

244
HOBOKEN,
N. J.

MARCH, 1923

Report No. 244

NATIONAL BOARD OF FIRE UNDERWRITERS
COMMITTEE ON
FIRE PREVENTION AND ENGINEERING STANDARDS

REPORT
ON THE
CITY OF HOBOKEN, N. J.
(SUPERSEDING THAT OF 1914)

NATIONAL BOARD OF FIRE UNDERWRITERS

76 WILLIAM STREET, NEW YORK.

JOHN B. MORTON, President, Philadelphia.
W. H. STREVS, Vice-President, Watertown.

R. EMORY WARFIELD, Treasurer, New York.
SUMNER BALLARD, Secretary, New York
W. E. MALLALRU, General Manager.

COMMITTEE ON FIRE PREVENTION AND ENGINEERING STANDARDS

OTTO E. SCHARFER, Chairman, New York.

C. A. LUDLUM, New York.
F. C. WHITE, Hartford.
W. A. BLODGETT, New York.
NEAL BASSETT, Chicago.
GEO. W. DORNIN, San Francisco.
G. T. FORBUSH, New York
W. R. TOWNLEY, Chicago.
FREDERICK HOADLEY, Newark.

J. L. FULLER, San Francisco.
SHERLON CATLIN, Philadelphia.
J. A. KELSEY, New York.
E. G. PIERCE, Providence.
C. W. PIERCE, New York.
LYMAN CANDLER, Hartford.
J. H. VREELAND, Hartford.
MILTON DARGAN, Atlanta.

GEORGE C. LONG, Jr., Hartford.

GEO. W. BOOTH, Chief Engineer, New York.
A. C. HUTSON, Asst. Chief Engineer, New York.
CLARENCE GOLDSMITH, Asst. Chief Engineer, Chicago.
ROBT. E. ANDREWS, Asst. Chief Engineer, San Francisco.

The investigation of conditions in Hoboken, N. J., was made during November and December, 1922, by Engineers Arthur F. Ballou, George L. Swan, Allen Roberts and George F. Hoag.

Acknowledgment is made of the valuable assistance rendered by the Hon. Patrick R. Griffin, Mayor; the officials of the various city departments concerned; the Hackensack Water Company, and others.

Office Engineers

ROBERT C. DENNETT

CLINTON T. BISSKILL

MARCH 15, 1923.

MARCH, 1923.

HOBOKEN, N. J.

REPORT NO. 244
(Superseding that of 1914)

CITY IN GENERAL

The commissioners of the commission government are Hon. Patrick R. Griffin, Mayor; Gustav Bach, Director of Revenue and Finance; James L. Londrigan, Director of Streets and Public Improvements; Bernard N. McFeely, Director of Public Safety; Harry L. Schmulling, Director of Parks and Public Property.

Population estimated to be 70,000; the 1920 U. S. Census shows 68,166. The city is important as a center of shipping and transportation, several trans-Atlantic and coastwise steamship lines and two railroads using the city as a terminal. Other important industries are shipbuilding and allied industries, woodworking and the manufacture of machinery, scientific instruments, lead pencils, and metal and silk goods.

The city covers an area of about $1\frac{1}{4}$ square miles, about $\frac{3}{4}$ of which is built upon. The surface is generally flat. Elevations range from mean high water to 100 at the top of Stevens Point Terrace in the eastern part of the city. The grades generally average about one per cent., but some streets, notably 4th and 8th streets in the vicinity of Washington street, have grades around five per cent. Washington and Hudson streets are respectively 100 feet and 80 feet in width; other north and south streets are 65 feet and those running east and west are 50 feet wide.

There are 27.6 miles of streets, of which 25.4 miles are paved, and mostly in good condition.

Overhead wires would form serious obstructions to fire department operations in many places. Bituminous coal and anthracite screenings are used for manufacturing purposes, and anthracite and manufactured gas for domestic purposes.

Records of the U. S. Weather Bureau Station at New York, on the opposite side of the Hudson river, show that winds of 25 miles per hour and over are frequent, with the prevailing direction from the northwest; as Hoboken is situated in a hollow adjacent to the high ridge forming Jersey City Heights, its wind velocities are probably somewhat lower than at New York. The average snowfall is such as to cause moderate interruption to traffic. There is practically no continuous severe cold weather; periods of hot, dry weather are infrequent.

The gross fire loss for the past five years, as given in the fire department records, which do not include many small losses or those incurred by fires on ships, piers or on railroad property, some of which were serious fires, was \$1,959,237. The average yearly number of fires was 247, varying from 197 in 1917 to 296 in 1921, with an average loss per fire from the records available of \$1,586, a very high figure. Based on an average population of 70,000, the average yearly number of fires per 1,000 population was 3.5, a moderate figure, and the annual loss per capita \$5.60, a high figure, which, if the records were complete, would probably be much higher.

FIRE-FIGHTING FACILITIES.

WATER SUPPLY.

OWNERSHIP.—The municipality owns and operates the distribution system, with the exception of a small amount of pipe of private ownership, chiefly along the water front. The supply is purchased by the city from the Hackensack Water Company, which also supplies 50 other cities and boroughs and owns and operates the supply works and all mains up to the city limits.

ORGANIZATION.—The municipal control is vested in the Commissioner of Revenue and Finance who appoints the subordinate officials with the confirmation of the City Commissioners. Gustav Bach, who has been water registrar since 1901, became commissioner for a 4-year term in

May, 1919. Edward Hunter is deputy-commissioner and A. Paolista has been assistant registrar since 1916. Thomas Haggerty is inspector and has been in charge of maintenance and construction since 1914. There are 11 permanent employees.

The officers of the water company are Robert W. DeForrest, president, Hamilton Kean, vice-president, and D. W. French, superintendent. Mr. French has been with the company since 1883 and superintendent since 1900; he is an able and experienced engineer.

Agreement.—A former agreement between the city and the company expired on July 21, 1922. Since that date the supply has been purchased through meters located at the northern city limits.

WATER SUPPLY.

Records.—Plans and records of the water company are generally complete and up to date. Practically no records relative to the distribution system had been kept by the city prior to 1913. A general map of the distribution system, made at that time by National Board engineers, has been brought up to date and constitutes the most reliable record.

Quarters.—The main office of the Hackensack Water Company is in Weehawken. The office of the registrar is in city hall at the corner of Washington and Newark streets; shop is on Bloomfield street between Second and Third streets; pipe storage is at the Public Pound, Twelfth and Madison streets. Telephones are maintained in all quarters of the company and the city.

Fire Service and Emergency Operations.—Fire alarms sound on tapper in the office of the registrar. Response to alarms is not generally made. In emergency the police department notifies the inspector or registrar.

GENERAL OUTLINE OF SYSTEM.—Supply is obtained from the Hackensack river at New Milford, about 16 miles north of Hoboken; is filtered and pumped to two reservoirs, located respectively about $\frac{1}{2}$ and $1\frac{1}{4}$ miles north of Hoboken, which supply the distribution system by gravity. These reservoirs are maintained with nearly full storage and at times the supply is repumped at a booster station located on the force mains about one mile from the upper reservoir. There is also a third reservoir which operates in a high service for the supply of territory outside of Hoboken.

Elevations in this report are in feet above mean high tide.

SUPPLY WORKS.—General.—Water is taken from the Hackensack river at New Milford, about 16 miles north of Hoboken; area of water shed about 115 square miles. At Woodcliffe, about 3 miles above the intake, a low earth dam with concrete core-wall serves to impound about 900,000 gallons. At Oradell, about 0.6 miles above the intake, a reinforced concrete dam, elevation 4.8, forms a reservoir of 4,000,000 gallons capacity. This dam is equipped with 7 sluice gates for stream control. It was completed in July, 1922, and reservoir had not been filled at the time of inspection beyond the storage of 600,000 gallons which was obtained during the construction.

Intakes.—An open concrete canal and a 48-inch conduit, part brick and part cast iron, extend from a race, formed by low dams near the pumping station, to a well from which a 48-inch pipe extends to an unfiltered water well within the station, from which two 24,000,000-gallon low lift pumps draft and a 54-inch pipe extends to a

45,000,000-gallon pump. The inlet to the canal is protected by screens and a concrete diversion wall and no trouble is experienced from ice. The raw and filtered water wells within the station are separated by a valve which is closed and sealed, and there is a 48-inch cast-iron branch from the brick conduit which extends to the filtered well for emergency use.

Filter Plant.—From the pair of low-lift pumps and from the largest unit separate discharge lines of 48-inch cast-iron pipe extend to a gate house, from which a 48-inch line extends to a settling basin of 12,000,000 gallons capacity, elevation 22, east of the station and constructed in earth embankments lined with masonry. From the settling basin a 54-inch cast-iron pipe carries the gate house to the 12 filters, which are of 3,000,000 gallons per day capacity each, with provision for 4 additional units. Sedimentation basin may be by-passed at the gate house. Filter house is a 1- to 4-story brick building, 30 feet north from the station, area 30,000 square feet, with peaked slate roof on tile on unprotected steel trusses; floors are of concrete; building contains office, laboratory, chemical rooms, wash water pumps and other operating machinery. Beneath the filters is a concrete clear-water basin, capacity 900,000 gallons, from which a 54-inch line extends to the suction wells for the service pumps in the station.

New Milford Pumping Station.—General.—Built in 1882 and enlarged in 1898 and 1911; located in New Milford on the Hackensack river, about 16 miles north of Hoboken. This station supplies, in addition to Hoboken, 50 other cities and boroughs, some of which are on a high service. It is operated continuously by 3 shifts of at least 7 men each, under the direction of a chief engineer who resides nearby and reports to the company's mechanical engineer. Elevation of pump room floor 10. The low-lift pumps deliver from the raw water well to the settling basin with total head of about 22 feet. Service pumps have independent suctions with practically no lift from wells beneath the station, which have emergency connections to unfiltered water. Two High service pumps have gated connections with a 30-inch line extending to Reservoir No. 3; the four other service pumps have gated discharges into a 30- to 54-inch loop, so gated that a single break would put only one pump out of service. Steam piping is well installed but is not arranged in a loop, and a single break might prevent the operation of all low-lift and 3 service pumps, leaving only one 20,000,000-gallon service pump and the pair of High service pumps for operation. Coal is received on siding nearby and transferred mechanically to storage building 50 feet south of the station.

