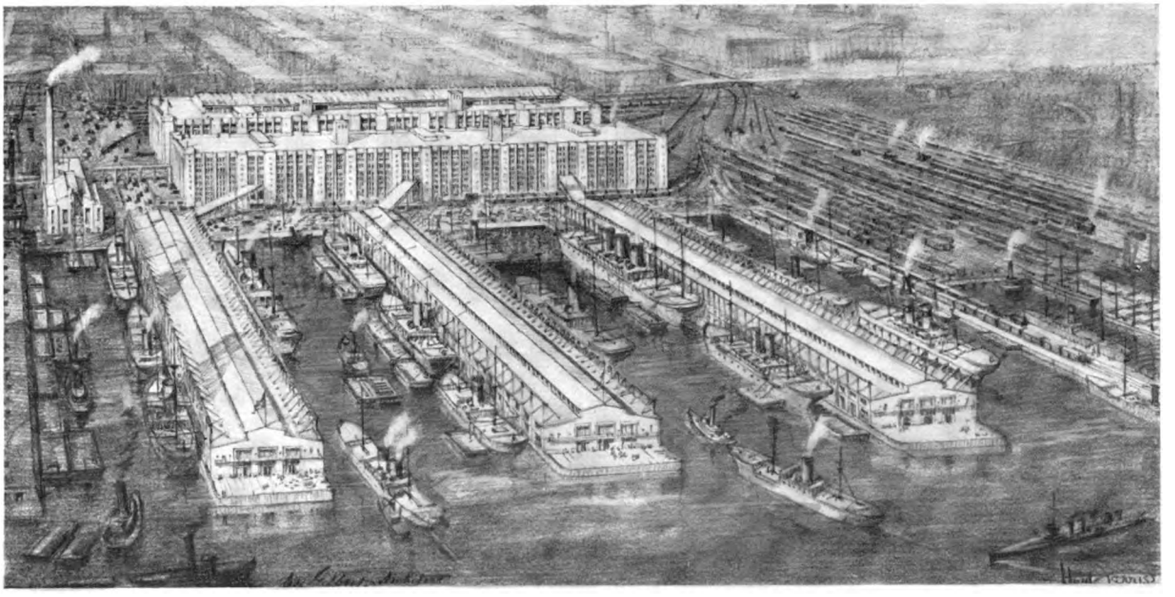
Sand and stone were unloaded from scows with boom derricks and clam-shell buckets which deposited the material in elevated hoppers. Motor trucks drove under these hoppers, received their loads and drove over trestles, one along the east side of Warehouse A and one in the court of Warehouse B. The trucks discharged their loads through the floors of the trestle into bins from which the material was discharged by gravity into measuring cars and deposited in the mixer hoppers.

Cement was unloaded from barges by means of six portable conveyors shown in the illustration on page 101. These conveyors were so constructed that they operated equally well at high and low tide and could be moved about the dock as required.

Each of these conveyors, when in operation, handled about twelve bags of cement per



THE BIG 9.2 YARD DIPPER OF DREDGE NAPOLEON IN ACTION
The dipper handle on this dredge is 60 feet long



ARTIST'S BIRD'S-EYE VIEW OF THE BASE LOOKING FROM NEW YORK HARBOR

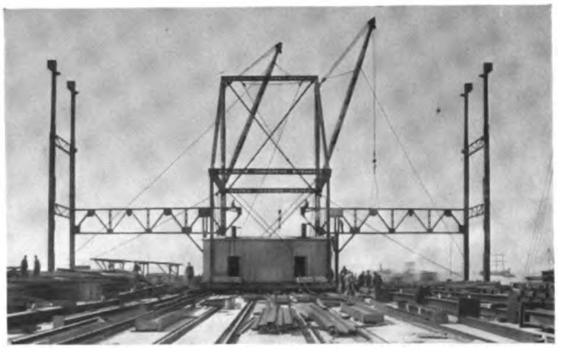
minute keeping busy a gang of six men in the barge. Four concrete mixers were set up for Warehouse A and eight for Warehouse B—all of one cubic yard capacity. The success of the plant layout can best be stated by the fact that there was never a time when any part of the concrete work was held up for concrete materials. Motor trucks passed over the trestles at the average rate of one per minute.

The Boiler House and the Administration Building had separate concrete plants served also by motor trucks. Steel reinforcement was received and fabricated in yards adjacent to the buildings and during the run of the work about 210 tons of steel were handled per day. The form lumber was received and made up in a large yard secured from the Long Island Railroad at Sheepshead Bay and delivered in cars to the work as required.

PROGRESS ON DREDGING AND PIERS

The dredging was a tremendous task, involving about 1,700,000 cubic yards of material. Work was started on June 3rd, and was carried on with one clam-shell and four dipper dredges. Five tugs and an average of four scows per dredge were used in the moving of the excavated material.

As bottom-dump scows in this vicinity were very scarce and practically no ocean-going tugs were available, it was not possible to send all of the material to sea for disposal. It was necessary to provide nearby spoil areas in order that scows could be loaded more than once a day and also that smaller tugs might be used in towing them. Areas were provided both north and south



ERECTING THE FIRST BENT OF STRUCTURAL STEEL ON PIER NO. 4, OCTOBER 5th, 1918

Pile driving was started August 25th, 1918

of the Base so that the tows could take advantage of the tide at all times. One of these was on the New Jersey shore in the vicinity of Black Tom and the other in Gravesend Bay at Sea Gate. At each of these localities the excavated material was dumped in basins excavated for the purpose and pumped ashore by suction dredges.

Excellent progress has been made by the dredging companies and the work substantially completed by March 15th, 1919.

The first pile was driven in the bulkhead July 9th, and in Pier No. 4 July 25th. Erection of the steel superstructure of Pier No. 4 was started October 4th and the completion of this pier was scheduled for January 1st, 1919. Pier No. 2 was started August 5th and Pier No. 3 on September 14th. All of this work was progressing in fine shape until November 11th, after which all schedules were off because of the labor conditions which developed. Undoubtedly, if the war had continued, the sub-contractors for the water-front work would have established new records for such work and it is quite possible that records will yet be made since the work was resumed in February.

PROGRESS ON ADMINISTRATION BUILDING AND BOILER HOUSE

In the early fall, excellent progress was made in the construction of the Administration Building, but with the reduction which was made in the size of the building and many other modifications in plans, it was not possible to force progress on this building.

In the case of the Boiler House, however, the Storage Officer who was to operate the Base, asked that steam be turned on in the north section of Warehouse A on January 1st, 1919.

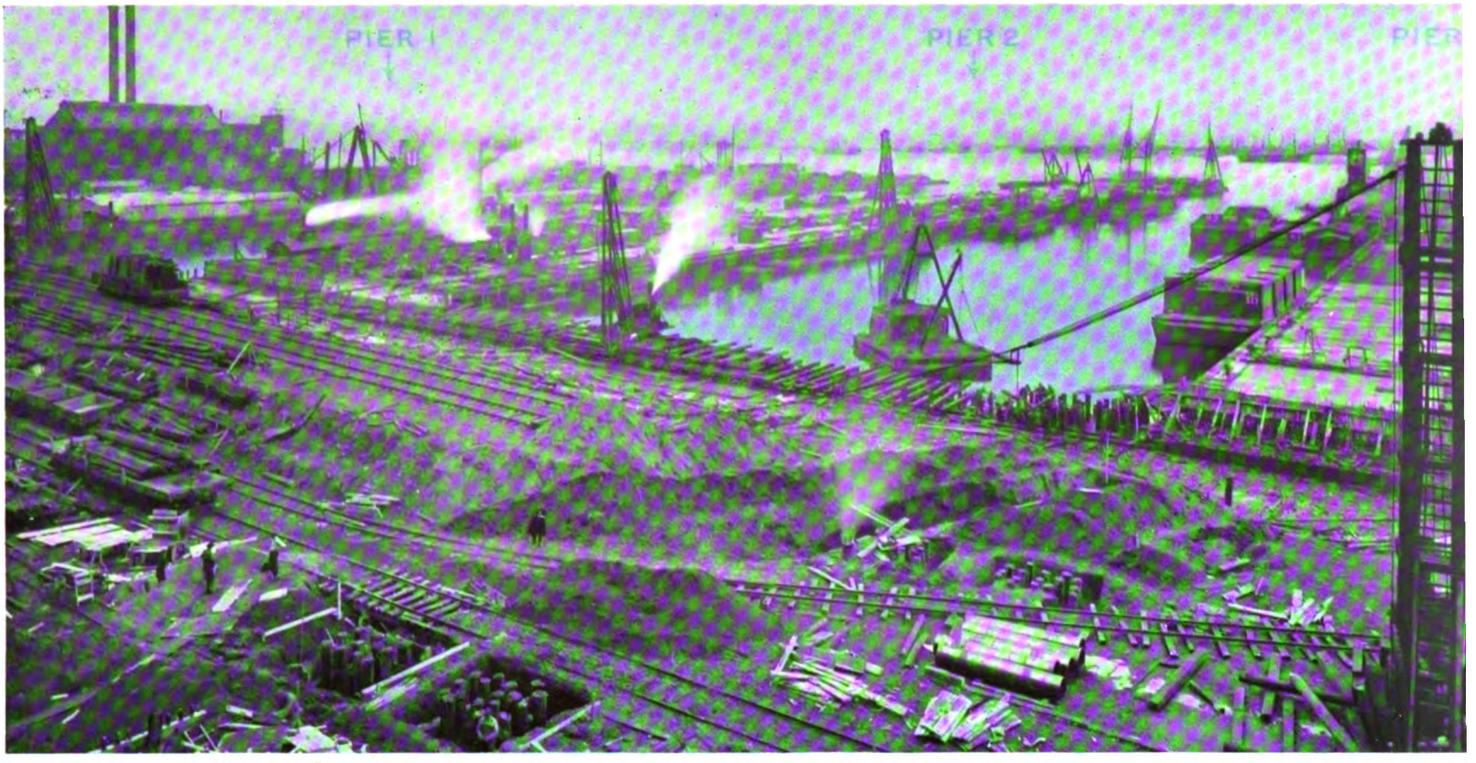
Owing to the fact that the bulkhead adjacent to the Boiler House had to be completed and the back-filling put in place behind it before work on the Boiler House foundations could begin, it was not possible to drive the first pile under the Boiler House until August 31st.

Good progress was, however, made on the Boiler House, the brick stack and on the boilers, and by making substitutions of materials during the carpenter strike in November, December and January, progress was continued and heat turned on in Warehouse A on January 11th, 1919.

SUB-CONTRACTORS

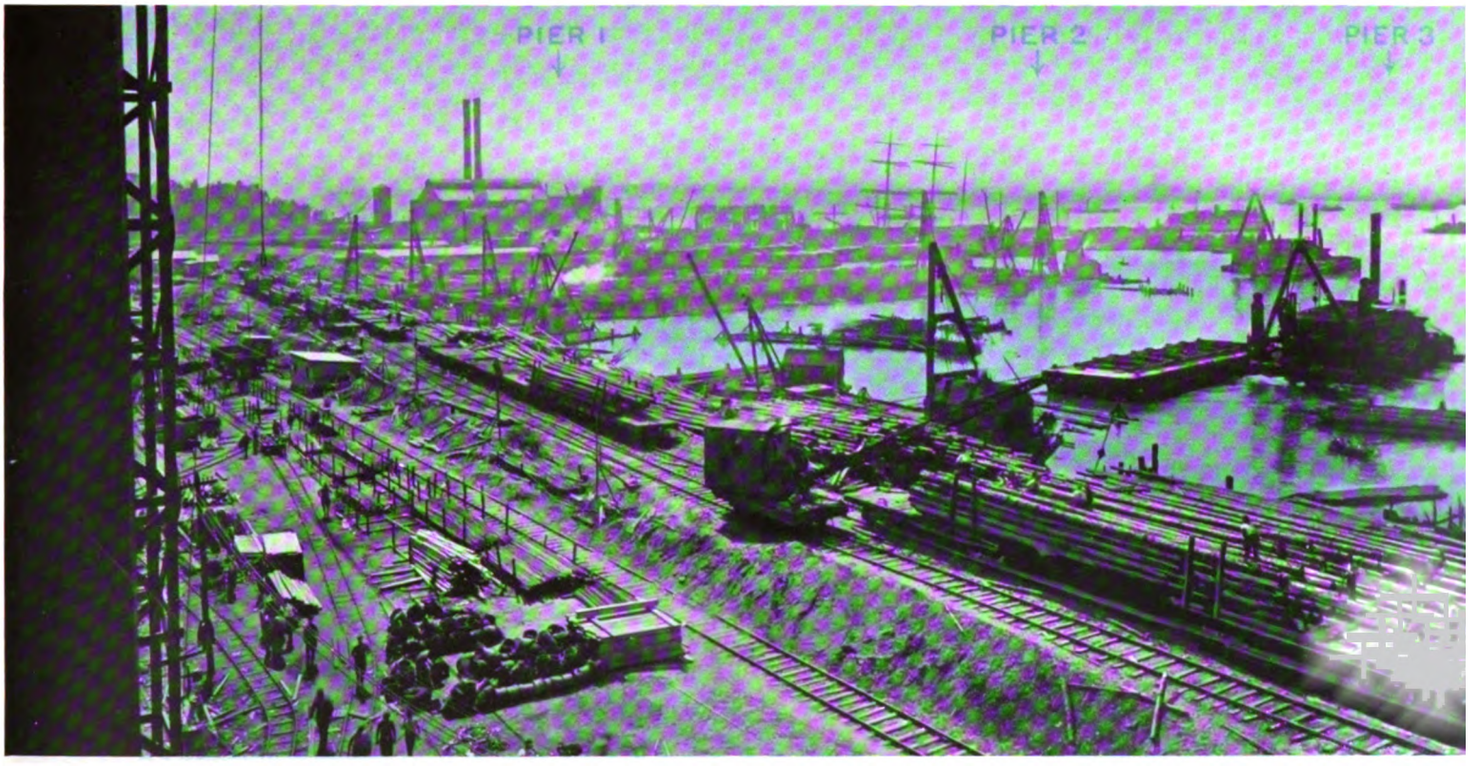
The policy was adopted of sub-letting the parts of the Base requiring specialized knowledge and experience in order that every part of the work might be under the immediate direction of the most skilled superintendents and foremen obtainable. Under this plan, the sub-contractors could place on the work immediately all the plant and equipment required and could bring to the work, which was of vital importance, a following of skilled and dependable workmen.