Equipment.—See Table 1. Normal operation is both High service pumps, two of the four

WATER SUPPLY.

HOBOKEN, N. J.

TABLE 1.—PUMPING STATIONS.—EQUIPMENT.
PUMPS.

Station	Number and Make	Class	Date of Manufacture	DIAMETER, IN INCHES		Strokes, Inches	Revolutions per Minute	Water Pressure, Pounds	Rated Capacity, Gallons Per Day
				Steam Cylinders	Water Plunger				
New Milford	1 Worthington	Horizontal, tandem, compound, condensing, duplex, double-acting	1892	30, 60	26	48	16½	125	10,000,000
	1 Allis-Chalmers	Vertical, triple-expansion, condensing, crank and fly-wheel, triples, single-acting	1900	25½, 47, 72	25½	42	31	125	12,000,000
	1 Ditto	Ditto	1902	30, 53, 84	29½	48	30	125	18,000,000
	1 E. P. Allis	Ditto	1912	32, 64, 94	31½	60	23	125	20,000,000
	2 Allis-Chalmers	Ditto	1920	34, 56, 86	22½	60	20	248	7,500,000
	2 Allis-Chalmers	Centrifugal, each driven by a Corliss tandem, compound, condensing engine	1905	9½, 20	.....	24	120	7	24,000,000
New Durham	1 Allis-Chalmers	Centrifugal, driven by cross-compound condensing engine	1915	12, 28	.....	24	120	6	45,000,000
	1 E. P. Allis	Vertical, triple-expansion, condensing, crank and fly-wheel, triple, single-acting	1900	20, 38, 56	22½	42	33	84	10,000,000
	1 Ditto	Ditto	1906	30, 54, 84	33½	48	25½	84	20,000,000
	1 Ditto	Ditto	1910	30, 54, 84	29	48	25½	140	12,000,000
	1 Ditto	Ditto	1908	20, 38, 58	26½	48	29	140	14,000,000
	1 Ditto	Ditto	.....	.....	.....	.....	.....	.....	.....

*Low Lift, delivering to sedimentation basin.

†Low Service Pumps.

‡High Service Pumps.

BOILERS.

Station	Number and Make	Type	Date of Manufacture	Grate Surface, Square Feet	Heating Surface, Square Feet	Rated Horse Power, Each	STEAM PRESSURE		Fuel	Insurance
							Maximum Allowed	Average		
New Milford	1 Aultman and Taylor	(Horizontal, Water Tube)	1898	82½	2700	250	190	175	Anthracite	Hartford Steam Boiler Inspection and Insurance Co.
	2 Sterling	Ditto	1906	88	3200	500	190	175	Pea Coal	
New Durham	1 Babcock & Wilcox	Ditto	1919	.....	500	200	175	.....	Anthracite and Bituminous	
	4 Aultman and Taylor	Ditto	1905	88	3200	500	190	175	.....	

service pumps and the largest of the three low-lift pumps. The two smaller low-lift pumps and the 10,000,000-gallon service pump are not regularly operated. The approximate daily pumpage is low-lift 41,000,000; service 23,000,000 and High service 12,000,000 gallons. The maximum demands, which occur usually during freezing weather, are about 3,000,000 gallons greater, only a small part of which is in the High service. The total rated boiler capacity is 2,500 h.p. of which 500 h.p. is in reserve. Equipment is in good condition and well maintained.

Construction.—The station consists of a group of 7 low to high, 1-story, brick and fireproof buildings, connecting through unprotected communications and forming a combined area of

21,600 square feet; there is no protection to exposed windows. The pump houses cover an area of 14,500 square feet and consist of 5 communicating buildings, the largest being of fireproof construction, with steel roof trusses unprotected and housing the largest service pump and both High service pumps. Two buildings have slate roofs on wooden sheathing supported by steel trusses and two have similar roofs supported on wooden rafters. The floors of 4 are of wood supported on wooden beams; basement floors cement. The boiler houses, which connect to the former buildings, have slate roofs on wooden sheathing supported on steel trusses; floors cement. The coal storage building is about 50 feet from the other buildings of the plant; it

has slate roof on wooden sheathing supported on wooden rafters; floor is flagged.

Hazards.—The buildings of the pumping station and filter plant are mutually exposing. Four of the pump houses contain an excessive amount of woodwork, which creates a serious hazard. Oils for immediate use are kept in two metal tanks in one of the pump houses; storage is in barrels in boiler room; waste in wooden bin in basement of one pump room; used oil placed in metal barrels in boiler room and burned. Electric lighting from own plant; wiring partly in conduit, safe as a whole. Breaching of boilers to outside brick stack well installed.

Protection.—There are three standpipes in the pump houses, each with 100 feet of 2½-inch lined hose with nozzle on rack; three hydrants and a 2½-inch hose connection outside within 200 feet of buildings. Two volunteer hose companies nearby and station whistle used to sound alarms of fire.

Force Mains.—From the New Milford pumping station 3 cast-iron mains lead to the 2 reservoirs in Weehawken. Mains, 20- and 30-inches in diameter, respectively, extend about 10 miles, mainly along different routes, to Ridgefield, where they are cross-connected, the 20- and 30-inch being cross-connected at two points en route. These mains supply Hackensack, Englewood and several other towns along their routes. At Ridgefield the 30-inch line increases to 36-inch and the three mains continue about 3 miles along the same route, with several cross connections, to the New Durham pumping station, and thence to Reservoir No. 1, about 2 miles, and two 24-inch lines continue about 4,500 feet to Reservoir No. 2.

These mains are of Class C pipe. Average gate spacing is 4,000 feet. They are well covered and frequently patrolled for leaks. At stream crossings pipes are laid in trench and covered. The 20-inch main is carried over a railroad on the abutments of a highway bridge.

New Durham Pumping Station.—General.—Built in 1905 about 3 miles north of Hoboken. Operates about 100,000,000 gallons of water through three mains from New Milford as a booster to the service of Reservoirs 1 and 2 and as a supply to the High service and Reservoir 3, under the direction of a chief engineer with at least 3 men on a shift. Elevation of pump room floor 27; of gages 33. Normal operation is a 20,000,000-gallon pump and 8 boosters 8 hours daily, at times when the delivery from the New Milford station does not maintain the full storage in Reservoirs 1 and 2. A concrete reservoir, capacity 4,322,000 gallons, adjacent to the station was formerly supplied from the force mains and provided suction for the pumps; this reservoir is not used and pumps are supplied through independent suctions from a 42-inch line, reducing successively to 30- to 24-inch, from the force mains

with pressure of 75 pounds reduced to 60 pounds for a 20,000,000-gallon rate. Discharge piping is arranged as two headers in which a break would prevent the operation of the two pumps in the service affected. Steam piping is arranged as a single header in which a break or the repair of a valve might prevent the use of the four pumps. Coal is received on railway siding and transferred mechanically to storage.

Equipment.—See Table 1. Equipment is maintained in good condition. All pumps are turned over frequently. One of the four boilers is sufficient for ordinary operation.

Construction.—The station consists of a group of 3, low to high, 1- and 2-story brick buildings connecting through unprotected communications forming a combined area of 17,400 square feet; there is no protection to exposed windows. The pump house, a 2-story building, covers an area of 7,300 square feet; it has a peaked, slate-covered, wooden-sheathed roof on steel trusses; operating floor is 3-inch planking on wooden beams, supported on wooden columns; ground floor is cement. The coal storage building adjoin the pump house; construction is similar to the last; the floors of both are concrete.

Hazards.—The buildings are moderately exposed on the south by a small frame building and on the north by several single-roof frame dwellings. Oils in compartment in boiler house; large metal tank for draining used oil in pump room. Waste in bags and open bin in pump room in close proximity to small cans of oil for immediate use. Electric lighting from own plant; wiring open, in safe condition. Breaching of boilers to outside brick stack well installed.

Protection.—Hand reel with 200 feet of 2½-inch, cotton, rubber-lined hose and nozzle in boiler room. Three standpipes for 2½-inch hose in pump room and one in boiler room. Three post hydrants on grounds outside.

DISTRIBUTING RESERVOIRS.—Reservoir No. 1.—Located in Weehawken about 1¼ miles north of Hoboken. Built in 1883, mainly in earth embankment; inside slopes paved with brick; bottom of clay puddle. Area 3¼ acres; depth 20 feet; capacity 15,960,000 gallons; overflow at elevation 180, 4 feet below top of embankment. Supplied by three force mains from New Milford; can be by-passed. From this reservoir two lines, 12- and 16-inch in diameter, equipped with check valves, extend southerly about 4,100 feet to connections with a 30-inch line from Reservoir No. 2 and about 2,400 feet beyond to the Hoboken city line. This reservoir can also be supplied through a 16-inch line from High service Reservoir No. 3, located about 3½ miles to the north; the latter is supplied from New Milford or New Durham pumping stations,

is at elevation 319, and has a capacity of 18,000,000 gallons.

Reservoir No. 2.—Located in Weehawken about ½ mile north of Hoboken. Built in 1896 and enlarged in 1901; in excavation and embankment; inside slopes paved with stone; bottom partly of concrete and partly of clay puddle. Area 11 acres; depth 24 feet; capacity 67,700,000 gallons; overflow at elevation 194. Supplied through two 24-inch lines from the force mains, one of which can be used as a connection to Reservoir No. 1. Supplies Hoboken through a 24-inch and a 30-inch line about 1,000 feet long which connect with three mains, 12, 16 and 24 inches in diameter, that extend about 2,400 feet to the Hoboken line. The reservoir can be by-passed.

CONSUMPTION.—Estimates of consumption were formerly based upon occasional meter readings in the 30-inch distributing main from Reservoir No. 2. Since July, 1922, the consumption has been continuously measured at the city line and for a period of four months the average daily consumption has been 7,410,000 gallons with a maximum of 8,108,000 gallons on November 1st and a minimum of 6,313,000 gallons on August 21st. Of the total, approximately 17 per cent. is measured by a 10-inch meter on the 12-inch main in Park avenue, and 32 and 51 per cent. by the 8- and 10-inch meters on the 30-inch main in Willow avenue.

There are approximately 5,000 services; about 70 per cent. have meters and under a recent ruling the remainder are to be metered immediately. Large meters include 7 eight-inch; 16 six-inch; 23 four-inch and 31 three-inch. Controlling valves at large services are usually near the street main.

PRESSURES.—A recording gage is maintained at fire headquarters on Hudson street near Second street, elevation 25. Charts from this gage show pressures ranging between 30 pounds by day and 58 pounds by night; a variation of 28 pounds, of which 15 pounds occurs at the city line. The pressure head above this gage of Reservoir No. 1 is 67 pounds and of Reservoir No. 2 is 73 pounds. The pressures at the 12 residual hydrants in the fire flow groups were observed between 9:50 a. m. and 12:15 p. m. and ranged from 35 to 46 pounds, with an average of 42, or 5 pounds less than at the same hydrants in 1913.

DISTRIBUTION SYSTEM.—General.—Distribution is in one service, supplied from Reservoirs 1 and 2 in Weehawken. The city is nearly level and only a few feet above high tide, except for a small area near the river front with a maximum elevation of 100 feet.

Mains.—The supply lines to the Hoboken city

line have been described in the paragraphs devoted to Distributing Reservoirs. At the city line three Gem meters are installed on by-passes about closed gates in two of the large mains. Two meters, an 8- and a 10-inch, are on a 30-inch main which is supplied by a 10-inch main and a 16-inch branch from a 24-inch main and supplies the 30-, 16- and 12-inch mains in Willow avenue, and a 10-inch meter is on a 12-inch main which supplies a 12- and a 16-inch in Park avenue. These meters are of an undesirable type for fire service and with their connections produce a considerable friction loss during the high rates of flow which would occur in the event of a serious fire. As shown on the accompanying map, the five mains above mentioned extend southerly by diverging routes and with numerous branches 12 and 16 inches in diameter form a system of arteries and secondary feeders which would be generally satisfactory if these mains were properly connected to one another and to the smaller pipes. At the southwestern city limits there are three 12-inch closed connections with the distribution system of Jersey City.

Minor distributors are mainly 6 inch with a small proportion of 8 inch. Gridiron is close; the average length of 6-inch pipe on the long side of blocks between cross-connections is 500 feet. About 1.7 miles of 6-inch pipe is in dead ends which supply hydrants.

PIPES.—Length and Age.—Table 2 shows the amount of pipe in the distribution system within the city limits as scaled from the map. It includes small amounts of 12- and 16-inch pipes of private ownership along the river front. Most of the mileage has been installed since 1895; about 4 miles of 16, 24- and 30-inch mains were installed in 1908 and 1910 and 1.4 miles in 1920.

TABLE 2.—PIPES AND VALVES IN THE DISTRIBUTION SYSTEM, NOVEMBER 1, 1922.

Diameter, inches	PIPES			Number of Gate Valves
	Length, Miles	Per Cent. of Total	Net Increase, Miles Since 1913	
4	0.14	0.4	.....	175
6	17.83	53.6	+1.20	62
8	2.13	6.4	+1.70	44
12	7.88	22.7	0.34	44
16	0.64	1.9	.....	32
24	0.41	1.2	.....	8
30	1.30	3.9	.....	8
Total	33.32	100.0	0.75	313

Decrease.

Condition and Cover.—All pipe is tar-coated cast iron. Carrying capacity is slightly affected

WATER SUPPLY.

by incrustation and tuberculation. No trouble is reported from sediment. Mains are not regularly flushed but the discharges from hydrants during the flow tests were generally clear. Broken mains are infrequent and mainly in the smaller sizes.

Mains are laid with cover of 4 feet; in the territory where marsh land has been reclaimed, mains are laid with cover of three feet and the street surface gradually settles and is filled in. When cover exceeds 7 feet the lines are generally abandoned and new ones installed above them. The main on Ferry street is covered about 9 feet. Frost penetration rarely exceeds 2 feet and there is no trouble from frozen mains.

Specifications.—Pipe is purchased as required and only small amounts are kept on hand for emergencies. Weights correspond closely with Class B, American Water Works Association specifications. Pipes are hammer-tested at the trench and pressure is generally applied before joints are covered.

Electrolysis.—See Electricity, page 21.

GATE VALVES.—Number and Type.—There are approximately 313 gates on mains and 335 on hydrant branches. They are set usually with wooden or brick vaults; some are operated through cast-iron extension boxes. The direction of opening is clockwise; those of the opposite hand are said to have been replaced. The 30-inch valves are set horizontally and geared.

Location and Spacing.—Valves are located generally at street intersections near the property line; some are near the connecting main. Detail measurements of locations are not filed.

From the best obtainable data, the average length of main which would be shut off in consequence of a single break in the principal mercantile district is 915 feet with a maximum of 1,650 feet. Throughout the system the average length is 945 feet.

Inspection and Condition.—Valves are not systematically inspected and are operated usually only when occasion requires. Gears on the 30-inch valves have recently been cleaned and oiled.

An inspection of 29 valves, 6 to 12 inches in diameter, made by a National Board engineer in December, 1922, indicated that valves received but little attention and that necessary repairs are not promptly made. One valve was found closed; 3 maintained closed and not so indicated upon map; 4 broken and inoperative; 1 very stiff in operation and 5 with stuffing boxes badly in need of packing.

Closing of Valves.—The fire department is notified by telephone when valves shutting off the supply to hydrants are operated.

HYDRANTS.—Number and Type.—In November, 1922, there were in service 414 hydrants,

all of the post type and, with one exception, opening clockwise. Of these 335 have gate in the connection with the main. Nearly all have 6-inch connection and one 4½- and two 2½-inch outlets. Of these 189 are Smith, 109 are Darling, 29 are Corey, 14 are Iowa, 7 are Ludlow and 6 are Galvin. Two Darling hydrants have two 4½- and four 2½-inch outlets. A few have 4-inch connection with the main and include 9 Glamorgan with 4½- and one 2½-inch outlets and 49 McLean hydrants with 3-inch barrel and one 2½-outlet. The last are of an unsatisfactory type and are installed mainly in closely-built districts where a sufficient supply for a pump is of prime importance.

How Located.—One hydrant is installed usually at or near each street intersection and an intermediate hydrant in long blocks. Locations are determined by the water registrar and the fire chief.

Drainage.—Hydrants have automatic drip-valves and drain into brick chambers with pockets of loose stone beneath; drainage is generally satisfactory.

Inspection and Condition.—Hydrants are inspected semi-annually when each is flushed and caps greased. During extremely cold weather, 7 men are employed and each hydrant is inspected daily. Those found frozen are thawed and treated with salt and wood alcohol. The hydrants operated during the National Board inspection were in fair to good condition.

Distribution.—In the principal mercantile district the average area served by each hydrant is 51,000 square feet. Throughout the city the average area served is 72,000 square feet.

Of the 15 hydrants within and 29 upon the boundaries of the principal mercantile district, 15 are Darling, 16 are Smith, 6 are Corey, 1 is an Iowa, 5 are McLean and 1 is a Glamorgan; 30 have one 4½- and two 2½-inch outlets, 1 has two 4½- and four 2½-inch outlets, 2 have one 4½- and one 2½-inch outlets and 5 have one 2½-inch outlet; 38 have gated connection with the main.

Use by Street Department and Others.—Hydrants are used by the street and sewer departments for flushing. Contractors desiring to use hydrants are required to obtain a permit. Little damage is reported in consequence of these uses.

FIRE FLOW TESTS.—See Table 3. The tests were made on November 29, 1922, between 9:30 a. m. and 12:30 p. m. under ordinary conditions of consumption which for the day was 8,170,000 gallons.

IMPROVEMENTS.—Since the National Board report of 1914 about 2 miles of 8- and 12-inch mains have been laid and 1¼ miles of 6-inch mains removed; gate valve spacing has been slightly improved; 142 small hydrants have

WATER SUPPLY.

HOBOKEN, N. J.

TABLE 3.—FIRE FLOW TESTS.

District	Number and Location of Group*	DISCHARGE, GALLONS PER MINUTE		PRESSURE, POUNDS PER SQUARE INCH	QUANTITY	
		Individual Hydrants	Total of Group	Hydrants Closed	Hydrants Open	Required Available for Engine Supply
Principal Mercantile...	1. Bloomfield and Fourth Sts.	510 620 640 820 970	3560	41	27	8000 4500
	2. Washington and Newark Sts.	400 400 510 590 790	2840	37	23	8000 3200
	3. Hudson and Second Sts.	390 440 510 590 790	2840	37	23	8000 3200
	4. Adams and First Sts.	520 560 630 960	2670	46	23	5000 2000
Mercantile...	5. Harrison and First Sts.	550 460 520 540	1770	44	27	3000 2100
	6. Washington and Fourth Sts.	350 450 450 490	1080	40	23	4000 1800
	7. Jefferson and Fourteenth Sts.	440 550 600 670 1140	3460	49	38	4200
Manufacturing...	8. Adams and Eleventh Sts.	530 550 600 970	2640	45	24	5000 2500
	9. Adams and Eighth Sts.	380 390 450 540	1760	42	20	4000 1800
	10. Garden and Ninth Sts.	350 420 450 480	1730	41	17	4000 2200
Residential...	11. Willow and Sixth Sts.	160 280 410 420 680	1940	41	28	4000 2500
	12. Jefferson and Fifth Sts.	480 540 610 680	2310	46	30	4000 3000

*Location of groups shown on accompanying plan by corresponding numbers.

been replaced by those of satisfactory type and 49 additional hydrants installed.