The sub-contractors were carefully selected and with a few exceptions, rendered splendid service. The great progress, which was made and which was much better than was considered possible when the contract was awarded in May, 1918, was due to the spirit of determination and co-operation which prevailed all along the line of



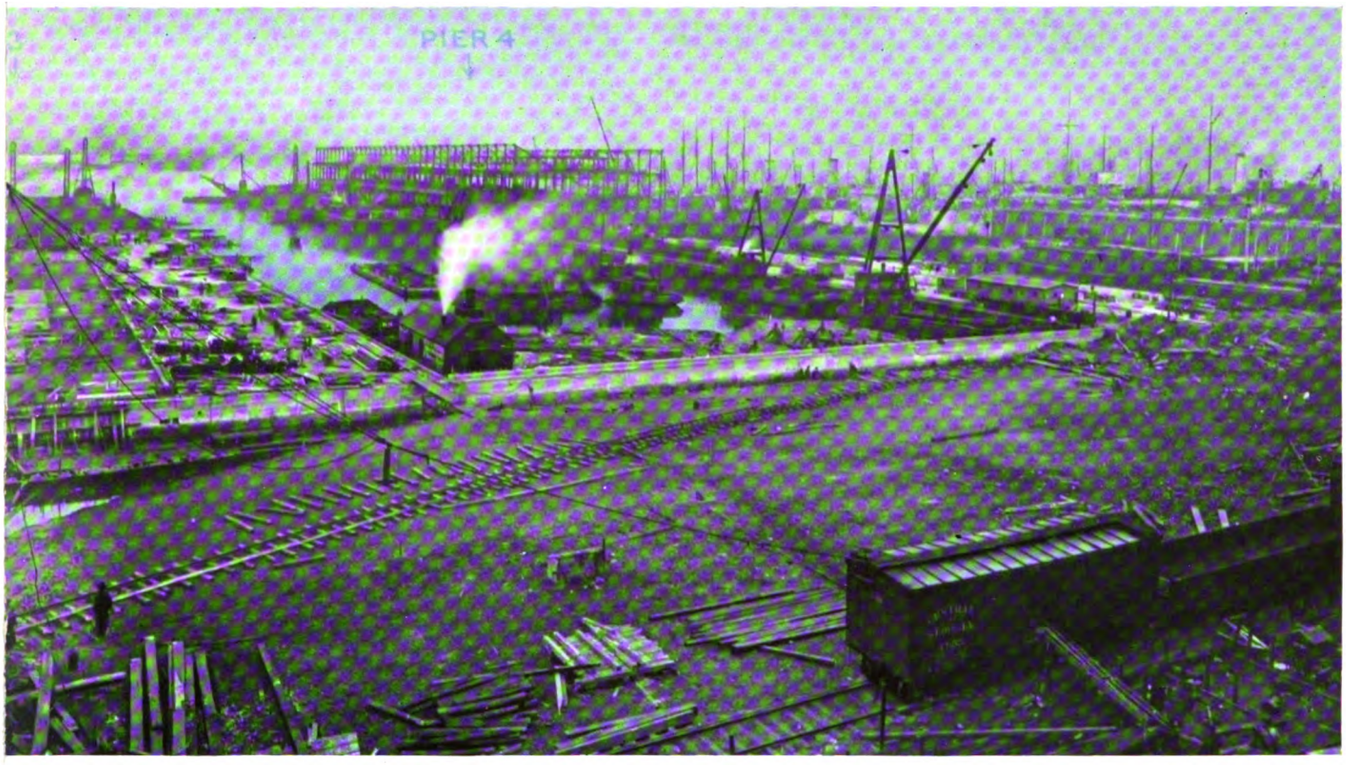
NOVEMBER 4

A week before the armistice was signed—3½ months after pile driving was started on Pier No. 4. Three month

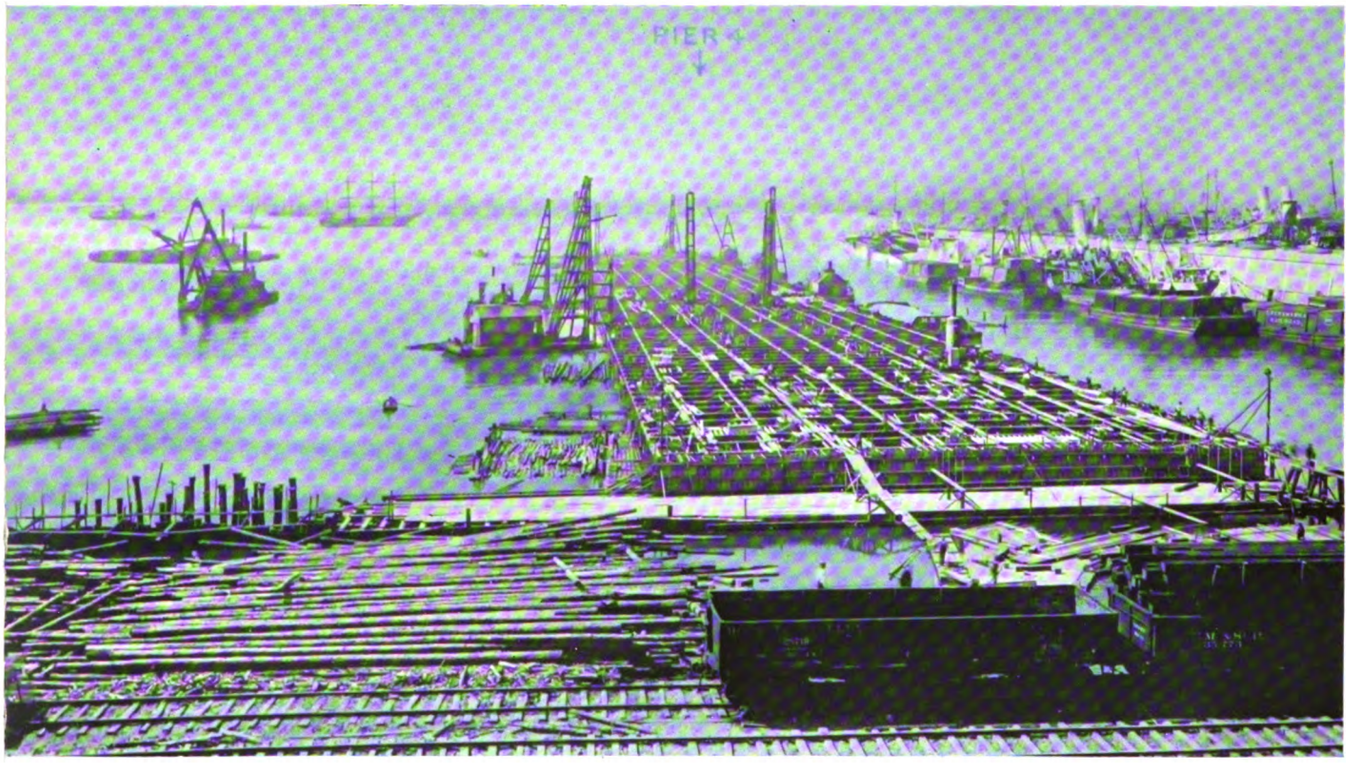


AUGUST 25t

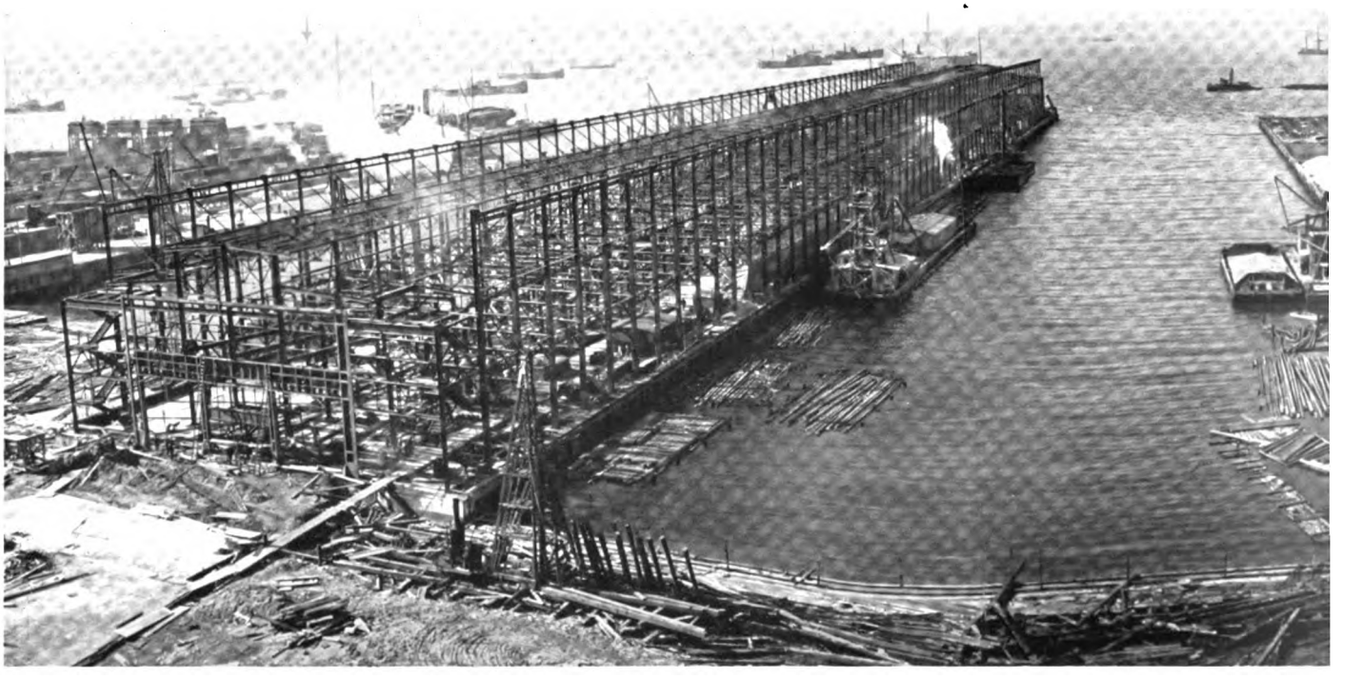
One month after pile driving was started on Pier No. 4 and tw



.h, 1918
; after pile driving was started on Pier No. 2. Seven weeks after pile driving was started on Pier No. 3



ı, 1918
nty days after pile driving was started on Pier No. 2



Showing progress on structural steel work; the first bent was erected on Pier No. 4 October 5th, 1918. The strike of dec
completed by May 1st, which will establish a re

WORK DONE TO NOVEMBER 11, 1918

BUILDINGS

Excavation—Steam shovel, started May 15—total quantity excavated to November 11, 600,000 cubic yards. Concrete Pile Driving started May 21—5829 piles driven in 44 working days.

	Building A	Building B West	Building B East	Total
Footings started	June 6	June 1	June 6	. . . .
Footings finished	July 27	August 8	July 31	. . . .
Number of working days placing footing concrete	44	59	47	. . . .
Rough concrete floor started	July 3	July 13	July 12	. . . .
Roof on	September 25	September 26	September 24	. . . .
Number of working days to place floors and roofs	71	64	63	. . . .
Total square feet of floor and roof	1,960,000	1,213,680	1,213,680	4,387,360
Total cubic yards of concrete	81,044	51,092	51,037	183,173
Total tons reinforcing steel	5,106	2,956	2,979	11,041
Number days pouring footings, floors and roofs	94	98	94	. . . .
Average cubic yards per day	862	521	543	1,962
Square feet self-supporting floor average per day	18,800	11,100	11,600	41,500
(100 acres of floor and roof constructed in 100 days)				

JARY 17th, 1919

builders and carpenters stopped all other work on the piers from November 20th, 1918, to February 20th, 1919. Pier No. 4 should be entirely ›rd in the construction of piers of this type in New York Harbor

PIERS

Dredging started June 3—1,081,000 cubic yards dredged to November 11

	Pier	Started	Finished	Working Days	Total Quantity
Pile-driving	4	July 25	September 17	45	7,875 piles
Pile-driving	3	September 14	November 11	47	7,908 piles
Pile-driving	2	August 5	October 14	58	7,972 piles
First deck concrete	4	August 26	October 14	40	8,860 cubic yards
First deck concrete	3	October 15	53 per cent	. . .	8,720 cubic yards
First deck concrete	2	September 19	90 per cent	. . .	8,787 cubic yards
Structural steel	4	October 5	71 per cent	. . .	3,022 tons

RECORDS

Excavation during the month of June	275,000 cubic yards
Pile-driving, concrete, one driver, 10-hour shift; average length, 15 feet in sand	62 piles
Concrete, one week, September 4 to 10, inclusive, cubic yards: Building A, 8,297; Building B West, 6,685; Building B East, 6,399; Piers, 1,533	22,914 cubic yards
Floor poured, one week, September 4 to 10, inclusive, square feet: Building A, 215,920; Building B West, 164,110; Building B East, 149,650	529,680 square feet
Dredging, one week, July 22 to 27, inclusive	67,300 cubic yards
Pile-driving, one driver, 11 hours, 60-foot piles, total penetration, 4,000 feet in sand	144 piles
Pile-driving, one day, August 20, 12-hour shift	545 piles
Concrete on piers, one day, October 3	729 cubic yards
Structural steel, one week, October 23 to 29, erected on one pier	615 tons

TRUCKS RECEIVING LOADS OF CEMENT BY BELT CONVEYORS FROM CEMENT BARGES

work. An appreciation of the loyal and able support given the general contractor by these many sub-contractors is here expressed.