CONCLUSIONS.—Organization.—Company organization is efficient; records are carefully compiled and kept up to date. In the city department the organization is weak by lack of capable engineering direction and dependable records of the underground system, and there is need for a well-qualified engineer who shall devote his entire time to the maintenance of the system and a study of the best means of improving it.

Supply Works.—Supply is from an ample source; filter capacity does not provide for fire use of service but filters can be by-passed in emergency; pumps are sufficient in number and capacity and are well maintained. Fire hazard of pumping stations is serious. Force mains are sufficiently in duplicate in conjunction with the distributing storage.

Distributing Reservoirs.—Substantially constructed and well maintained. The aggregate capacity is nearly 3 days consumption.

Consumption.—The per capita rate in Hoboken is moderately high. The small proportion of flat-rate services are to be metered immediately.

Pressures.—A wide range in pressures is caused daily by the varying rates of consumption and the average pressure is fair for engine supply, not well sustained under heavy draft and too low for effective supply to automatic sprinklers above the second story. Reservoir No. 2 is at a satisfactory elevation but its effective head is considerably reduced by a pressure regulating valve and the use of meters of an unsatisfactory type.

Protection.—Fire flow tests indicate that the quantities available for fire protection are not as large as in 1913 and are generally much less than

the quantities required for reasonable protection. They are not sufficient for the full capacities of the city's engines, not to mention a desirable surplus for the engines available from the neighboring cities. The weakness of the protection afforded is caused by unnecessary losses of pressure which occur in the supply mains in consequence of pressure regulation and the master meters in use, and in the distribution system caused by lack of connections between mains which should be connected for mutual support, and some small hydrants and branches. The greatest proper quantities for registration by the three meters in the supply mains are sufficient but in service one of the large meters registers only 17 per cent of the consumption, and the aggregate available capacity of the three is slightly less than the average demands of the maximum day's consumption and required fire flow.

Mains.—What would otherwise be a strong distribution system, having adequate and well arranged main arteries and secondary feeders, is seriously weakened by the lack of connections in many places between these large mains and the minor distributors, which are mainly 6-inch, and between the main arteries and the secondary feeders. A considerable portion of the distribution system is installed in filled-in marsh land, where pipes are subject to settlement and repairs are difficult and apt to be delayed. The interior condition of mains is probably fairly good.

Gate Valves.—Spacing is generally too wide. There are no reliable records of the location of gate valves nor of the direction of operation. Some are in poor condition and there is urgent need of a complete inspection and immediate repair of valves, and an indexed system of records showing their location, operation and condition.

Hydrants.—Spacing of hydrants is generally

FIRE DEPARTMENT.

satisfactory. The small hydrants are of an unsatisfactory type and from some of the others a sufficient supply for an engine cannot be obtained. Hydrants are inspected and maintained in fair to good condition.

Improvements.—Mains installed since the previous report are of satisfactory sizes with good distribution of gates and hydrants. A large number of small hydrants have been replaced by those of satisfactory type but the small branch has not in all cases been removed and remains as the connection for the larger hydrant.

FIRE DEPARTMENT.

ORGANIZATION.—Basis.—Full paid since 1891; on 2-platoon basis March, 1919.

Supervision.—Under the supervision of a director of public safety, elected for a 4-year term. Bernard N. McFeely, the present director, is serving his second term, which expires in 1923.

Districts.—For fire department purposes, the city is divided into two approximately equal districts by Fifth street.

Officers.—

	Age	Appointment to Position	Years in Service
Chief, John J. Gilday	61	1918	31
Assistant Chief, Andrew U. Keller	44	1918	11
Assistant Chief, Michael J. Kennedy	58	1918	24
Battalion Chief, John P. Reilly	43	1922	14

The chief is the executive head of the department, with full control at fires, and is responsible for the general conduct and efficiency of the department. The assistant chiefs act in place of the chief in the latter's absence. The battalion chief acts as relief chief officer and has charge of the school of instruction.

Membership.—Total membership, 151; fire force, 142, an increase of 52 since 1914.

MEMBERSHIP TABLE.

	1922	1913
Fire Force:		
Chief	1	1
Assistant Chief	2	1
Battalion Chief (Drill Master)	1	0
Captains	10*	10*
Lieutenants	0	0
Firemen	119†	69
Total Fire Force	142	90
Inspector	1	0
Clerk	1	1
Chaplain	2	0
Veterinary	0	1
Repair Shop	5	0
Total.	151	92

*Includes an electrician.

†Includes 1 lineman and 10 other details.

Expenses.—The expenses of the fire department, including the fire alarm system, for the past five years, have been as follows:

Year	Salaries	General Expenses	Total Maintenance	New Apparatus and Houses
1917	\$144,085	\$19,570	\$163,655	\$6,000
1918	139,311	17,561	156,872	
1919	210,273	27,163	240,436	
1920	280,804	40,580	321,433	9,000
1921	351,710	38,548	390,258	

This is a per capita expense for maintenance for 1921, of \$5.58, based on an estimated population of 70,000; it was \$1.79 in 1913.

Appointment and Promotions.—In general, applicants for appointment to the fire department must be between the ages of 21 and 35, not less than 130 pounds in weight, and not less than 5 feet, 6 inches in height; these limits have not been closely adhered to in the past. Other than to show ability to read, write and make out reports, no mental examinations are held for appointment or promotion; applicants must have recommendations from 3 to 5 citizens and be passed by the city physician. Promotions are usually based upon merit, with particular consideration given to seniority, but there are evidences of outside influence having been used to secure promotion.

Retirement and Pensions.—Members are retired after 20 years of service on reaching 65 years of age, and may be retired, upon their own application, after 20 years service if 50 years of age, or for disability, upon certification of the department surgeon; members are retired for permanent disability incurred in line of duty. Pensions are paid to dependent relatives of members killed in service from a Police and Firemen's Pension Fund, supported by 2 per cent. assessments of the salaries of members and appropriations by the city, fines, donations, etc. Salaries are continued in the case of sickness or injury incurred in duty. A Firemen's Mutual Benevolent Association, supported by assessments on members, and a State Firemen's Relief Association, supported by tax on premiums of foreign insurance companies, pay death benefits. Fourteen members are 55 years of age or over, and 4 are 62 years or over; the average age is 42 years; there are 14 persons on the pension roll.

Companies.—Organization.—Five engine, a hose and 3 ladder companies are in service in 7 stations. See Tables 4 and 5. Each company has a captain on each shift, and sufficient operators to insure one being on duty with each piece of apparatus at all times.

Maintenance.—Platoons are approximately equal in strength and work 10 and 14 hours, alternating every 3 days. Annual vacations of 16 to 30 days, according to rank, are allowed. Continuous watch is maintained at each station.

FIRE DEPARTMENT.

HOBOKEN, N. J.

TABLE 4.—FIRE COMPANIES—LOCATION AND EQUIPMENT.
ENGINE AND HOSE COMPANIES.

Company	Location	Members, Each Platoon	APPARATUS			Hose Carried, Feet	Spare Hose, Feet	Ladders Carried	Extinguishers and Tanks, Gallons
			Type	Motor h.p.	Put in Service				
Engine 1 <i>hs</i>	Headquarters: Hudson St., near 2nd St.	7	1000-Gallon Pumper Hose Wagon*	83 55	1917 1917	500-2½" 400-3" 200-1" 1000-2½"	1500-2½" 800-3"	1-12" 1-12" 2-2½" 1-60"	2-2½" 2-2½" 2-2½" 1-60"
Engine 2 <i>hs</i>	13th and Washington Sts.	7	1000-Gallon Pumper Hose Wagon	83 40	1916 1916	500-2½" 400-3" 150-1" 1000-2½"	1500-2½" 800-3"	1-12" 1-12" 1-14" 1-20"	2-2½" 2-2½" 2-2½" 1-60"
Engine 3 <i>hs</i>	2nd and Jefferson Sts.	7	750-Gallon Pumper Hose Wagon	55 55	1917 1916	750-2½" 200-1" 1000-2½"	750-2½" 1-10"	2-2½" 2-2½" 1-60"	2-2½" 2-2½" 1-60"
Hose 4 <i>hs</i>	Park Ave., near 2nd St.	6	Hose Wagon	40	1914	1000-2½"	1-10"	1-60"	1-60"
Engine 5 <i>hs</i>	Grand St., near 4th St.	7	750-Gallon Pumper Hose Wagon	73 40	1916 1916	750-2½" 200-1" 1000-2½"	700-2½" 1-12" 1-14"	2-2½" 1-12" 1-14"	2-2½" 2-2½" 1-60"
Engine 6 <i>hs</i>	Clinton and 8th Sts.	7	750-Gallon Pumper Hose Wagon†	73 40	1916 1916	750-2½" 200-1" 1000-2½"	1250-2½"	None	2-2½" 2-2½" 1-60"

*Equipped with Turret Pipe.
†With Booster Pumps.

hs—Company located in or near High Value District.

LADDER COMPANIES.

Company	Location	Members, Each Platoon	LADDER TRUCK			Ladders Carried	Extinguishers and Tanks, Gallons
			Type	Motor h.p.	Put in Service	Number	Total Length, Feet
1 <i>hs</i>	With Engine 2	7	Combination Ladder Co. 75' Quick-Raising Aerial	40	1917	14	390
2 <i>hs</i>	Ferry and Madison Sts.	7	American-La France 75' Quick-Raising Aerial	73	1912	13	365
3 <i>hs</i>	With Engine 6	7	American-La France 75' Quick-Raising Aerial	73	1922	11	318

hs—Companies located in or near High Value District.

Members may leave the city only upon permission, and are required to respond to second or greater alarms of fire; no means of notification are provided.

Distribution.—A 2-piece engine company is located within the principal mercantile district and dock districts; another engine and a ladder company is in the factory and dock districts in the northern end of the city. Ladder trucks are located at either end, and in the middle, of the city. An engine company is within and 2 additional engines and a ladder company are on the edge of the frame district in the southwestern

section of the city. The entire department is within 1 mile of all thickly-built districts. Chemical service is adequate in all sections.

EQUIPMENT.—Fire Engines.—See Tables 4 and 5. Two pumpers have rotary and the other 3, piston pumps with 4 or 6 cylinders. Each is equipped with two 4½- or 6-inch hand, and one 4½- or 6-inch soft suction, the latter usually kept attached, suction gate and automatic and hand relief valves; each has divided hose body. A steamer of the double pump reciprocating type, equipped with a Christie tractor, is in reserve.

FIRE DEPARTMENT.

TABLE 5.—FIRE ENGINES.

Engine No.	Make	Type	Put in Service	Renovated	DIAMETER, INCHES		RESULTS OF ENGINE TESTS							
					Cylinder	Pump	Stroke, Inches	Reasonable Capacity per Minute	Gallons Obtained	Per Cent. of Rated Capacity	Net Water Pumped	Pump Speed, Revolutions per Minute	Engine Speed, Revolutions per Minute	Slip of Pumps, Per Cent.
1	Ahrens-Fox.....	Gasoline	1917.....	a	3½-4	6	1000	1095	110	125	329	1228	3	
2	Ahrens-Fox.....	Gasoline	1916.....	a	3½-4	6	1000	820	52	233	253	945	3	
3	Ahrens-Fox.....	Gasoline	1917.....	a	3½-4	6	750	828	98	107	298	1112	3	
5	American-La France	Gasoline	1916.....	Rotary	4½-6	7	750	791	105	107	732	1215	20	
6	American-La France	Gasoline	1916.....	Rotary	4½-6	7	750	828	110	122	732	1205	15	
Reserve	Metropolitan.....	Steam	1909.....	9	5½	8	900			Not tested.				

*Reasonable slip of pumps in good condition, less than 7 per cent.

a—5-cyl. pump. b—4-cyl. pump.

Engine Tests.—Pumpers were tested in December, 1922, by engineers of the National Board, to ascertain their condition and the ability of the operating crews. Engines 1 and 3 delivered 110 and 98 per cent. of their capacities, respectively; Engine 2 developed a bad knock due to bearings burning out from the use of improper grade of lubricating oil; and it was impossible to get satisfactory tests on Engines 5 and 6 due to their generally poor condition. Engines 2, 5 and 6 were overhauled and repaired, and were retested in January, 1923, delivering, with operation by the makers' mechanic or the inspector of motor vehicles, the results shown in Table 5.

Ladder Trucks.—See Table 4. All ladder trucks are 75-foot quick-raising aerial; two are equipped with Christie tractors and the other has an American-LaFrance 4-wheel tractor. Each is provided with ladder pipe, attached; and carries in addition to the aerial, 10 to 13 other ladders, including a 45- or 50-foot extension, a roof and 2 pomper ladders. Trucks are in good condition.

Hose Wagons.—See Table 4. In addition to the 5 pumpers carrying hose, 6 automobile or tractor-drawn hose wagons are in service; two of these are equipped with water tanks and booster pumps, and the rest with chemical tanks; 2 have divided hose bodies and 2 are provided with turret pipe. All are in good condition.

Chief's Cars.—Miscellaneous Vehicles.—Fuel.—Two 4-passenger automobiles are provided for the chief and the assistant chief on duty, each carrying a portable extinguisher and a first-aid kit. A horse-drawn fuel wagon, loaded with coal and fitted for towing, is provided for use with the reserve steamer, and there are 2 reserve Christie tractors. Each station, except Station 4, has an underground gasoline tank, of 200 to 280 gallons capacity, with pump, usually on apparatus floor.

Hose.—All 2½- and 3-inch hose is double jacketed, cotton, rubber lined, purchased under the usual service and pressure guarantees; it is tested upon purchase to 250 pounds and annually to 200 pounds, and sections showing defects are discarded. The amount of 2½-inch hose allows 2,000 to 3,500 feet per company; Engine Companies 1 and 2 each has 1,200 feet of 3-inch hose. About 2,850 feet of 2½- and 300 feet of 3-inch hose is in reserve. About 10,000 feet of 2½-inch hose has been purchased since 1920. Hose is well cared for, dried in towers or on racks, then rolled and stored until needed; hose is replaced on wagons monthly if not used at fires.

Hose Couplings.—Hose couplings are of the usual screw type, with the New York thread, which is also found on the 2½-inch hydrant outlets.

Connection	Nominal Size, Inches	Outside Diameter Male Thread, Inches	Threads, per Inch
Hoboken Hose.....	2½	3	8
Hoboken Hydrants.....	2½	3	8
New York and Neighborhood Cites, Hose	4 to 4½	5½	4
National Standard	2½	3	8
	2½	3½	7½

National Standard 2½-inch couplings will attach to Hoboken hydrants without alteration. Adapters are kept for New York and Jersey City section connections.

Minor Equipment.—Equipment carried on pumpers and hose wagons is uniform and generally complete, and includes axes, bale hooks, burst-hose jackets, an angle play-pipe, 2 to 4 chemical extinguishers, door openers, double male and female connections, smoke masks, hose

FIRE DEPARTMENT.

HOBOKEN, N. J.

hoist, hose gate, an open and 2 or 3 shut-off nozzles with 1½- to 1¾-inch tips, distributing nozzle, nozzle holder, pomper belts and ladders, and a gated wye connection. Ladder trucks carry, in addition to much of the above, augers, forks, ladder pipe with 1½- to 2-inch tips, life net, life gun, picks, battering ram, tin-roof cutter, sledge, shovels, wire cutter, and carbolic torches; 2 have oxygen helmet, cell pipe, and wrecking hook. Principal items lacking include: hose clamps, extra chemical charges, and waterproof covers.

acetylene welding and cutting tools, with a good supply of bench tools. Few spare parts are kept on hand.

Fire Stations.—All are joisted brick, 2 or 3 stories in height, and, except for Station 4, in good condition and mainly well arranged; Stations 2 and 6, housing an engine and a ladder company, each have but one door. Stations are heated by steam and lighted by electricity; all, except Station 4, which is old and unsuited for fire station use, have hose tower and concrete apparatus floor.

SUMMARY OF APPARATUS.

	1922	1913
	In Service	In Reserve
Fire Engines:		
Pumpers.....	2	0
1000 gallons.....	2	0
750 gallons.....	0	0
Steamers:		
900 gallons.....	0	1
700 to 750 gallons.....	0	1
550 to 600 gallons.....	0	3
Total Fire Engines.....	5	1
Hose Wagons:		
Automobile Combination.....	6	0
Horse-drawn Combination.....	0	4
Horse-drawn Plain.....	0	1
Total Hose Wagons.....	6	5
Ladder Trucks:		
Aerial, Automobile.....	3	0
Aerial, Horse-drawn.....	0	2
Chemical Engines, Automobile:		
Chief's Automobile.....	2	0
Chief's Wagon.....	0	1
Fuel and Exercise Wagon.....	0	1
Horses.....	0	2
Hose, 2½-inch.....	17000	2850
Hose, 3-inch.....	2400	300
Hose, 1-inch for chemical.....	1150	300
Ladders, total length.....	1455	289
Ladders, short, on hose wagons, etc.....	24	12
Portable Extinguishers.....	29	20
Deluge Sets.....	0	2
Stamess and Wye Connections.....	10	0
Turret Nozzles.....	2	0
Ladder Pipes.....	3	0
Cellar Pipes.....	0	2
Distributing Nozzles.....	9	0
Special Coupling (for engines, from other cities).....	0	2

Repairs.—Departmental repairs are made at a repair shop located in the rear of Station 3, under charge of Captain Frederick Schaff, department mechanic; he is assisted by an inspector of motor vehicles and 3 permanently detailed firemen. The shop is equipped with lathes, shaper, and drill press, driven by electricity, and forges,

OPERATION.—Discipline.—Regulations governing the department are made by the director of public safety. A printed book of rules, issued in 1909 and furnished each member, is still in force; additional rules necessitated by the 2-platoon system have been issued in the form of general orders. The chief has power to transfer and suspend members temporarily. Charges are made by or through the superior officers to the chief, who refers them to the director for trial; the latter grants a hearing and renders a decision, which is final. The accused is given the right of representation by counsel. Discipline appears good.

Drills and Training.—A regularly organized drill school, under the charge of Battalion Chief John F. Reilly as instructor, is held at a tower at Station 3, where all members undergo training for a period of 4 months yearly, receiving instruction in hose and ladder work, life saving, use of appliances, and, for officers, methods of fighting various kinds of fires. Drills by companies as units are held by the instructor upon completion of the regular school course. The 5-story hose tower is used as a drill tower; and a good supply of equipment and ladders is provided.

Response to Alarms.—The usual response to box alarms is as follows, the amount of apparatus given for second including that which has already responded:

District	Alarm	Engines	Hose-Carrying Vehicles	Ladder Trucks	Chemical Apparatus
Principal, Mercantile, (Duck and Factory).....	1	3	7	2	4
Other Districts.....	1	2 or 3	5 to 7	2	3 or 4

The chief responds on first alarms to all water-boxes, to locations of the particular hazard, and to all second alarms. The assistant chief on duty and the battalion chief, when on duty and not engaged elsewhere, respond to all alarms.