The names of the principal sub-contractors are as follows:

Chimney for Boiler House — Alphonse Custodis Chimney Construction Company

Concrete Piling — Raymond Concrete Pile Company

Doors, manifold, Warehouses A and B — Kinnear Manufacturing Company
W. H. Brodie

Dredging . . . . . { Great Lakes Dredge and Dock Company / Atlantic Gulf and Pacific Company / W. H. Gahagan, Inc.

Electric Installation . . . . . L. K. Comstock & Company

Elevators and Elevator Doors . . . . . Otis Elevator Company

Excavation . . . . . Rodgers & Hagerty, Inc.

Glazing . . . . . Pittsburgh Plate Glass Company

Heating . . . . . Child & Scott Company

Painting . . . . . J. I. Hass, Inc.

Paving, Asphalt Blocks . . . . . The Hastings Pavement Company

Paving, Bithulithic . . . . . Warren Brothers Company

Paving, Granite Blocks — Asphalt Construction Company

Piers Nos. 1 and 2 Substructure — George B. Spearin

Piers Nos. 3 and 4 Substructure — Henry Steers, Inc.

Pier Superstructures . . . Post & McCord, Inc.

Plumbing . . . . . G. J. Staats

Railroad Yards . Eastern Contracting Company

Roofing and Waterproofing — New York Roofing Company

Skylights . { Keppler Glass Constructions, Inc. / Herrman & Grace Company

Sprinklers, Warehouse A — Rockwood Sprinkler Company

Sprinklers, Warehouse B — Globe Automatic Sprinkler Company

Sprinklers, Piers . . . H. G. Vogel Company

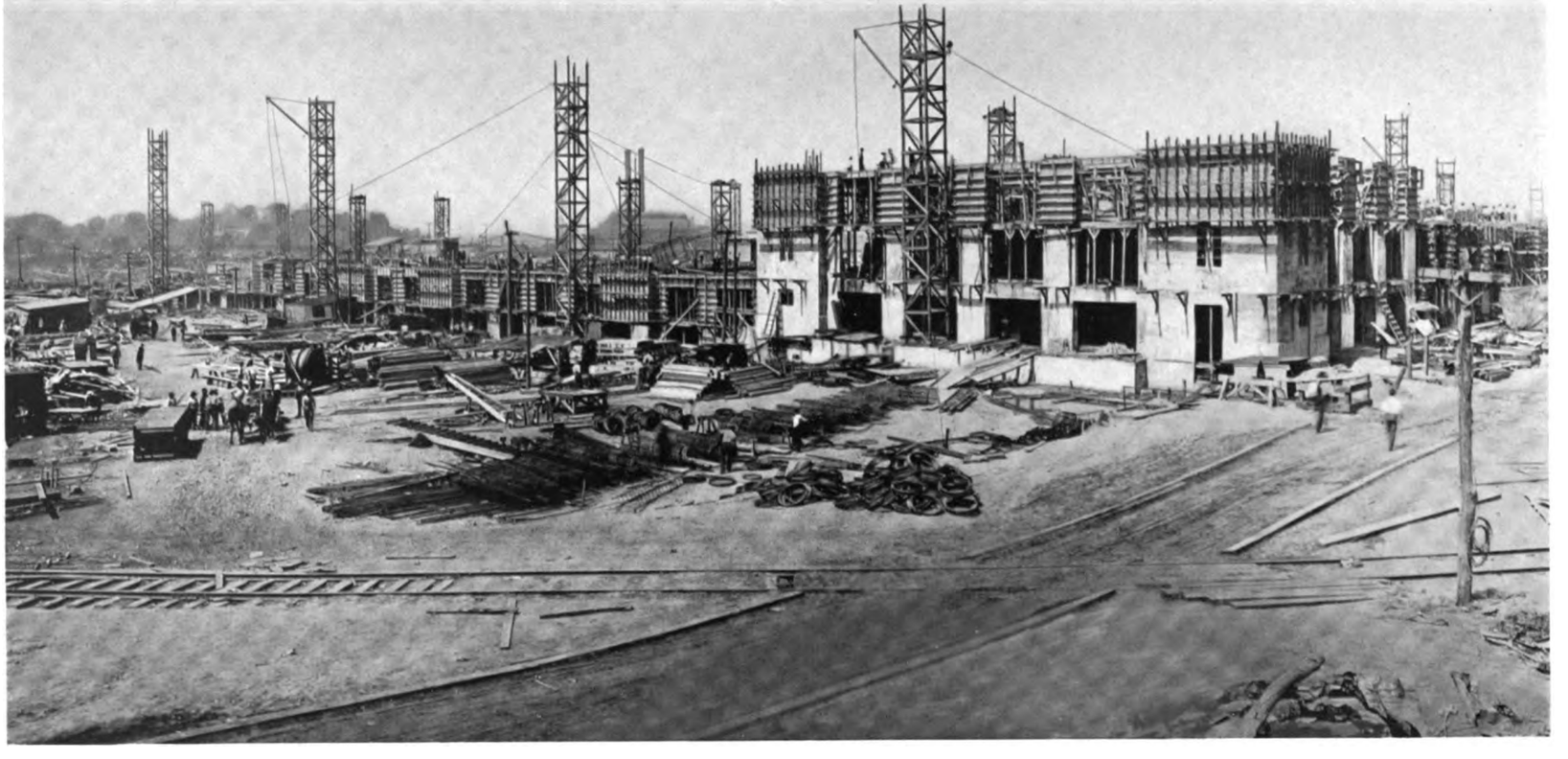
Steel Sash . { Detroit Steel Products Company / S. H. Pomeroy Company, Inc.

Stevedoring . . . . Rodgers & Hagerty, Inc.

A LARGER VIEW OF ONE OF THESE BELT CONVEYORS FOR HANDLING CEMENT

Note the special design of the truck body

DERRICK WITH CLAM-SHELL BUCKET UNLOADING SCOW OF STONE INTO HOPPER BINS FOR TRUCK DELIVERY



JULY 27th, 1918

Warehouse B—Two weeks after first forms for the first self-supporting floor were erected

SEPTEMBER 23rd, 1918

Warehouse B— Roof was completed three days later. Two and one-half months after first forms for first self-supporting floor were erected

MEN WHO DIRECTED THE WORK

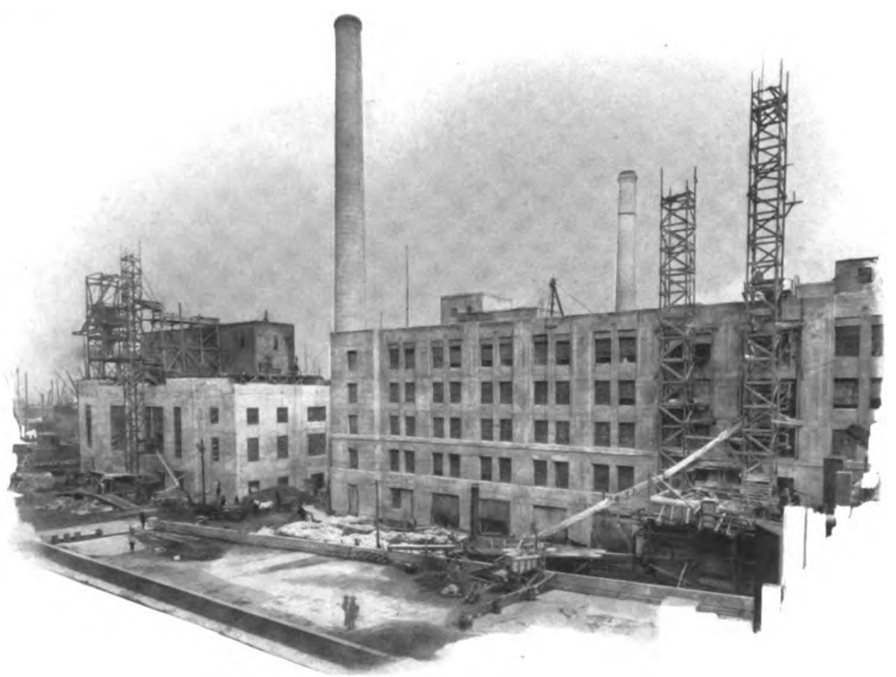
The design and execution of the work were directed by the Construction Division of the War Department, Brigadier-General R. C. Marshall, Jr., Chief of the Division. This division of the Army was noted for its high-class personnel, its progressive methods and its determination to give its contractors every reasonable assistance and co-operation. It was a real pleasure to work with this division in the execution of a monumental work for the Government.

The Construction Division was represented on the work by Lieut.-Col. H. S. Crocker, Constructing Quartermaster, who had full charge of the entire project. He was assisted by Majors Perrine, Cerny and Bennett, thirteen other commissioned officers and a large corps of civilian engineers, inspectors and clerks. J. J. Hastings was the field auditor for the Government.

The plans and specifications for the entire project were prepared by Cass Gilbert, architect. His chief assistants were John R. Rockart, Dene E. Polglase, chief mechanical engineer, succeeded by B. W. Latham, Franklin H. Keese and the Gunvald Aus Co., consulting structural engineers. L. V. Morris rendered valuable service in consultation regarding railroad layouts.

The field organization of the Turner Construction Company consisted of A. C. Tozzer, executive manager; A. W. Stephens, engineer; H. H. Fox, auditor; E. L. Ford and W. H. Nye, purchasing agents; Albert Larson, general superintendent; G. E. Larson, W. T. Quinn, W. W. Roberts, G. H. Smith, superintendents; C. E. Trout, F. E. Cudworth, T. I. Coe, J. C. Hilton, J. P. Patterson, L. H. Usilton, R. Hayden and E. R. Bear, superintendents, respectively, of dredging and piers, statistics, mechanical work, excavation, railroad yards, steel reinforcement, miscellaneous sub-contracts and elevator installation, and a large staff of loyal and able assistants.

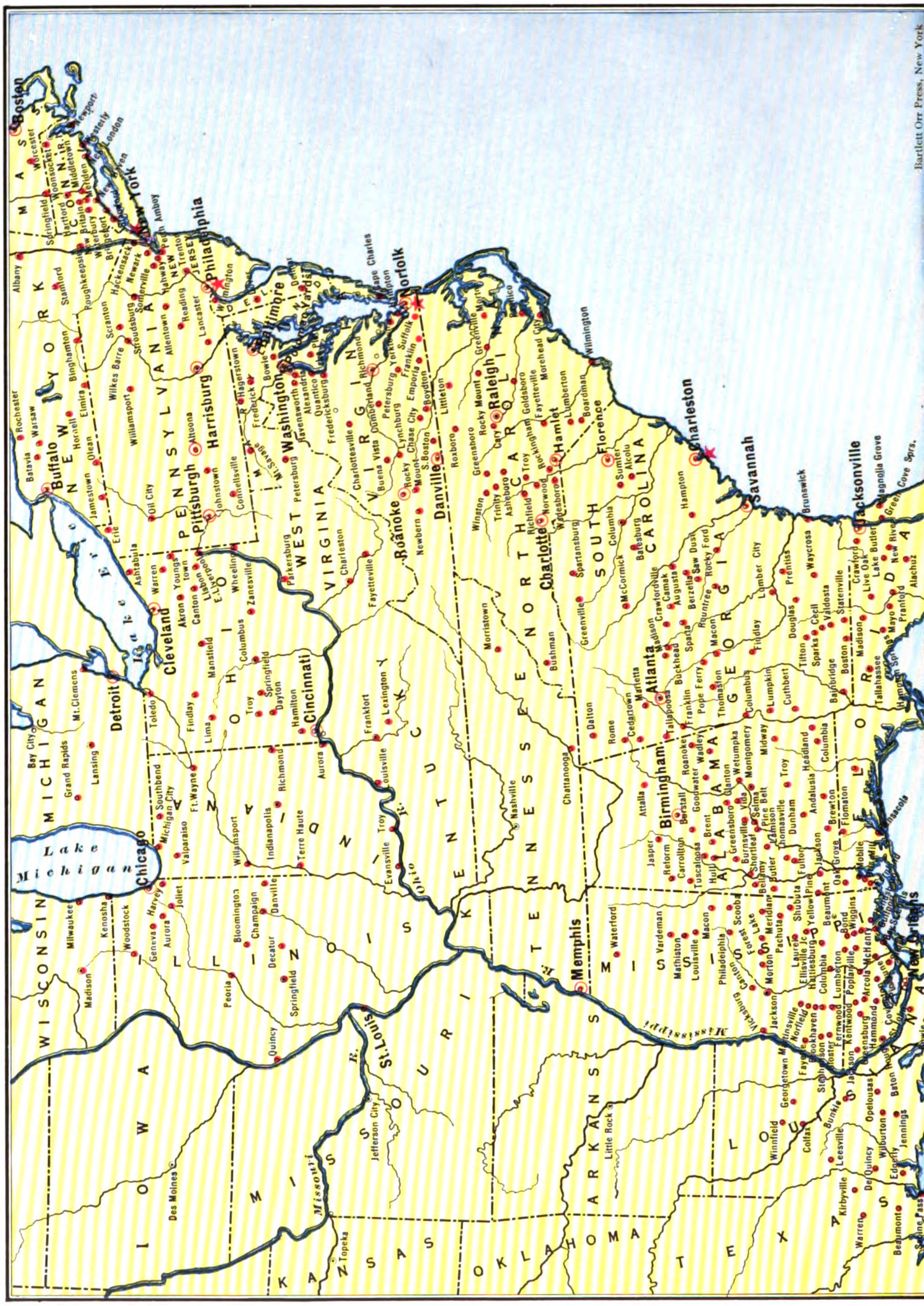
A remarkable spirit of co-operation prevailed among the forces of the Constructing Quartermaster, the Architect and Contractor, all united in the purpose of aiding the Government to win the war.