FIRE ALARM SYSTEM.

Hose Company 4 and Ladder Company 3 respond to all alarms. An engine and a ladder company usually respond to telephone or A. D. T. alarms.

Fire Methods.—Fire department records do not show, in every case, how fires were extinguished, but it is believed that chemicals are used largely; and chief officers estimate that about 85 per cent. of fires requiring apparatus are extinguished by chemicals or small water lines. Lines of large hose are laid to back up chemical streams if signs of fire are seen. Hydrant streams are used whenever possible, but engines connect to hydrants in readiness. Nozzles with 1½- or 1¼-inch tips are used at ordinary fires; heavy stream appliances have been frequently used upon serious fires. Hose lines are carried up stairs or ladders or hoisted to roofs by ropes. Ladder companies ventilate buildings upon arrival and assist with hose lines when necessary. Standpipes would be used when occasion required; the second company due at a fire is instructed to connect to standpipe or sprinkler connection on arrival. No salvage work is done by the department; watch is left after serious fires, for rekindling. Overhead wires would seriously interfere with fire department operations in many places.

Building Inspections.—A captain, permanently detailed, devotes his whole time to fire prevention inspections. Company officers make inspections of buildings in their respective districts for rubbish and to familiarize themselves with building construction; the districts are changed frequently. Reports are made and filed with the chief; and where defective conditions are found, written notices to correct them are sent to the owner or occupant. Follow-up inspections are made by the inspector, and, if conditions are not remedied, court action may be started. Details are made to performances in 4 theaters.

Reports and Records.—Records are kept at each fire station of all events and a daily report is sent to the chief covering fire duty of the company, company strength, supplies received and details affecting the company. The chief makes a monthly report to the director of fires and department conditions, and an annual report which is fairly complete and contains recommendations for betterment of the service; these reports have not been printed or published for several years. Records of fires are deficient; of apparatus and personnel, generally complete and accessible.

IMPROVEMENTS.—Since the 1914 report of the National Board the department has been placed on the 2-platoon basis, with an increase in total membership of 59 men; all steam fire engines, except one in reserve, have been replaced by motor pumps; all other apparatus

motorized; the chemical company replaced by a hose company acting as a squad company; a new ladder company established and Engine Company 3 relocated; and considerable additional equipment has been provided. A mainly satisfactory system of drills and training has been established under a competent instructor.

CONCLUSIONS.—The fire department is under generally satisfactory supervision and is commanded by experienced and competent chief officers. Methods of making appointments and promotions are unsatisfactory; age, weight and height limits are satisfactory; but only perfunctory mental examinations are held, and there are evidences of outside interference. Pension and retirement provisions are good. Companies are mainly well distributed, and are sufficient in number; a large amount of outside aid is also available. Manning is adequate, except at night. Engine capacity is sufficient and there is also a large amount of pumping capacity available from neighboring cities. Engines were in fair to poor condition; they were mainly well operated. Other apparatus was mainly in good condition. Needed reserve hose wagons and ladder trucks are not provided. While a municipally controlled fire boat would be of inestimable value for waterfront fires, cooperation of New York fire boats is good. A good supply of minor equipment is provided; heavy stream appliances are mainly satisfactory. Chemical service is good. The supply of 2½- and 3-inch hose is adequate; but the 3-inch hose could be more advantageously distributed. Hose is well cared for and properly tested. Repair facilities are mainly adequate. With one exception, fire stations are in good condition.

Discipline appears to be good; the book of rules is obsolete and should be replaced. A generally satisfactory system of schools and drills are held under a competent instructor. Response to box alarms is well arranged and prompt; response to telephone and A. D. T. alarms is inadequate. Fire methods are mainly satisfactory; commendable use is made of chemical and small water lines, but no salvage work is done. Building inspections by company members are infrequent, but fairly effective. Records are fairly complete and accessible.

FIRE ALARM SYSTEM.

ORGANIZATION.—The fire alarm system is a part of the fire department, under the supervision of the chief. It is maintained by Captain John Regan, of the fire department, who has had charge of the system since 1909; he was formerly an electrician with a local lighting company and worked on the original installation of the system; he is assisted by a lineman, a member of the department.

FIRE ALARM SYSTEM.

HOBOKEN, N. J.

HEADQUARTERS.—On the third story of fire department headquarters, a joisted brick building, seriously exposed on the rear and containing the usual hazards of a fire station with automobile equipment and electric wiring in poor condition on the third floor. A portable chemical extinguisher is provided on the second floor and a sand pail in the apparatus room. The operating room, badly littered with much unnecessary combustible material at the time of inspection, has since been cleaned; apparatus was dirty and dusty.

EQUIPMENT.—Apparatus at Headquarters. The automatic system of Gamewell make, of greater part installed in 1913, consists of a 6-circuit battery board, with the usual meters and devices for testing, charging and operating storage batteries, and a 4-circuit non-interfering repeater, with contacts for 2 closed alarm circuits on the drum and 1 open circuit on the repeater shaft.

Alarm circuits enter the building overhead and are carried in lead cable through an unused chimney to an asbestos-covered wooden protector board on wall of operating room, thence in bunched wires in conduit under the floor to battery board and repeater. Wires between switchboard and battery rack are No. 12 triple-braid rubber-covered copper wire in conduit under the floor. Circuits are protected by Argus lightning arresters and 7-ampere fuses on the protector board, ½-ampere fuses and grounded plate lightning arresters on the switchboard and by 7-ampere link fuses on the battery racks.

Apparatus at Fire Stations.—Each fire station has an ink or punch register, a large gong and an automatic lighting switch, all clock-work to extinguish lights, directly on a box circuit, with a key for sounding the gong on still alarms. A relay, operating an electro-mechanical gong and punch register, is provided in Headquarters on the A. D. T. system.

Batteries.—Current for operating the system is supplied by 206 cells of chloride accumulator type, in duplicate sets, mounted on glass rails on porcelain knobs, on wood and metal racks, in the room with the switchboard and repeater. Batteries are charged daily from a 550-volt trolley circuit, all-metallic from the power station; circuit enters from overhead to a fuse and meter board behind the battery board, passing thence through conduit to a double pole, double throw switch with 10-ampere cartridge fuses, in the adjoining room and thence through conduit back to the battery board. A motor-generator set, of small capacity, serviced by a 220-volt A. C. power circuit, provides for emergency charging; wiring of motor-generator is poorly installed. Battery circuits are protected on the battery rack by 3-ampere link fuses.

Boxes.—Description.—Total number 76, of which 26 are private, mostly accessible to the public; all are of Gamewell make and of succession type. Each box has door sniut, Morse key, tapper, and has double key breaks and lightning arrester; except for boxes mounted on metal poles and pedestals, neither outer nor lightning arresters are grounded. All boxes have key attached under guard. Three boxes are mounted on pedestals and connected to underground cable; 7 are inside buildings, 4 are mounted on buildings, and the rest on any available pole. No red lights to indicate box locations at night or red bands on supporting poles are provided; and boxes generally are dingy. An inspection of 10 boxes in December, 1922, by a National Board engineer showed them to be in a fair operating condition, but dirty; they are timed to transmit signals at about 1-second intervals.

Distribution.—In thickly-built sections most buildings are within 500 feet of some box. The more important steamship docks and factories are provided with private boxes and alarm systems. In the frame residential section and the northwestern sections of the city, about 7 locations were noted where additional boxes were needed.

Circuits.—Four all-metallic, normally-closed circuits are in use; circuits are mostly overhead; one has a short section underground in No. 14, rubber-covered copper wire, in lead sheath, in telephone ducts. Aerial construction is No. 12, copper-clad iron wire with triple braid weather-proof insulation, run on iron pole-top fixtures on any available pole; many poles with high tension circuits and transformers are used. Much twisted-pair construction is used; and box leads are mostly twisted-pair conductors, installed in conduit from top of pole to box, with a break in the continuity of the conduit a few feet above the box. A total length of about 15 miles of circuits, of which about 15 per cent. is underground, carries all boxes, alarm instruments in fire stations, and tappers in the residences of chief officers, in 2 police stations and a newspaper office.

Telephone System.—A 10-circuit telephone switchboard, owned and maintained by the fire department, is located in the chief's office, and one on the apparatus floor of headquarters; either switchboard may, by means of double-throw switches, be connected to the system. Each fire station has an instrument on an individual line connecting to these switchboards; and a line from the public exchange connects with an instrument at the watch desk and in the chief's office. An operator is on duty at all times.

OPERATION.—Routine and Maintenance.—The electrician and lineman are at headquarters

during the day when not engaged on outside work or at fires. The electrician sleeps at home, next to headquarters, and responds with engine 1; the fireman sleeps at home near the station of Ladder 1, and responds with this company at night. Circuits are tested once daily for current, voltage and grounds; test taps are sent over the system three times daily. No tests of battery electrolyte and individual voltage are made unless trouble is indicated. Boxes are tested by pulling one each day, and those that have been opened or fire recently. Circuits are inspected after severe storms. No records of test, inspections or troubles are kept and no map of circuits or box locations is provided. Note is made in house journals each day of receipt of test taps.

Alarm Transmission.—Four rounds of box alarms are automatically transmitted over the system. Telephone and A. D. T. signals are received at headquarters, and the nearest engine and ladder company are dispatched by telephone. On verbal alarms, the company notifies headquarters and responds.

During 1921 there were 471 alarms, of which 198 were box, and 273 telephone and A. D. T.; 23 were false. There were 9 second and 3 general alarms.

IMPROVEMENTS.—Since the report of the National Board in 1914, thirteen additional boxes have been installed; about 1 mile of underground cable has been installed; boxes of non-succession type and with brush-break contacts have been replaced by succession boxes with key breaks; and all boxes now have key under glass guard.

CONCLUSIONS.—The fire alarm system is under fairly good supervision, with a sufficient and experienced maintenance force. It is of improper type and incomplete, lacking a manual transmitting device; and is poorly maintained. Headquarters equipment is insecurely housed in a non-fireproof building containing severe internal hazards and with unprotected exposures; and wiring and housekeeping in the apparatus room is poor. Batteries were in mainly good condition and well mounted, but are poorly located in the same unventilated room with the other equipment. Charging current sources are in duplicate; the primary source, however, is a badly fluctuating trolley circuit, and the emergency source is of insufficient capacity and poorly installed. In addition to the inherent unreliability of aerial circuits, many are installed on top of poles carrying high-tension circuits, and much twisted-pair construction is used; the small amount of underground cable is of good type and well installed. The lack of duplicate alarm circuits to fire stations constitutes an element of

unreliability; 2 box circuits are overloaded. Apparatus at fire stations, with few exceptions, is of good type, but slightly deficient. Boxes are of good type and fairly well cared for; distribution is, in general, fairly good. Because of lack of red lights and bands on supporting poles, boxes are generally inconspicuous; they are dingy. The department telephone system is mainly satisfactory; insufficient circuits are provided to the public exchange, and no line is reserved for fire calls. Transmission of box alarms is mainly satisfactory; telephone and A. D. T. alarms are not properly confirmed over the fire alarm system. Tests, except for daily test taps, are infrequent and unsatisfactory; no records are kept and no map showing locations of boxes and circuits provided.

FIRE DEPARTMENT AUXILIARIES.

FIRE MARSHAL.—None. The chief of the fire department, with the assistance of the police department, investigates the causes of fires; if sufficient evidence of incendiarism is obtained, arrests are made and referred to the grand jury. During 1922, there were 100 fires of unknown origin, 1 malicious, and 1 suspicious. Sufficient evidence has not been available on which to make an arrest for arson in the last few years.

POLICE DEPARTMENT.—Chief, Patrick Hayes, Jr. Total membership, 150; active force, 137. The city is divided into two precincts.

Equipment.—Two automobile patrol wagons and seven motorcycles, three of which have side cars, are in regular service. Rope is carried by the fire department for use in fire lines and is so labeled on the ladder trucks. A Gamewell police signaling system, consisting of 22 boxes with 8 street flashlights, is in use. Patrolmen report hourly; reports are received on time stamp and ink registers.

Fire Service.—Fire alarms are received at precinct stations on a gong connected to a fire alarm circuit. Men on adjoining beats respond to all alarms to form fire lines; 8 patrolmen should be on hand within a reasonable time. On time off, members are required to respond to serious fires, and may not leave the city without permission. Watch is provided at premises seriously damaged by fire until owners can make other arrangements. The police investigate suspicious fires with the fire chief, and make necessary arrests.

Patrolmen are required to see permits for building construction on their beats.

PUBLIC SERVICE CORPORATIONS.—The Public Service Corporation of New Jersey distributes both gas and electricity in the city. No connection with the city fire alarm system is

maintained in corporation trouble stations; and response is made with trouble wagon to fires only on telephone request from the fire department.

CENTRAL STATION WATCH, SPRINKLER SUPERVISORY AND AUTOMATIC ALARM SERVICES.—The American District Telegraph Company maintains central station watch, sprinkler supervisory, automatic fire alarm, and burglar alarm services, with office in the basement of a fireproof office building in Jersey City about two miles from the nearest part of Hoboken; and furnishes service from this office in several other cities.

The central station board is of slate, mounted on metal frame; and has provision for 31 night watch, fire alarm and sprinkler supervisory circuits, eight of which serve Hoboken, two for sprinkler supervisory and the remainder for night watch and fire alarm; they are all-metallic McCullough circuits. Signals are received on double pen registers. Fire alarms are transmitted to Hoboken fire headquarters by manual transmitter and confirmed over the telephone. Current for operating the system is supplied by a common storage battery in duplicate sets; each set is charged every day. During the day, there are three men, including the manager, on duty in the central office; and at night five on each of two shifts, with a roundsman provided with automobile, who covers Weehawken and West New York. Watchmen report at least hourly; and are allowed 15 minutes for meals.

In Hoboken the central station watch service includes 386 boxes of approved combined watch and fire alarm type in premises of 33 subscribers, 8 of which are equipped with local fire alarm gongs and in three of which boxes are used for fire alarms only; maximum number of boxes on a circuit, 56. There are two subscribers to the sprinkler supervisory service with water-flow, closed valves, high and low water, and air pressure alarms.

Circuits between the central office and the Hoboken telephone exchange are in cable in telephone underground ducts, from which much of the local distribution is in leased wires in telephone cables. The open overhead lines are No. 14, double-braided, rubber-covered, copper or iron wire. At subscribers' premises wire is No. 14 copper, rubber-covered and double-braided; the older installations have open runs of single wire, or twisted-pairs on knobs and the risers in conduit; new installations are all in conduit.

One Aero automatic fire alarm equipment is installed on a dock, with connection to the A. D. T. central office through one of the sprinkler supervisory circuits. This system operates by the expansion of air in a hollow metal tube expanding diaphragms and tripping transmitters.

Dry batteries are provided for local operation; an annunciator on the exterior of the building indicates location of trouble or fire. Fire alarms are handled in the same manner as A. D. T. alarms.

All installations on the A. D. T. system are inspected and tested every six months, and gong and sprinkler supervisory installations every month. During 1922, the A. D. T. system transmitted ten fire alarms, of which two were due to sprinkler leakage; the remainder were for fires.

TELEPHONE SERVICE.—The New York Telephone Company serves about 5,000 subscribers with 6,000 telephones on single and 4-pair lines, through an exchange in a fireproof building used exclusively for telephone purposes, with exposed openings protected. Internal protection consists of chemical extinguishers, water and sand pails, and standpipes and hose, with waterproof covers for the operating board. About 50 per cent. of the lines are underground. The exchange is connected to fire headquarters by a single line, not reserved for fire alarms. Calls known to be for fire are properly supervised; and for such calls the operator would cut in, if the line to fire headquarters was busy. About fifty-five per cent. of the fire alarms during 1921 were received by telephone.

AUXILIARY FIRE ALARM SYSTEMS.—The New Jersey Fire Alarm Company has provided 6 establishments with Gamewell auxiliary equipments of from 3 to 9 stations each, with a total of 30, connected to auxiliary fire alarm boxes on the city circuits; in addition, 2 establishments also have provision for fire drill through connections with the auxiliary box circuits actuating gongs without tripping the master box. This company owns and maintains the local alarm system at the Shipping Board piers, consisting of control board, storage batteries, 56 boxes and 18 vibrating code ringing bells, the latter on open circuits; two boxes on a city fire alarm circuit are located in the Board's fire station for transmission to the city of alarms received over the local alarm system. All the auxiliary boxes, except one on the street, are private, and located in the subscribers' premises. Boxes and equipments are inspected at least monthly, and after all fire alarms; on inspection the box is cut out and an auxiliary box pulled. Each installation has a trouble bell which indicates open circuits or crossed wires, and a vibrating gong which indicates that an auxiliary box has been pulled. The local circuits are No. 16 and 18 duplex, single-braided, rubber-covered wire. The risers are installed in conduit; the horizontal runs are mostly in conduit except at the Shipping Board piers, where No. 14 wire is

used supported on porcelain insulators. Each installation of auxiliary stations has 10 cells of dry battery for the fire alarm and 2 cells of primary battery for the trouble bell. The city electrician resets the auxiliary boxes after they are pulled.

PRIVATE FIRE APPARATUS.—The Delaware, Lackawanna & Western Railroad terminal, consisting of passenger station and ferry house, 13 other buildings, 9 piers, and numerous minor buildings, is partly in Hoboken and partly in Jersey City. The fire protection consists of fresh and salt water pipe systems of from 6 to 16 inches in size; the salt system is divided into two separate sections; supply for the fresh water system is obtained through a 36-inch connection with a 72-inch Jersey City supply main at Secaucus, 5 miles distant, the railroad having its own mains from there, reducing to 16-inch before reaching the terminal; metered connections are provided with the Hoboken and Jersey City water mains; the salt water system is supplied by five 1,500-gallon and one 750-gallon steam-driven fire pumps distributed in three power stations. The combined systems supply 224 hydrants and hose outlets. Normally the salt water system is filled with fresh water; and 60 pounds pressure is maintained on the system by a 100,000-gallon tank which is automatically cut off on raising the pressure. The mains on the piers are provided with siamese connections at the water ends for both D. L. & W. and New York City fire boats; at four piers this supply is direct to the mains and at a fifth pier to a perforated pipe system. The 14 D. L. & W. tug boats are each supplied with a fire pump of 10 to 1,500 gallons, and 4 of 750 gallons capacity each, a turret pier and 400 feet of 2½-inch cotton rubber-lined hose. The 7 switch engines in the yard are provided with hose connections on the injectors, and 50 feet of hose and nozzle. There are 10 hose reels with 500 feet of cotton, rubber-lined hose on each, and one tire carrying 200 feet of hose; in addition, there is 13,600 feet of cotton rubber-lined hose distributed about the terminal on reels and racks at the hydrants, both inside and outside of buildings. One 40-gallon chemical engine with 50 feet of hose, 226 chemical extinguishers, 25 Pyrene and 126 non-freezing safety water tanks with 6 buckets each are in service. Two piers have dry-vine sprinkler systems; and one pier and the coaling station have perforated pipe sprinkler systems. Monitor pipes with 2 hose outlets each are on the roof of each covered pier and on platforms on the open grain pier. Three men devote their entire time to fire duty, one as Division Chief, one as Assistant Division Chief, and one as fire alarm bellman, the terminal during the day. A force of at least 26 men is on duty on piers 3 and 4 at all times

including nights, Sundays and holidays constituting a fire brigade which is always available; drills are held once a week, a box being pulled, hose lines laid and regular fire duty performed. The foreman is in charge until the arrival of the chief or assistant chief, who are summoned on all fire alarms.