BOILER HOUSE AND ADMINISTRATION BUILDING

THE INSPECTION DEPARTMENT

Bureau of Yards and Docks, U. S. Navy



RED DOTS SHOW POINTS VISITED BY "NAVY INSPECTION DEPARTMENT" FORCES ORGANIZED BY THE TURNER CONSTRUCTION COMPANY. THE CITIES AND THE NAVY BASES WHERE MEN WERE STATIONED ARE INDICATED WITH RINGS AND STARS

THE INSPECTION DEPARTMENT

Bureau of Yards and Docks, U. S. Navy

THE activities of the Turner Construction Company on this contract had rather a modest beginning. In the late Fall of 1917, Lieut.-Com. Kirby Smith, of the Bureau of Yards and Docks, who had under his direction the shipment of materials for a number of Naval Air Stations on the French and Irish coasts, commissioned the Turner Construction Company to investigate the production, inspect the materials and expedite the shipment of the various items needed as there was not available in the Bureau a suitable force to carry out this work.

On December 1st, 1917, W. T. Anderson, as manager, with a force of six men, made his headquarters with the Bureau of Yards and Docks in Washington to take up the work. From the very outset it was the intention of this force to co-operate with every department or officer with whom they had dealings and render aid wherever they could, whether closely allied with the project in hand or not. It soon became necessary for men to be stationed at the embarkation points and four of the Navy Yards to aid in receiving and classifying the materials, so that they could be properly transshipped. This aid was at once appreciated and these men were allowed to perform other duties at those points.

Other projects were turned over to the force rapidly and from the original nucleus the organization expanded until at the time of the signing of the armistice, 167 persons were engaged in the work, 20 of whom were women, 48 were enlisted men and the rest civilians, largely with technical or traffic training. Members of the organization were stationed in the Brooklyn, Philadelphia, Norfolk and Charleston Navy Yards, and at the Seaplane Stations at North Sydney and Halifax (Nova Scotia), Moorehead City, Brunswick and Galveston, and at various Naval Bases, as the Norfolk, New London and Indian Head Bases. The map on page 106 shows cities where the men in this force operated at various times.

The force was sub-divided so that certain members followed the production of raw and manufactured materials, others also made formal inspection and acceptance of materials for the Navy ; the third division followed shipments over the transportation lines, watching the transfer at the various gateways or transfer points and hurrying the delivery of materials at the terminals. The force also was frequently called upon to locate material which was urgently needed by the Department or in obtaining information for the various project managers.

As stated above, the men stationed at the various Navy Yards co-operated with the officers in charge and made themselves valuable in many directions.

Altogether, the organization made some 347 inspections in 65 cities and towns, followed the production and shipment of materials on 948 requisitions of the Bureau of Yards and Docks which necessitated dealing with 2448 contractors or dealers, and visiting 271 towns and cities. The Traffic Division had members stationed in 27 of the

principal gateway cities of the east. They expedited the movement of 10,244 carloads and 2252 less carloads of materials to the point of destination.

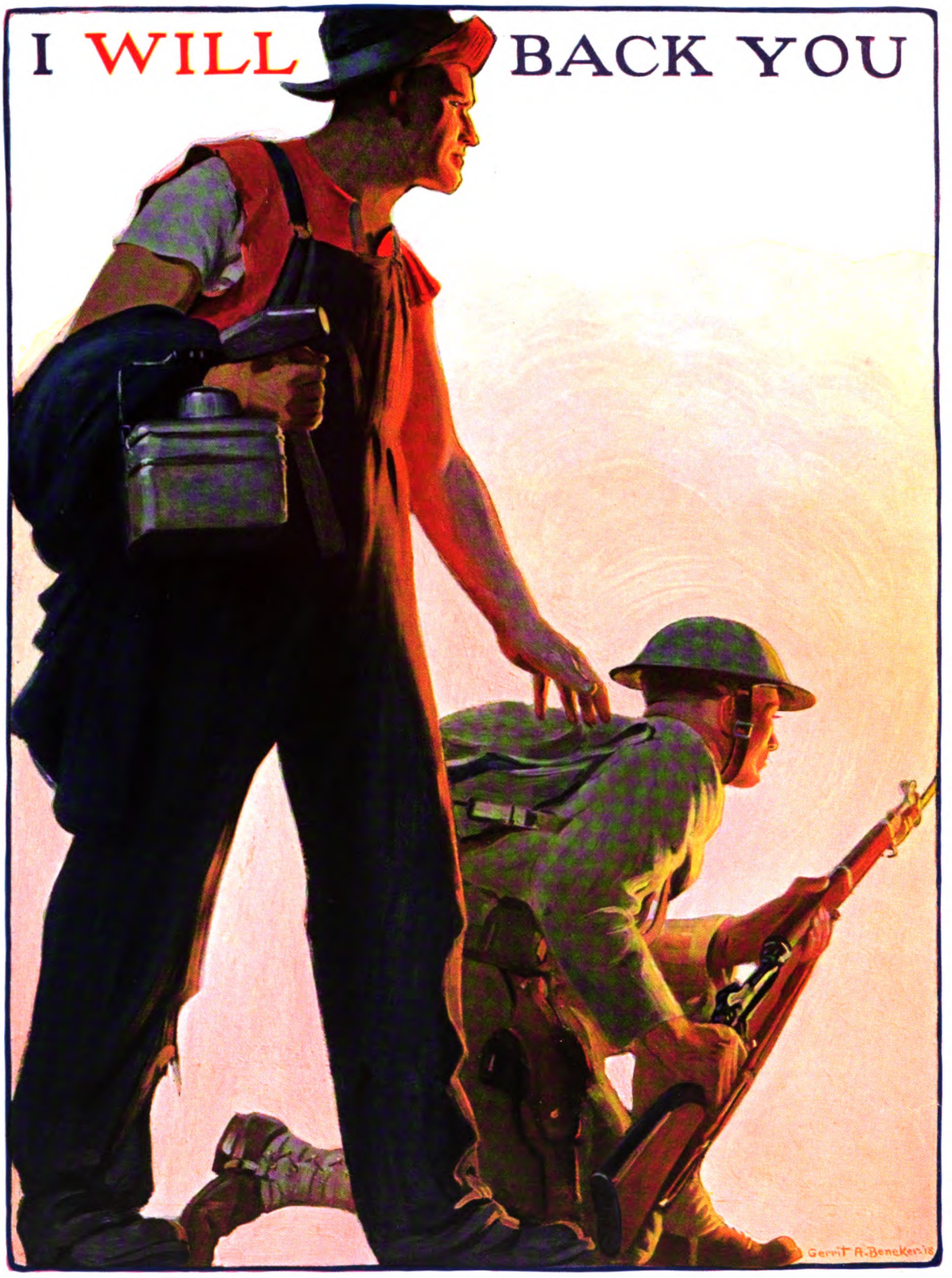
In addition to the above work for the Bureau of Yards and Docks, the organization in less than 11½ months handled over 300 special requests from various project managers, such as the production and delivery of 7 radio towers 840 feet high involving over 3700 tons of steel which were shipped to France; 24 smaller radio towers shipped to Cuba; 18,000,000 feet of lumber and other material for the Naval Training Camp at Norfolk; $1,000,000 worth of materials for extension to the Quantico Camp; materials for the Submarine Station in New London; 68 miles of pipe line in Texas. A total of 31,000,000 feet of lumber was inspected and the production of same at the mills expedited. Besides lumber, the following materials may be mentioned as illustrating the variety of materials that were handled.

Plumbing supplies, electrical apparatus, and equipment, motors, generators, engines, boilers, hoists, derricks, camp equipment, mess gear, stoves, ambulances, automobiles, trucks, hospital buildings, trailers, locomotives, flat cars, portable buildings, sea-planes, balloon hangars, portable machine shops, two complete power houses, with all equipment for overseas service, tank cars, stretchers, anchor chains, rope, piles, railroad supplies, and building materials of all kinds.

From the outset, the greatest enthusiasm and the fullest co-operation with all whom they came in contact was manifested by the men in this organization. They worked early and late in lending a hand wherever they could see they would be of assistance, and as a result, the organization became eventually largely to be relied upon for the prompt following and inspecting of orders placed by many of the project managers of the Navy, and all members of this force can justly take pride in the service they were able to render in the war programme.

MAIN OFFICE OF THE "INSPECTION DEPARTMENT" IN THE NEW CONCRETE NAVY OFFICE BUILDING, WASHINGTON, D. C.

Labor Stimulation



ONE OF THE POSTERS USED IN THE LABOR STIMULATION CAMPAIGN

LABOR STIMULATION

EARLY in May, 1918, with the Navy and War Office Buildings, Washington, and the Fleet Supply Base, Brooklyn, in full swing and the Army Supply Base, Brooklyn, just starting, it became evident that there was another problem to be considered besides the scarcity of materials, congested railroad conditions and the general shortage of labor.

The problem was to bring home to the workman the importance of his part in winning the war. Even though he was working on a job directly for the Government, he did not see how he was in the fight unless he carried a gun. To show him how he held the second line defenses, how, without his support, the armies overseas would have no food to eat, no guns to carry, no bullets to shoot, was the great message which must be carried into the hearts of the 14,000 men in the company's employ on the three great Government jobs.

The plan adopted had five phases: a weekly newspaper for each of the three jobs, called the *Mixer*, job mass meetings, posters, job contests for honor flags and badges or pins for the staff and office forces of the company.

Typical pages of the *Mixer* appear on pages 119, 120, 121 and 122. The first page was always made in newspaper style, usually including cartoons by company talent, or by national cartoonists, the center pages filled with pictures of the men themselves and interesting construction views, and the back page with editorials, personals and weekly records of work done.

The newspapers for all jobs were directed from the New York office by a publication committee, whose names appear on the back page of the *Mixer*, shown on page 122. Each job had a job editor who wrote the copy and arranged for the taking of photographs under the general supervision of the job executive manager. All material was forwarded to the New York office, re-edited and made up by the managing editor, who was responsible for production. Eventually on the Army Supply Base where the *Mixer* was published longer than the others, the job editor working closely with the job executive manager, assumed independent responsibility for the production of the paper.

The mass meetings were preceded by parades, led by bands, formed according to trades. The speakers were usually officers who had seen active service overseas, English, Italian and American. These mass meetings were very enthusiastic, mass singing of popular war songs led by capable song leaders aided materially in getting the right spirit across. On pages 113 to 118, inclusive, appear photographs of typical mass meetings on each of the three big jobs.

Three posters were issued and every man on all the jobs received a poster enclosed in his *Mixer*. One is reproduced at the beginning of this chapter. The designs were made by Gerrit A. Beneker and carried the following captions: "I Will Back You," "Work As You Would Fight," and "Concrete Ammunition."

The honor flag to foster healthy competition, reproduced on page 115, was designed by Charles Livingston Bull. The men were told by their foremen and through the *Mixers*

that the flag would be awarded at stated periods, for definite performances on carefully selected sections of the work. The contests between different gangs for the winning of the "Eagle and Broom" and the privilege of flying the banner on their part of the job, were keen and without question very beneficial in their effect on the progress and cost of the work.

The bronze badge reproduced on the front cover of this book was worn as a badge of loyalty and service by the officers of the company and by the engineers, draftsmen, superintendents, foremen and the clerical staff comprising the company's entire personnel.

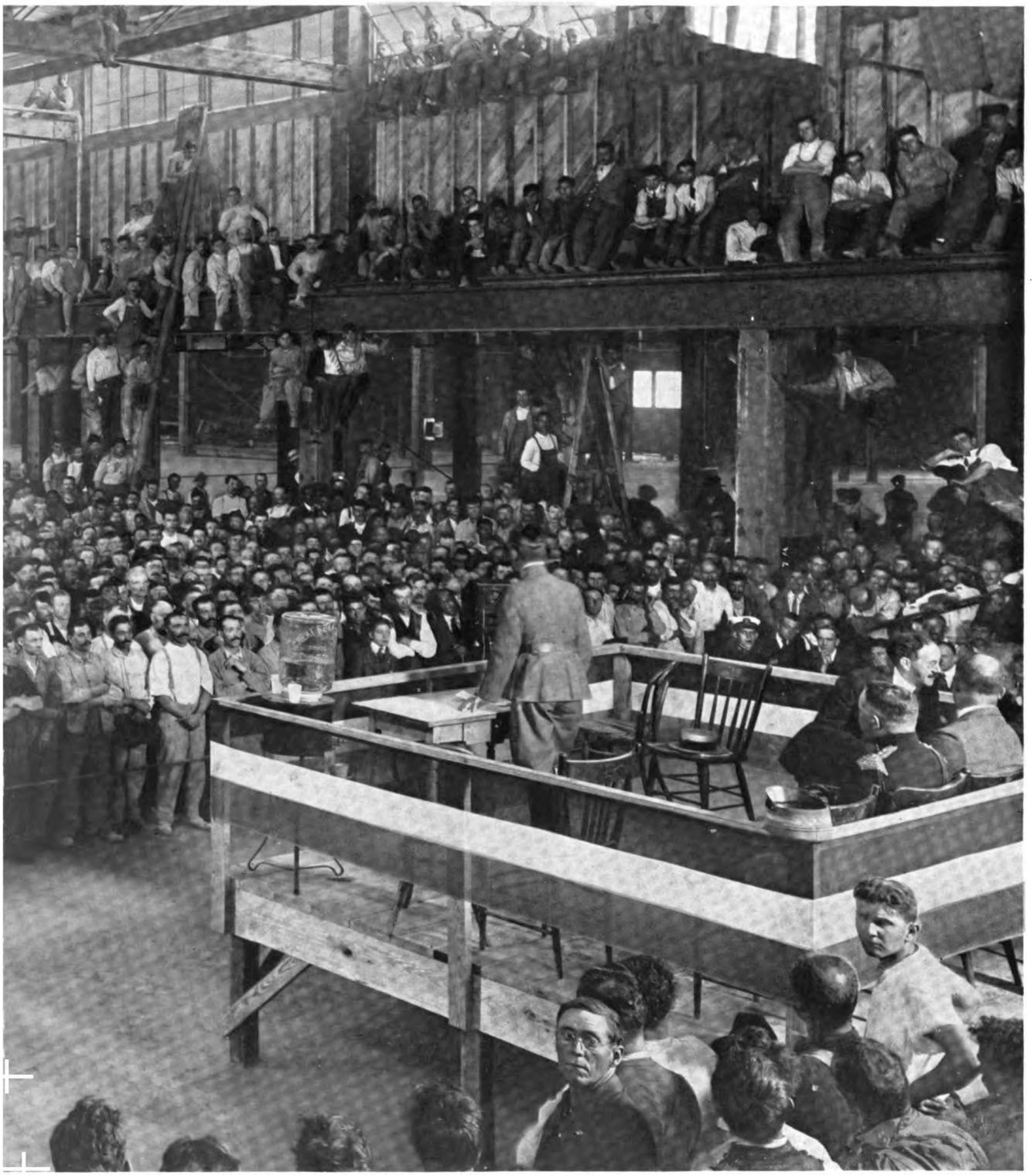
The sale of Thrift Stamps to workmen was pushed with vigor for the psychological effect as well as to aid the Government. The greatest success was scored at the Washington job, where spirited contests in the buying of stamps were carried on between various groups of workmen, with a grand total of sales of $25,000.00 in eleven weeks.

Very active canvasses for the sale of Liberty Bonds were conducted among the workmen on all of the Company's work. The Fourth Liberty Loan at the Army Supply Base was the leader, and rightly so, since this job was employing the greatest number of workmen, totaling 6821 men. Eighty-three per cent of these men subscribed for $388,050.00 of bonds. The Navy Fleet Supply Base with 1287 men subscribed for $69,100.00 of bonds, and the Navy and War Office Buildings with 1173 men subscribed for $31,250.00 of bonds. The record of Liberty Bonds purchased by the officers, engineers, superintendents, clerical force and workmen of the Turner Construction Company is interesting.

First Loan	$116,550.00
Second Loan	127,750.00
Third Loan	207,350.00
Fourth Loan	635,500.00
	$1,087,150.00

Convincing proof of the effectiveness of this labor stimulation is hard to obtain. It must be considered along with the factors of intensive experienced organization and direction of the work. The facts are, however, that the Navy and War Office Buildings were completed on time in the face of many obstacles, the Navy Fleet Supply Base gained forty days' time which had been lost as a result of changes in plans and delays in the receipt of materials, and the Army Supply Base poured its concrete roofs nearly two months ahead of schedule. Unquestionably, the special attention which was given to stimulating the interest of labor played an important part in bringing about such satisfactory performances.

MASS MEETING HELD JULY 9th, 1918, IN WAREHOUSE No. 1
COL. AMERICO PIO IS SPEAKI



· ON THE FLEET SUPPLY BASE, BROOKLYN, N. Y.
NG IN ITALIAN

MIXER GANG NUMBER TWO ON S-2

MIXER GANG N

These are the men wh
on S-2 during their

JOE McKIERNAN AND THE SHEET PILING GANG ON SEWER WORK
This Husky Gang Has Driven All the Sheet Piling for the Big Sewer

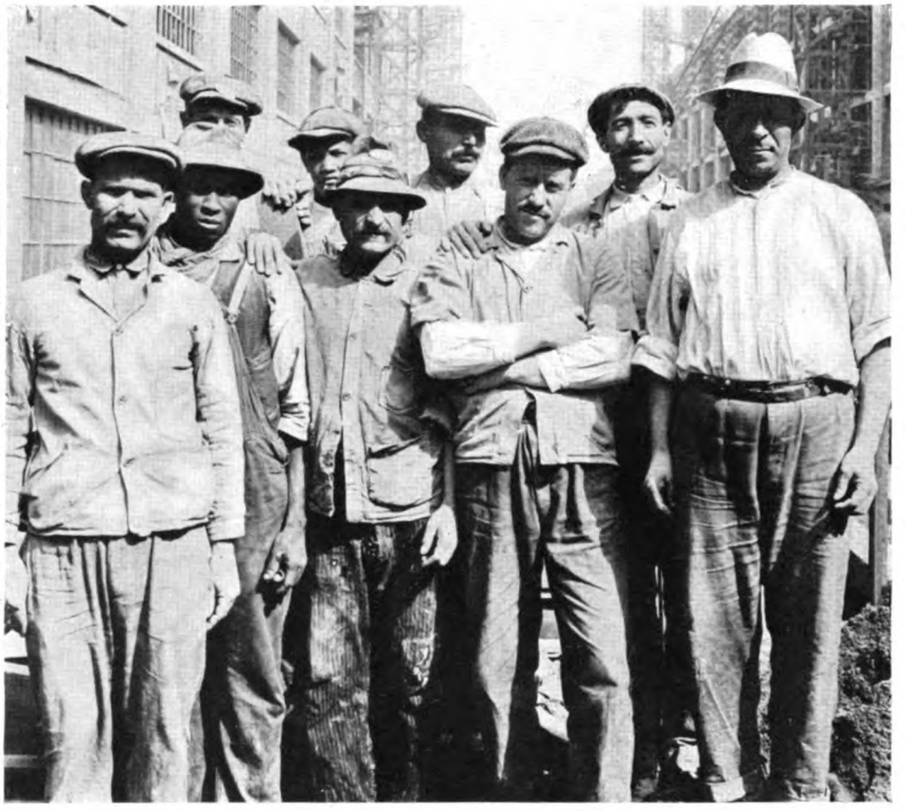
ELMER CHRISTMAN AND THE CONCR
PLACING CONCRETE IN

"BIG" JOHN COTALDO AND THE EXCAVATING GANG
They Have a Dirty Job, but They Do It Well

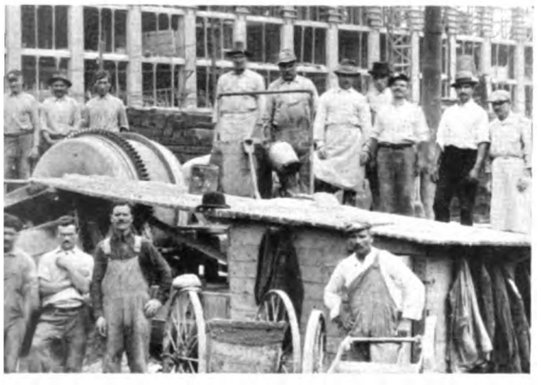
BENNIAS SCARRAFERRO'S G
These Men Are Real Sewer Buil

'MBER SIX ON S-2

) mixed all the concrete
record-breaking week



MIXER GANG NUMBER FOUR ON S-2



ETE GANG ON W-2, WHO HAVE BEEN
TRACKWORK AND ROADS

PROGRESS VIEW OF S-1 AND S-2 JULY 19

ANG ON SEWER CONSTRUCTION
ers. The Big Sewer Is Now Finished

JOE USIFERO AND THE GANG THAT DID GOOD WORK UNLOADING
THE SPIRALS

GE SPREAD OF MIXER

DEDICATED TO VICTORY

Navy and War Depts' Office Buildings

MIXER

VOLUME 1 WASHINGTON, D. C., JULY 20, 1918 NUMBER 5

SECRETARY DANIELS WILL SPEAK TO THE MEN ON THIS JOB ON MONDAY, JULY 22nd, 1918

THE SECRETARY OF THE NAVY WILL HONOR THE NEXT JOB MASS MEETING

Next Monday, the 22nd of July, the Honorable Josephus Daniels, Secretary of the Navy, will address the men on this Job on the occasion of the regular mass meeting, which will be held, as usual, at 11.15, over in front of the Marine Camp on 17th Street.

Secretary Daniels, from the very first, has taken very keen, personal interest in the construction of these office buildings. It has been largely due to his eagerness to see his great department move into these splendid, fireproof offices, that the progress has been as good as it has. Only by the great power of the Secretary's personal interest has it been possible to obtain all the great quantity of materials necessary for our work in the time necessary for prompt completion.

As everyone knows, Secretary Daniels has been head of the Navy ever since President Wilson has been in office. The growth and development of the American Navy under his able and conscientious administration needs no description here. Suffice it to say, that it has never been equalled in the world's history.

One of the most marked characteristics of Secretary Daniels' work for and with the Navy has been his unfailing and never-tiring interest in the welfare of the enlisted men of the Service. His work for the Jackies has always been intensive and foremost among his activities. Perhaps he will feel inclined on Monday to tell us here what he thinks of our work in the past four and a half months in putting under roof nearly 17 buildings, each nearly 600 feet long and three stories high. Also, it is possible that our honored guest will explain—as only he can—why our work has been, is now and will continue to be War Work in the highest sense of the term.

HON. JOSEPHUS DANIELS
Secretary of the Navy

HEARST-PATHÉ TAKES MOVING PICTURES OF THE JOB

Last Tuesday Hearst-Pathé News made moving pictures of the various gangs at work, showing the different operations in erecting a concrete building. Two weeks ago they made pictures of the mass meeting at which Major Barnes spoke. Next Monday, July 22nd, they are going to make pictures of the parade which will precede the regular job mass meeting.

These pictures will be released some time in the near future. They will be seen all over America by millions who go to the movies.

ELECTRIC STORM CAUSES SHORT CIRCUIT

CONSIDERABLE SMOKE BUT SMALL DAMAGE

On Wednesday, July 10th, considerable excitement was caused on the job by some of the temporary wiring in the head-house in front of the second wing of the War Building becoming short-circuited during a severe electrical storm. The only damage done consisted in the burning of a few sections of conduit and a few feet of wire. There was considerable smoke from the wires, however, and the Marine Guard came in a hurry to extinguish the fire. As soon as the power was turned off the fire died out and practically no damage was done.

ALL RECORDS SMASHED

1700 Cubic Yards of Concrete Were Placed Last Friday

THIS IS THE BANNER DAY FOR THE WHOLE JOB

Friday, July 12th, was a big day on the job. Over 1700 cubic yards of concrete were placed on that day. This is the banner day for the whole job.

The following gangs helped to make this record: Fredericko's gang on Mixer No. 8, with Foreman Finkbiner in charge of the bins; Demori's gang on Mixer No. 7, with Foreman Hall in charge of the bins; Randazzo's gang on Mixer No. 4, Randazzo himself having charge of the bins as well as the concrete; O'Hara's gang on Mixer No. 3, with O'Hara himself looking after the bins as well as after the concrete.

Mixers Nos. 3 and 4 concreted the third story columns and roof of the Navy Building, and Mixers Nos. 7 and 8 concreted the second story columns and third floor of the War Building. Fredericko's gang put in more concrete than any of the other gangs. The total yardage which they placed was 455 yards.

A truck passed over the trestle every minute during the day.

$1170.50 *for* THRIFT STAMPS LAST WEEK

SUB-CONTRACTOR MAKES EXCELLENT SHOWING

The total sales of War Saving Stamps fell off somewhat for the week ending July 13th, the total sales being $1170.50. This shortage was largely due to the fact that the man who brings the stamps to the job did not arrive in time to have them available for sale among some of the men paid off earlier in the day, and a much larger amount could have been realized had the stamp man been on the job sooner. Many of the men who were unable to secure them last Saturday have promised to double the amount this coming Saturday.

The following office girls sold stamps on Saturday last: Mrs. Van Saun, Miss Greiner and Miss Hemenway.

The W. G. Cornell Co. are making a remarkable record in selling stamps. The sales for this Company are handled by Mr. W. L. Hopper, Auditor for the Cornell Co., and Mr. M. G. Shamberg, the Jackie Timekeeper for this Company.

The Cornell Co., on Saturday, July 13th, sold $465.00 worth of stamps. The total number of men paid off by them on Saturday was 348. This is an average of $1.34 worth of stamps per man employed. Out of a gang of 60 laborers working for this company 54 bought stamps.

TYPICAL FIRST PAGE OF THE MIXER

Naval Supply Base MIXER

Published by the
TURNER CONSTRUCTION COMPANY
244 Madison Avenue, New York
Buffalo Washington Boston
Henry C. Turner, *President*

PUBLICATION COMMITTEE
J. P. H. Perry, *Chairman*
E. J. Moore G. F. Floyd
Charles Chidsey, *Managing Editor*
George S. Nobles, *Job Editor*
Lester Smith, *Assistant Job Editor*
Third Ave. and 31st St., Brooklyn, N. Y.

ARE YOU "DOING YOUR BIT"?

Below is a copy of a letter from the Naval Officer who will use this Fleet Supply Base on which we are working:

FLEET SUPPLY BASE

July 16, 1918.

Mr. R. C. Wilson,
Executive Manager,
Naval Supply Base,
South Brooklyn, N. Y.

Dear Mr. Wilson:

I cannot begin to tell you how much I was pleased with the result of my inspection of S-1 yesterday afternoon.

From personal observation I know you have a most remarkable organization and the "team" spirit cannot be beaten. Every man I have spoken to has shown that he is most enthusiastic over the work and is going "to do his bit" to complete the buildings on time.

In connection with the completion, let me call your attention to the tremendous strides being made by the shipbuilders of the country. The rate at which ships are being turned out makes it mandatory that the storehouses and all other work connected with the "Job" be completed at the earliest practicable moment.

What is the use of the "riveters" of the country making records of 4000 to 7000 rivets driven in a working day, completing ships in 34 days, if the ships cannot be outfitted with supplies. That is the reason why we must hustle, and not let the shipbuilders "get anything on" the building constructors.

The Supply Base work is already cut out and it may be of interest to you to know that it will have to supply over 700 freight steamers in addition to the regular Navy.

Please convey to the Superintendents, Foremen and all other persons on the job my appreciation for what they have already done and tell them not to let up on the good work, but drive on to a conclusion which will stand out as a monument to themselves and the Turner Construction Co.

(Signed) Sincerely yours,
T. W. LEUTZE,
Pay Inspector, U. S. Navy,
Supply Officer,
Fleet Supply Base.

The message conveyed by this letter should be a matter of great pride to each one of you, especially if you are "doing your bit" in a manner to earn such a compliment. Could we have a greater incentive than this to "carry on" and complete this great work ahead of time, so that when we are done Commander Leutze will feel that we have finished our work as well as we started it and that the ships that he speaks of may receive their supplies at this Base and start overseas without delay.

$126.00 FOR THRIFT STAMPS LAST WEEK

This Showing Is Most Disappointing

From the Navy and War Office Buildings Job in Washington, D. C., our other big job for the Navy, comes the word that last week the men on that job bought $1170.50 worth of Thrift Stamps. And they apologize because it is so small. Down there they have about the same number of men as we have here on the Naval Base, so comparison is fair.

One sub-contractor alone, who has 348 men, sold $465.00 worth of stamps. This is an average of $1.34 per man.

The United States Government is spending billions of dollars in this war. Some of us are asked to fight, others to work and to loan our money. It is *our* duty to work and loan our money.

You are not asked to *give*, only to *loan* and to loan *with interest*.

If you don't understand what Thrift Stamps are, ask your foreman. He will be glad to tell you. We are sure that you will do your full duty when you know what your duty is and what is expected of you.

TWO BIG EVENTS

During the past week two important milestones were passed in our march towards our goal, "COMPLETION ON TIME." Both of these events occurred on Storehouse No. 1. The first was the completion of the concrete roof on this building, and the second was the occupation of about 30,000 square feet of the second floor of this building by Commander Leutze, the Supply Officer.

It was only about three months ago that the concrete piles for this building were finished, and since then the skeleton of this great structure has been completed and a large amount of finishing work has been done, as is evidenced by the occupation of a portion of the building by the Supply Officer. The portion of the building occupied is practically completed, even to glazing, plumbing, heating, lighting, painting and telephone service.

HATS OFF TO THE MEN ON STOREHOUSE No. 1! Not only to you men of the Turner Company, but to the men of our Sub-Contractors—and the Roll of Honor contains the name of every Sub—for no one of them fell down on the job we set for them. Their work is complete in the section turned over to the Supply Officer, and in another column of this paper you will read what he thinks of such work as this—Keep it up!

LOST, STRAYED OR *STOLEN*

55 Lathers.
62 Laborers.
67 Carpenters.

In the future, all men on this job will be painted green for the purpose of identification at the Army Base.

ON THE JOB

Joe Intrabartolo's gang on receiving cement are keeping up their end on the job. It is no fault of theirs if there is not enough cement on this job.

Joe Keeley's gang seems to like to unload steel from the cars, in fact, so much so that they load the trucks faster than the receiving gang at 29th Street can unload them.

The ballast for the railroad tracks is expected in a few days and we hope that Joe Healey and his fleet of motor-trucks will handle this ballast as efficiently as he does the sand and gravel.

Now that Bill Smith is foreman lather in the steel yard we know that the steel will reach the floor in quick time.

Alec Michaelsen is now going to try his hand as carpenter foreman on our new power house. Here is where we get good costs on forms.

On July 10th this job had another red letter day, as there were 2000 cubic yards of concrete poured on this day.

Mr. Schwab, foreman glazier for Elias Co., must be very fond of nails, as he gathered two of them in his Ford automobile tires last Sunday.

Samkoff and his electricians are certainly handling the temporary electric work in a very efficient way, they are on the job no matter how late the hours are.

Mr. Spear does not see why it is necessary for us to let a dredging contract to deepen the waterway into the float bridges. He assures Mr. Wilson that with the experience he has gained on the excavation for the power house, he could easily remove the bottom of the bay with his steam shovel.

SCORE BOARD

OF

Work Done from July 6th to July 12th

S-2 BUILDING S-1

TOTAL	PER MAN	WORK	PER MAN	TOTAL
158200	761	Sq. Ft. Forms	821	124901
319.5	7.37	Tons of Steel	8.35	208.5
4650	37.7	Cu. Yds. Concrete	36.7	3600

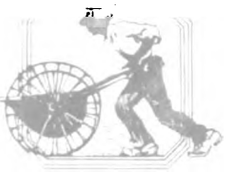
Note: The above record for S-1 is their highest record and was actually made the week of June 22d to 28th

The record of S-2 for the past week was so close to the highest record of S-1, that a half hour conference of the Committee on Awards was necessary to decide whether S-2 should be awarded the honor flag. The Committee on Awards is as follows:

Lieut. Schroeder Mr. Wilson Mr. Nelson Mr. Kennedy Mr. Fall

TYPICAL BACK PAGE OF THE MIXER

BRIEF HISTORY
of the
TURNER CONSTRUCTION COMPANY



HONOR ROLL

IN HONOR OF THE MEMBERS OF THE TURNER CONSTRUCTION CO. WHO HAVE ANSWERED THE CALL OF OUR COUNTRY TO MAKE THE WORLD SAFE FOR DEMOCRACY

H. ABRAMS
E. M. ANDERSON
A. A. ANDREASON
W. H. BALDY
A. W. BARRUS
D. M. BARTLETT
J. S. BICKET
R. S. BOARDMAN
J. D. BURRAGE
A. T. BROWN
H. E. CHILDS
C. K. CLARKE
P. COFFEY
F. W. CONOVER
J. D. COOK
T. CRANE
W. CORRELL
M. A. DARVILLE
J. CASEY
F. R. DEMAREST
G. S. DEMING
A. J. DOOLITTLE
L. B. DAVIS
D. FRAZEE
C. FOX
D. B. FRASER
E. B. FREY
A. C. GALLAGHER
W. A. GANNON
R. W. GARDNER
R. GENUNG
L. GINSBERG
A. G. HAMMOND
J. J. HARTMAN
P. H. HEIMER
J. HELD
R. W. HERRICK
J. J. HERRING
T. HEASLIP
B. HOTCHKISS
N. B. JENKINS
J. J. KELLY
J. C. MACRELL
E. E. HICKEY
T. L. HUGHSON
H. D. HYNDS
O. JOHNSON
W. H. JONES
E. KENNY
H. W. KOONS
H. KELLY
C. E. LANCHANTIN
W. F. LOCKHARDT
H. LONERGAN
J. Mc. PARTLAN
H. A. McKEEN
H. J. McLELLAN
S. A. Mc QUADE
W. M. MacDONALD
J. W. MAITLAND
C. E. MEEK, Jr.
A. S. MERRILL
R. W. MILLER
J. NELSON
B. V. O'DAY
V. PAULSON
H. B. PARKER
D. PELLECHIA
J. PENDLETON
G. H. PETIT
H. B. POPE
E. PRAEGER
F. G. RUDOLPH
F. E. RANSOME
P. E. RATTINGER
W. REINER
M. J. ROACH
H. M. ROBBINS
G. RUSSELL
A. F. SMITH
W. S. SEIPEL
J. W. SESSUMS
H. SANDIFER
A. E. SHEA
L. SKELDING
C. De. GROAT
F. E. SCHILLING
W. L. SEAMAN
G. G. SMALLMAN
F. B. STEERE
G. E. STEERE
N. SNYDER
R. ULRICH
J. P. UHLINGER
F. C. WAITE
D. WATTEL
J. R. WILES
J. W. WEISS
C. WENDT
C. F. WESTERBERG
C. WHITEHEAD
W. W. BAILEY
C. E. BURTIS
F. MEISLER
N. O. NILSON
W. RAFF
F. BARRY
A. BECKER
J. M. BRAUSE
M. BOGART
H. T. GRATHWOL
S. HALSTEAD
R. HODGE
R. W. HOUSEHOLDER
H. P. JONES
W. KLIEFOTH
J. Mc. GONIGAL
R. V. Mc. KEE
J. H. MILLER
J. L. PARKER
A. J. RAHTZ
H. A. RIGNEY
D. ROTHKRUG
J. SCHWARTZ
G. F. MENSCHINC
C. PINCKNEY
F. QUANTMEYER
H. PLUMER

E. Parmiter

BRIEF HISTORY
of the
TURNER CONSTRUCTION COMPANY

THE story of the formation and growth of a business is always of interest if it describes interesting personalities or the perfection of a new industry or art.

In this instance, the story revolves about the growth of a new industry in which the Turner Construction Company has taken a leading part.

Reinforced concrete originated on the other side of the water, in France. Concrete, without steel reinforcement, according to history, dates back to Roman architecture and construction and the remarkable durability of concrete is attested by public works in Italy at least 2000 years old.

The first reinforced concrete work in the United States was done by W. E. Ward, who built a small reinforced concrete house at Port Chester, New York, about 1872. Shortly after, Ernest L. Ransome began experimenting with the material on the Pacific Coast and constructed a building for the California Academy of Science about 1888, the Museum Building and the Girls' Dormitory at Leland Stanford, Jr., University about 1892 and some smaller work.

Mr. Ransome moved to New York in 1897 and designed and built the factory of the Pacific Coast Borax Company at Bayonne, N. J., in the same year. This building was 200 x 250 feet, partly four stories and partly one story, with foundations, walls, columns and floors of reinforced concrete. It stands today in excellent condition, a notable achievement in the successful application of reinforced concrete to building construction. Mr. Ransome interested Charles M. Pratt of the Standard Oil Company in this form of construction, organized the Ransome Concrete Company in 1899 and built the St. James Church in Brooklyn, the Robert A. VanWyck Laboratory in New York, and prepared the structural plans for the Nassau County Court House and Jail at Mineola, N. Y., which were built by Edward Roche in 1899 and 1900 from plans prepared by Wm. B. Tubby, architect.

The fifteen-story Ingalls Office Building, constructed in Cincinnati, Ohio, in 1903 by the Ferro Concrete Construction Company under the Ransome system, was a notable contribution to the new industry.

Some small building work had been done around Boston and in New Jersey and some real progress had been made in the design of railroad culverts, bridges and sewers of reinforced concrete. Although very valuable pioneer work had been done both in this country and abroad, it is a fact that reinforced concrete is substantially a product of this century.

This was the situation when in May, 1902, Henry C. Turner and DeForrest H. Dixon, both of whom had been employed as engineers by the Ransome Concrete Company, organized in New York the Turner Construction Company to design and

build reinforced concrete structures. The Company commenced business with a cash capital of $25,000.00.

The background of experience was very limited, the material possessed real value, but there was little in the past to encourage or kindle hopes of large financial success.

The value of the pioneer work which had been done should not be minimized, because out of that experience, it was possible to steer a course that would avoid complicated or ornamental structures.

The policy of the Company was to solicit simple, straightforward work and to gradually develop an experienced and dependable working force. None existed at that time, but fortunately, the Company succeeded in employing a few men who had a good foundation for concrete work. Two of these men, Joseph C. Grady and Albert Larson, are now among the Company's ablest superintendents.

Much educational work had to be done to interest architects, engineers and property owners in the acceptance of the new material. The conditions are very different today, and it is difficult to grasp the really amazing growth which has been made in twenty years.

The first contract secured was for $690.00 for the construction of a bank vault for the Thrift, a Pratt institution in Brooklyn. A. C. Bedford, now chairman of the Board of Directors of the Standard Oil Company, gave us this contract.

The second contract was with J. B. King & Company, for $18,839.00 for the construction of three one-story industrial buildings on Staten Island. Here was made the first real start in building construction and in the standardizing of methods of construction, invaluable in successful concrete work.

The floors, stairs and roof in the Adrian Iselin School at New Rochelle (Brite & Bacon, architects) was another pioneer contract in 1902. The total value of work done in 1902 did not exceed $40,000.00.

The first contract of considerable size, carrying a reasonable profit, was secured in 1903 and was made with S. L. F. Deyo, chief engineer for the Rapid Transit Subway Construction Company for all of the stairways in the first New York City subway. Later, the self-supporting station platforms were added to the contract. William Barclay Parsons was chief engineer of the Rapid Transit Commission, St. John Clarke, engineer of design, and D. L. Turner, now chief engineer of the Public Service Commission, had supervision of the work for the city.

Other important contracts in 1903 were made with the Bergenport Chemical Works, Eagle Works, Standard Oil Company, Gleason-Tiebout Glass Co., J. B. King & Company and Edward R. Ladew.

The year 1904 began with a contract for the foundations, columns, floors and roof of the Naval Laboratory, Brooklyn Navy Yard (Ernest Flagg, architect). This was followed by a Storage Warehouse for George A. Wood, Jersey City (W. L. Tilton, architect), and the floors of the Lewis Cass Ledyard Stable, New York City (Alfred Hopkins, architect).

During the summer, the Robert Gair Company of Brooklyn decided to erect a large six-story building and had plans prepared for brick and timber construction. Fortunately, Mr. Robert Gair was a progressive business man, always seeking for improved methods and machinery in the development of a large and successful business. When reinforced

concrete was brought to his attention, with the advantages offered of greater floor loads, freedom from vibration from reciprocating machinery, better natural lighting, more fire resistance and altogether the great advance which was offered over mill construction for manufacturing buildings, he at once became greatly interested and went thoroughly into the merits of the material.

The result was a contract for a nine-story building containing 170,000 square feet of floor space—the largest reinforced concrete building projected in the United States up to that time. It became the first of the large group of reinforced concrete buildings in Brooklyn owned by the Gair Company and known as Gairville. Construction work was started in September and completed in the summer of 1905. William Higginson was the architect.

It is interesting to recall that the Building Department, in granting a permit for the construction of this large and high building, required us to construct a small building entirely of reinforced concrete to be tested by a four-hour fire, water and load test to demonstrate its fire resistance.

The temperature during the test for the entire four hours averaged 1700 degrees. Water was applied from a 1⅛-inch nozzle under 60 pounds pressure for five minutes. These test conditions were considered more severe than would result from actual fires in buildings. The test was a great success.

Unquestionably, the successful erection of this large building for the Robert Gair Company exerted a tremendous influence in favor of reinforced concrete construction, not only in New York, but throughout the country.

The Chemical Laboratory, Pratt Institute, Brooklyn (Howells & Stokes, architects), was also started in 1904.

All of this work contributed to the acceptance of reinforced concrete for industrial buildings by architects and property owners, and in 1905, we secured the contract for the first model factory for the Bush Terminal Company in Brooklyn. Twenty-one additional buildings have since been erected by us for the Bush Terminal, aggregating 5,839,000 square feet of floor space. Contracts were also taken in 1905 for the Kenyon, Schirmer, Gretsch & Hoole factories, the Loeser stable and J. Pierpont Morgan farm buildings.

Our first New England work was secured in 1907, the large reinforced concrete building for the Phelps Publishing Company at Springfield, Mass., and it is interesting to note that this was one of our early percentage contracts. This form of contract has grown in favor among leading business concerns embodying as it does the principles of fair dealing between the contracting parties, with a predetermined fee or profit to the contractor. It does presuppose greater care in the selection of the contractor in the same manner as careful and thorough investigation is made by any successful business firm or corporation before the employment of highly responsible employees. Much more than half of our business has been done under the percentage contract and as evidence of its successful operation, repeat orders have almost invariably followed this form of contract when once established.

The percentage contract with a limiting maximum fee was generally adopted by the War Department to meet the War emergency construction program and as Brigadier General Marshall has testified, it was the only basis on which the Government could

obtain promptness of service, adequate control of the work including costs with a fair and reasonable profit to the contractor. Lump-sum contracts were a gamble and when their actual execution involved a financial loss to the contractor, the Government's interests generally suffered.

During the year 1907, the increase in both the number and size of contracts taken required a change in the Company's organization, in order that close supervision might continue to be given to every detail of the business by capable executives.

Departments were organized representative of each major division of the business, each headed by a competent officer or employee of the Company, who became responsible for the prompt and economical work of his respective department. The president kept in very close touch with these departments and to make certain of their co-operation, the policy was then established of holding a weekly meeting every Wednesday at eleven o'clock of these department heads, at which the progress being made on every contract was thoroughly considered and stenographic records made for the information and guidance of each department. This plan contains the germ of successful corporate management. It promotes co-operation and loyalty, keeps each department correctly informed of the Company's business and enforces co-ordination of departmental work.

In 1907 another far-reaching innovation was made. With the growth of business, it became necessary to enlarge the working capital of the Company and the Board of Directors decided to permit certain responsible employees of the Company to purchase stock. These men have grown with the Company and with one exception, they are all occupying positions of responsibility today. One of them entered the service of the Government during the war and may not resume his work.

This policy of permitting designated employees to purchase stock has been continued, and in 1913, 1917 and 1918 additional stock was sold to employees.

Our first building in the south was started in 1908 for John G. Christopher in Jacksonville, Florida, on a straight percentage contract, and was followed by two other operations for him.

During the business depression which followed the year 1907, it became necessary to enlarge the territory cultivated by us and a branch office was opened at Buffalo in 1908 to solicit the industrial cities of the Mohawk Valley and the upper part of New York State.

A contract was made with the Pierce-Arrow Motor Car Company in the Fall of 1909 for the completion of a large four-story building by the following spring, necessitating the maintenance of a progress schedule thought possible by many people only during good building weather. During that winter, we had 126 inches of snow fall in Buffalo with extreme temperatures and yet through careful planning combined with up-to-date winter protection, consisting of canvas enclosures, covers, artificial fires, hot water and steam lines, the work progressed regularly on schedule, demonstrating to factory owners our ability to build modern reinforced concrete buildings on schedule time either in summer or winter. And it was found possible to do such building work in severe winter at a reasonable additional cost over summer conditions and without sacrifice of good workmanship.

In January, 1913, we received our first contract in excess of $1,000,000.00. This was the Loose-Wiles Bakery, Long Island City, owned by the Degnon Realty Company

WORK DONE DURING THE YEAR 1916

1—Carborundum Co., Niagara Falls, N. Y.
2—Carborundum Co., Niagara Falls, N. Y.
3—Vacuum Oil Co., Paulsboro, N. J.
4—Aluminum Co. of America, Niagara Falls, N. Y.
5—American Brass Co., Waterbury, Conn.
6—Vacuum Oil Co., Paulsboro, N. J.
7—Sanitary Can Co. (American Can Co.), Fairport, N. Y.
8—Beach Manufacturing Co., Montrose, Pa.
9—Vacuum Oil Co., Bayonne, N. J.
10—Egyptian Lacquer Mfg. Co., Kearny, N. J.
11—Bush Terminal Co., Brooklyn, N. Y.
12—Turner Construction Co. (Shop), Brooklyn, N. Y.
13—Hoefler Ice Cream Co., Buffalo, N. Y.
14—Wheeling & Lake Erie R. R. Co., Canton, Ohio.
15—Taylor & Crate, Buffalo, N. Y.
16—Scovill Manufacturing Co., Waterbury, Conn.
17—Scovill Manufacturing Co., Waterbury, Conn.
18—Scovill Manufacturing Co., Waterbury, Conn.
19—Atlantic Warehouse, Inc. (Great A. & P. Tea Co.), Bronx, New York City.
20—Beaman & Smith, Providence, R. I.
21—L. A. Dreyfus Co., Rosebank, S. I.
22—Rudolph Wurlitzer Manufacturing Co., North Tonawanda, N. Y.
23—Scovill Manufacturing Co., Waterbury, Conn.
24—American Paper Tube Co., Woonsocket, R. I.
25—Union Terminal Cold Storage Co., Jersey City, N. J.
26—Bullard Machine Tool Co., Bridgeport, Conn.
27—Belleville Warehouse Co. (Wm. Whitman & Co.), New Bedford, Mass.
28—Kennedy Warehouse, New York City.
29—Chalmers Knitting Co., Amsterdam, N. Y.
30—A. Mendelson's Sons, Albany, N. Y.
31—Daggett & Ramsdell, New York City.
32—Newkraft Mfg. Co., New Brunswick, N. J.
33—Pathe Freres Phonograph Co., Brooklyn, N. Y.
34—William A. Rogers, Ltd., Niagara Falls, N. Y.
35—John E. Smith's Sons Co., Buffalo, N. Y.
36—Robert Gair Co., Building No 6, Brooklyn, N. Y.
37—Hoboken Land and Improvement Co., Hoboken, N. J.
38—Colgate & Co., Jersey City, N. J.
39—Robert Gair Co., Building No. 5 Extension, Brooklyn, N. Y.
40—Oakes Manufacturing Co., Steinway, L. I.
41—Bush Terminal Co., Building No. 10, Brooklyn, N. Y.
42—Bush Terminal Co., Building No. 9, Brooklyn, N. Y.
43—West 9th Street Terminal Warehouse Co., Cleveland, Ohio.
44—Weideman Co., Cleveland, Ohio.
45—Valentine & Co., Brooklyn, N. Y.
46—Vacuum Oil Co., P. H. Ex., Bayonne, N. J.
47—Sidney Blumenthal & Co., Shelton, Conn.
48—New Departure Manufacturing Co., Bristol, Conn.
49—Hudson Motor Car Co., New York City.
50—American Manufacturing Co., Brooklyn, N. Y.
51—Otto Higel Co., Inc., New York City.
52—O. K. Tool Holder Co., Shelton, Conn.

WORK DONE DURING THE YEAR 1917

1—Fort Hancock
2—Fort Schuyler.
3—Fort Hamilton.
4—Fort Wadsworth
5—Fort Totten.
} Coast Artillery Cantonments, New York Harbor

6—Endicott-Johnson Co., Johnson City, N. Y.
7—Boorum & Pease Company, Brooklyn, N. Y.
8—Carborundum Company, Niagara Falls, N. Y.
9—Carborundum Company, Niagara Falls, N. Y.
10—Carborundum Company, Niagara Falls, N. Y.
11—Carborundum Company, Niagara Falls, N. Y.
12—Standard Oil Co. (Eagle Works), Claremont, N. J.
13—Cleveland Electric Illuminating Co., Cleveland, Ohio.
14—Standard Oil Company (Eagle Works), Claremont, N. J.
15—Standard Oil Company (Eagle Works), Claremont, N. J.
16—Standard Oil Company (Eagle Works), Claremont, N. J.
17—Vacuum Oil Company, Paulsboro, N. J.
18—Rockwood & Company, Brooklyn, N. Y.
19—Belleville Warehouse Co. (Wm. Whitman & Co.), New Bedford, Mass.
20—Bristol-Myers Company, Newark, N. J.
21—Bristol-Myers Company, Newark, N. J.
22—Bristol-Myers Company, Newark, N. J.
23—The Rudolph Wurlitzer Mfg. Co., North Tonawanda, N. Y.
24—The Rudolph Wurlitzer Mfg. Co., North Tonawanda, N. Y.
25—The Rudolph Wurlitzer Mfg. Co., North Tonawanda, N. Y.
26—The Rudolph Wurlitzer Mfg. Co., North Tonawanda, N. Y.
27—Revere Sugar Company, Boston, Mass.
28—Revere Sugar Company, Boston, Mass.
29—Oakes Manufacturing Company, Long Island City.
30—Oakes Manufacturing Company, Long Island City.
31—U. S. Navy Chemical Laboratory, Brooklyn, N. Y.
32—Pierce-Arrow Motor Car Company, Buffalo, N. Y.
33—Quincy Market Cold Storage and Warehouse Company, Boston, Mass.
34—Bush Terminal Company, New York City
35—Bush Terminal Company, South Brooklyn, N. Y.
36—Merchants Refrigerating Company, New York City.
37—American Can Company, South Brooklyn, N. Y.
38—National Biscuit Company, Pittsburgh, Pa.
39—Black Cat Textile Company, Bennington, Vt.
40—The Norwich Woolen Mills Company, Norwich, Conn.
41—United Realty Company (Eckerson Co.), Jersey City, N. J.
42—American Can Company, South Brooklyn, N. Y.
43—New York Dock Company, Brooklyn, N. Y.
44—Bush Terminal Company, South Brooklyn, N. Y.
45—Rochester Railway and Light Company, Rochester, N. Y.
46—Wm. Becker's Aniline and Chemical Works, Inc. (National Aniline and Chemical Co.), Brooklyn, N. Y.
47—Bausch & Lomb Optical Company, Rochester, N. Y.
48—Colgate & Company, Jersey City, N. J.
49—U. S. Navy Supply Storehouse, Brooklyn, N. Y.
50—Doehler Die-Casting Company, Brooklyn, N. Y.
51—Doehler Die-Casting Company, Brooklyn, N. Y.
52—Bush Terminal Company, S. Brooklyn, N. Y.
53—Sperry Gyroscope Company, Brooklyn, N. Y.
54—Endicott-Johnson Company, Endicott, N. Y.
55—Vacuum Oil Company, Bayonne, N. J.
56—Bureau of Standards (Department of Commerce), Washington, D. C.
57—Scovill Manufacturing Company, Waterbury, Conn.
58—Black Cat Textile Company, Bennington, Vt.
59—Standard Milling Company, New York City.
60—Vacuum Oil Company, Rochester, N. Y.
61—Lightfoot-Schultz Co. (Hoboken Land and Improvement Co.), Hoboken, N. J.
62—Hudson Motor Car Company, New York City.
63—Knickerbocker Portland Cement Co., Hudson N. Y.

(William Higginson, architect). At the time this seemed to be a considerable contract, but as the work progressed, it became clearly apparent that size was merely a matter of organization. With carefully considered plans, well laid out contractors' plant and capable, experienced superintendents, foremen and workmen, the large operations go forward to completion as easily and as quietly as the small ones. But do not forget the necessity of the well-trained, skilled organization, without which satisfactory progress cannot be planned and maintained.

The extent of the building work executed by us from 1902 to the end of 1918 is impressively illustrated by the composite pictures which have been prepared from time to time for advertising purposes. The first picture includes the work done from 1902 to 1910, inclusive, the second picture the years 1911 to 1915, inclusive, and the third, fourth and fifth pictures include one year each, namely, 1916, 1917 and 1918. These pictures are reproduced on pages 129 to 134, inclusive, and 137, and are considered intensely interesting. Fifty-nine different industries are represented in them.

The years 1902 to 1910 represent a volume of work done by us of approximately $7,804,000.00; 1911 to 1915 a volume of $16,410,000.00; and the three succeeding years the following amounts, respectively, $6,638,000.00, $11,600,000.00 and $35,226,000.00.

The year 1917 shows the stimulation of construction work by the pressing demands of the war on our industries and includes the first warehouse for the Navy Department and the Coast Artillery Barracks for the War Department. The work done for the Government was 17.3 per cent of the total for the year.

By the year 1918, construction work for the Government dominated the situation. In fact, owing to the restrictions imposed by the War Industries Board, it was not possible to execute contracts of any magnitude unless they were for the Government direct or for industries serving the war program. Our Company, by virtue of its experience and the size and character of its organization, was not only well fitted to aid the Government in carrying forward its construction program, but the personnel of the Company were determined to devote their talents and energies to war work. This was as it should be, since the Government thereby obtained the full benefit of the experience and knowledge of men trained to build efficiently and the co-operative effort of the Company.

The volume of work actually completed within the year totalled $35,226,000.00 and 85 per cent of it was done for the Government direct. Another 6.5 per cent was for industries making additions to plant to execute war contracts. When one considers this very large volume of construction work done in one year, three times the volume of the best previous year, the thought must occur, where were the men obtainable to do this work and the superintendents and foremen to efficiently direct it? This problem, undoubtedly, caused deep concern to the management of the Company as one contract after another was offered to us by the Government. The solution was found in broadening the responsibilities of our leading men and in utilizing to the full the executive capacity of our many superintendents, foremen and sub-foremen. We were further greatly aided by the hundreds of skilled mechanics and laborers who had worked for the company in past years and desired to be known as Turner men.

In speaking of profits, it should be stated that the usual 10 per cent commission was not charged the Government. The percentage on all of the work done for the

Government during the year 1918 averaged 2.9 per cent and this was a gross profit, out of which all main office and overhead expenses, including officers' salaries and taxes, had to be paid. When compared with manufacturers' profits, the margin will be recognized as exceedingly small.

Much is heard these days about profit-sharing or additional compensation plans for employees. The Turner Construction Company was among the first to establish such a plan. In 1910, two plans were approved by the Board of Directors—the first for superintendents in responsible charge of construction work, whereby in addition to salary, they were paid additional compensation in definite prearranged amounts dependent upon the actual costs made on the work as compared with the estimated costs. These estimated costs were submitted to the superintendent for approval, and were modified if it could be shown by him that they failed to consider intelligently all the factors making up the costs for the work.

This plan over a period of nine years has given satisfactory results and aided in maintaining a contented and happy relationship between the Company management and its superintendents.

The second plan provided additional compensation for the officers and department managers, by creating a fund which bore a definite relationship to profits to be distributed at the end of the fiscal year in proportion to the salaries of the participants.

This plan brought closely together the leading men of the Company and undoubtedly created a feeling of partnership in the successful management of the Company. To the men in this group must be given the major credit for the constant and successful growth of the Company.

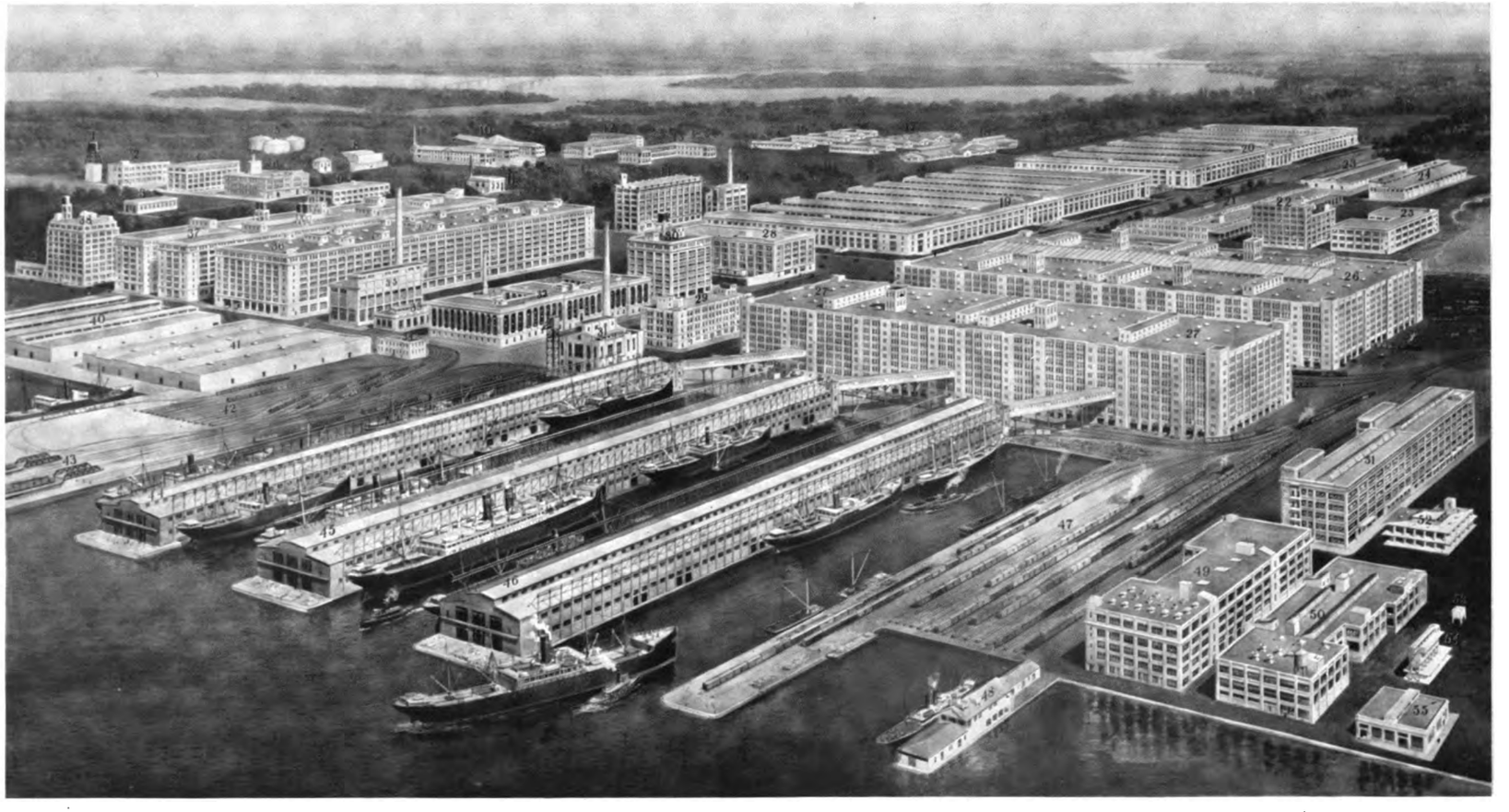
It seems appropriate that their names should be recorded here. They are:

H. C. Turner	E. J. Moore	H. H. Fox
D. H. Dixon	T. A. Smith	R. C. Wilson
F. E. Knapp	A. C. Tozzer	A. W. Stephens
J. C. Andrews	J. P. H. Perry	W. E. Lyle
A. W. Chapman		H. E. Plumer

Beginning with 1915, additional compensation has also been paid to the engineers, draftsmen, accountants and all employees in the main or branch offices of the Company, based upon the factors of length of service, salary, responsibility of position and the general prosperity of business. During these years, additional compensation has also been paid to assistant superintendents and promising foremen.

The publicity work of the Company has been noteworthy. In the early years, this was confined to a circular and catalogue, small advertisements in the "Engineering News" and the "Engineering Record" and one or two of the cement papers and to descriptive articles in the trade papers of the work done.

In 1907 and 1908, advertisements were placed in the "Manufacturers' Record" for Southern business for the winter months and in "System." These mediums brought inquiries from as remote places as Texas and Missouri and we were not prepared to follow them up. We also began in the Fall of 1907, the publication of illustrated bulletins issued three or four times a year and sent to a selected list of architects, engineers and manufacturers. These have been supplemented in later years by progress photographs of construction work.



WORK DONE DURING THE YEAR 1918

1 American Mfg. Co., Brooklyn, N. Y.
2 Vacuum Oil Co., Rochester, N. Y.
3 Bureau of Standards, Washington, D. C.
4 Nashua Mfg. Co., Nashua, N. H.
5 Scovill Mfg. Co., Waterbury, Conn.
6 National Biscuit Co., Pittsburgh, Pa.
7 Scovill Mfg. Co., Waterbury, Conn.
8 Scovill Mfg. Co., Waterbury, Conn.
9 F. E. Atteaux & Co., Boston, Mass.
10 U. S. Navy Emergency Hospitals, Washington, D. C
11 Bureau of Standards, Washington, D. C.
12 U. S. Navy Emergency Hospitals, Washington, D. C.
13 U. S. Navy Emergency Hospitals, Washington, D. C.
14 Pennsylvania Chocolate Co., Pittsburgh, Pa.
15 Pennsylvania Chocolate Co., Pittsburgh, Pa.
16 Portsmouth Naval Prison, Kittery Point, Me.
17 Portsmouth Naval Prison, Kittery Point, Me.
18 Portsmouth Naval Prison, Kittery Point, Me.
19 Navy Department Office Building, Washington, D. C.
20 War Department Office Building, Washington, D. C.
21 American Agricultural Chemical Co., Jacksonville, Fla.
22 National Lead Co., Brooklyn, N. Y.
23 Robert Gair Co., Piermont, N. Y.
24 American Agricultural Chemical Co., Carteret, N, J.
25 Brighton-By-The-Sea, Inc., Brighton Beach, L. I.
26 U. S. Army Supply Base, Warehouse B, Brooklyn, N. Y.
27 U. S. Army Supply Base, Warehouse A, Brooklyn, N. Y.
28 American Woolen Co., Medford, Mass.
29 U. S. Army Supply Base, Administration Building, Brooklyn, N. Y
30 Medical Supply Storehouse, Brooklyn, N. Y.
31 U. S. Army Supply Base, Brooklyn, N. Y.
32 Bureau of Standards, Industrial Testing Laboratory, Washington, D. C.
33 Bureau of Standards, Kiln Building, Washington, D. C.
34 U. S. Navy Fleet Supply Base, Administration Bldg., Brooklyn, N. Y.
35 U. S. Navy Fleet Supply Base, Brooklyn, N. Y.
36 U. S. Navy Fleet Supply Base, Storehouse, No. 2, Brooklyn, N. Y.
37 U. S. Navy Fleet Supply Base, Storehouse, No. 1, Brooklyn, N. Y.
38 Doehler Die-Casting Co., Brooklyn, N. Y.
39 Murphy Varnish Co., Newark, N. J.
40 U. S. Navy Fleet Supply Base, Warehouse No 2, Brooklyn, N. Y
41 U. S. Navy Fleet Supply Base, Warehouse No. 1, Brooklyn, N. Y.
42 U. S. Navy Fleet Supply Base, Railroad Yards, Brooklyn, N. Y.
43 U. S. Navy Fleet Supply Base, Float Bridges, Brooklyn, N. Y.
44 U. S. Army Supply Base; Pier No. 4, Brooklyn, N. Y.
45 U. S. Army Supply Base; Pier No. 3, Brooklyn, N. Y.
46 U. S. Army Supply Base; Pier No. 2, Brooklyn, N. Y.
47 U. S. Army Supply Base; Pier No. 1, Brooklyn, N. Y.
48 U. S. Naval Pier, Ninety-seventh Street, New York City.
49 Bay Ridge Dock Co., Brooklyn, N. Y. (C. Kenyon Co.)
50 Vulcan Proofing Co., Brooklyn, N. Y. (C. Kenyon Co.)
51 Scovill Mfg. Co., Waterbury, Conn.
52 Fort Lafayette, New York Harbor
53 Endicott-Johnson Co., Endicott, N. Y.
54 Robert Gair Co., Brooklyn, N. Y.
55 Revere Sugar Co. (United Fruit Co.), Charlestown, Mass.

In 1915, the use of newspapers was decided upon, containing the advantage of intensive localized publicity. The slogan "Turner for Concrete" was adopted and has since been an essential part of all of our publicity work, whether in newspapers, trade publications, bulletins or photographs.

The Turner Cities, grouping the buildings constructed during definite periods, reproduced on pages 129 to 134, inclusive, and 137, have told a most effective story of successful accomplishment.

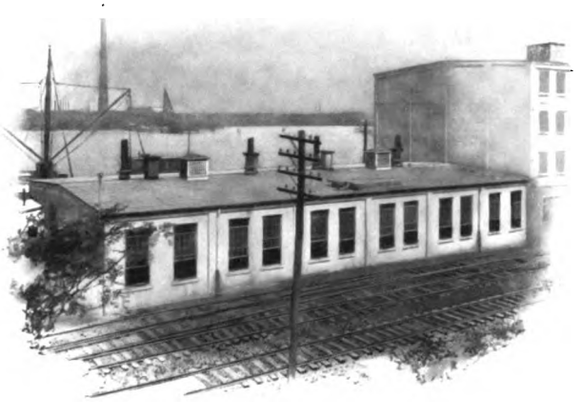
The Honor Roll of the Company is reproduced on page 124 and contains 128 names. It does not include any of our skilled workmen or laborers, many of whom either enlisted or were drafted. It includes volunteers and drafted men from our office organizations, superintendents, assistants and foremen. Forty-nine men saw service overseas. All were ready to go across and many more made a great sacrifice of personal ambition to remain in the industrial ranks.

It seems remarkable that the war took only two of these men. J. D. Cook was killed in action. J. P. Uhlinger died in camp.

The men who entered the Army and Navy and those who did conscientious work for the Company, all served their country in the great crisis.

This brief history cannot be closed without a word of appreciation of the loyal and splendid service which has been rendered by the many employees of the Company. Year in and out, they have carried the load with spirit and determination and built high the reputation of the Company for straightforward, honorable and intelligent service.

The Company's standing in the business world is the result of their combined effort, and the Board of Directors here wishes to record its thanks and appreciation.



FIRST REINFORCED CONCRETE BUILDING ERECTED BY THE TURNER CONSTRUCTION COMPANY. COOPER SHOP, BUILT IN 1902 FOR J. B. KING & CO., STATEN ISLAND, N. Y.

"Turner for Concrete"