The signal system consists of 25 non-interfering Gamewell boxes on 3 closed all-metallic loops connected in series through a cabinet in the passenger station. Current is supplied by storage batteries in duplicate. Circuit is for the most part underground. A combined indicator and gong, and punch register are located in the chief's office on Pier 3; and, in addition, 33 gongs are well located throughout the terminal. The tug boat dispatcher receives alarms on a gong in his office; usually several boats are immediately available at the Hoboken terminal; but if not, several are ordered to report at once in Hoboken on receipt of a fire alarm. A code whistle from the power station calls the nearby boats; and in the case of a serious fire all of the tug boats are available within a short time. This fire protection is in charge of Wm. McGrath as chief.

At 14th street, Hoboken, the company maintains a ferry house and marine repair shop. The reconstruction of the ferry slips at this location is to be completed in the near future, changing somewhat with the arrangement of buildings, which at present are all of frame construction; 2 or 3 ferryboats are always tied up undergoing repairs. The boats are tied together so that they may be quickly towed into the river. The fire protection consists of a 1,000-gallon, steam-driven fire pump supplying salt water to 12 hose outlets with 50 feet of 2½-inch cotton, rubber-lined hose on each; 2 hose reels with 500 feet of hose each; one 40-gallon chemical engine; 24 chemical extinguishers; and 4 safety non-freezing water tanks. One tug boat is on watch as a fireboat at the ferry slip at night. One man devotes his entire time to fire duty; and 6 men sleep in the ferry house. Weekly drills are held. The signal system consists of a local alarm with 6 boxes and gongs, and a city fire alarm box. Four night watchmen are on duty, 3 of whom report on watch clocks.

The Pennsylvania Railroad marine repair shops consist of shop buildings and 4 open wooden piers. From 9 to 15 boats and barges may be tied up at one time. The protection consists of one 1,500-gallon fire pump, normally taking suction from the city main, with suction from salt water in case of fire, and supplying 21 private hydrants; there are distributed 2 hose reels, each with 500 feet of 2½-inch cotton, rubber-lined hose, 4 safety water tanks with 6 buckets each, 13 5-gallon chemical extinguishers, 6 Pyrenes, and 78 fire buckets. The company

has 30 tug boats in the harbor, provided with fire pumps with an average capacity of about 1,000 gallons each; 15 have turret pipes and all carry 2½-inch cotton, rubber-lined hose. During the time that boats are tied up undergoing repairs hose and nozzles are kept on the boats so as to be readily connected to hydrants on the docks; and they also are equipped with a watchman's clock station. A fire brigade of 50 men is organized among the day employees; the night force consists of an engineer and 3 watchmen on each of two shifts, formed into a fire brigade; drills are held for both the day and night forces twice a month by an employee at the shops who devotes his entire time to fire protection work. A fire alarm system connects with the railroad company's terminal in Jersey City; and in case of an alarm from the Hoboken shops all available tug boats would be notified to respond at once; there is usually at least one tug boat at the shops.

United States Shipping Board Piers.—Formerly the Hamburg-American and North German Lloyd terminals. They consist of 4 fireproof piers and bulkhead building 2 and 3 stories high, and a portion of an old frame pier; in 1921 a fire destroyed one frame pier and the bulkhead building for two piers, with partial destruction of the second pier of this group. The fire protection consists of a 1,500-gallon fire pump discharging into a system of mostly 6-inch mains serving all of the fireproof piers, with 4-inch branch to the portion of the frame pier still standing. Suction is normally taken through a branch supplied through meter by the 12-inch city main in River street; salt water suction is provided for the pier, but would not be used except as a last resort as the yard mains are used for supplying ships with fresh water in addition to fire protection. The boiler and pump room is of fireproof construction; steam is maintained at all times. There are 8 hydrants on the reservation; 6 are on city mains and 2 on the yard system inside the check valves. Normally the yard system is under city pressure; an additional 12-inch connection extends into the reservation, but is not connected to the rest of the system; city connections are metered and equipped with check valves. There are 183 automatic hose reels with 75 feet of 2½-inch linen hose on each, distributed on each floor of piers and bulkhead buildings and 2,200 feet of linen hose in reserve. Each pier has siamese connections at river end for fire boats, and on the land end for engines to pump into the system. There are 160 water casks treated with calcium chloride and with 2 pails each, distributed on piers and in shops; 62 2½-gallon chemical extinguishers are located on the third floor of the bulkhead building, which is heated. The property is under constant supervision, with watchmen on duty at

each pier at all times; they do not report in or carry a clock.

The fire protection is in charge of Chief Fred G. Vieth, retired from the New York fire department, who has an assistant always on duty at the fire station, where there is located a Broadway automobile hose wagon equipped with a 40 gallon chemical tank, 1,100 feet of 2½-inch triple-jacketed, rubber-lined hose, play pipes and hand extinguishers; also 2 35-gallon chemical tanks mounted on a Ford chassis; 1,300 feet of 2½-inch triple-jacketed hose in reserve. There is no organized fire brigade; the Hoboken fire department is called on all alarms of fires by pulling a city box.

A fire alarm system consisting of 56 Sampson boxes looped into one circuit, with gongs on all piers, and gong, register and light in the fire station, covers all piers and the bulkhead building; a control board and storage batteries in duplicate sets are located in the fire station; equipment is owned and maintained by the New Jersey Fire Alarm Company; for test, a box is pulled each noon when there is no sailing. Two boxes and a gong on the Hoboken fire alarm system are located in the fire station; these boxes have different sections of the reservation assigned to them and on receipt of an alarm from the local alarm system the man on duty at the fire station pulls the proper city box and then proceeds to the location of the fire with the double tank chemical engine; there is another city box located near the opposite end of the reservation.

The Scandinavian-American Line has a frame pier; it has 10 automatic reels with 100 feet of linen hose on each and 2 with 50 feet, and depending on city water pressure; also a number of water barrels. Three watchmen are on duty on each shift, reporting through 6 A. D. T. night watch and fire alarm stations.

The Holland-American Line terminal consists of a 2-story semi-fireproof dock and joisted brick bulkhead structure, divided into 4 sections. A 6-inch connection to the city water main extends the full length of each dock on each floor with a siamese connection at each end. There are 30 automatic hose reels with 75 feet of 2½-inch linen hose on each. Water barrels and pails are distributed. Watchmen report over A. D. T. night watch and fire alarm stations.

The North German Lloyd Line terminal consists of a 2-story pier divided into 3 sections; construction is unprotected steel frame with corrugated iron sides; first floor is concrete and second floor and roof, plank. There are 12 standpipes with 100 feet of 2½-inch hose each, supplied by 6-inch pipe under city water pressure; water barrels and pails are distributed. Watchmen report through A. D. T. night watch and fire alarm stations.

The Ellermen's Wilson Line terminal consists of a frame pier with steel roof trusses, and frame office building. The pier is lighted by electricity and heated by gas. The protection consists of 5 standpipes with 100 or 150 feet of 2½-inch hose, supplied by a 4-inch pipe on the pier, connected direct to the city water mains. Water barrels and pails are distributed. Watchmen, at least 3 on each shift, report over 5 A. D. T. night watch and fire alarm stations.

The Norton-Lilly Company uses the new Wilson Line pier which is part 2-story construction having corrugated iron sides, concrete slab roof on unprotected steel trusses and columns, and a concrete block floor. The protection consists of 24 standpipes with 50 feet of 2½-inch hose each, supplied by a 4-inch pipe on the pier, connected direct to the city water mains. Water barrels and pails are distributed. Watchmen report over 6 A. D. T. night watch and fire alarm stations.

The Lampert and Holt line has 2 piers each 1 story with 2-story headhouse; piers have corrugated iron side on steel frame, plank roof on unprotected steel trusses and concrete floors. Protection consists of 12 or 13 standpipes on each pier with 50 feet of 2½-inch hose on each. A fireboat connection is provided at the river end of each pier. There are at least 3 watchmen on a shift on each pier, reporting over 11 stations of the A. D. T. night watch and fire alarm stations.

Within the city limits 7 establishments have fire pumps, 53 have standpipes or hydrants and hose, 41 have automatic sprinklers, 104 have

chemical extinguishers or fire pails and 61 have watchmen. This equipment would generally be of value only for the individual plants.

Conclusions.—The protection to most of the steamship piers is deficient, as the standpipes and water mains are connected only to the city water supply, the pressure of which is too low to give effective hose streams. The extensive private systems in some of the water-front property, the good pumping capacity provided, the large amount of additional capacity available from tug boats and the New York fire boats make it advisable to extend and combine the present systems, through the cooperation of all the water-front interests, thus providing a powerful separate fire main system for these high values. The need of such a system has been emphasized a number of times in recent years through the serious fires which have occurred in the various water-front properties.

OUTSIDE AID.—Powerful outside aid could be obtained in a few minutes from the following cities, couplings of which are interchangeable:

City	Distance Miles	Engines in Service
Jersey City	Adjoining	20
New York*	Opposite	200
West Hoboken	Adjoining	3
Union	1	1
Weehawken	Adjoining	2
West New York	2	3
Newark	8	27

*Also 10 fire boats.

STRUCTURAL CONDITIONS AND HAZARDS.

BUILDING DEPARTMENT.

ORGANIZATION.—Supervision.—The Inspector of Buildings, who is required to have been an architect, carpenter, mason, civil engineer or other mechanic, is appointed by the Board of Commissioners for an indefinite term and may be removed only for cause. Duties include the supervision and control of building operations and the enforcement of the building laws.

The State laws bearing on fire protection and fire escapes in factories and workshops are enforced by the State Department of Labor; those governing tenement house construction are enforced by the State Board of Tenement House Supervision.

Personnel.—Joseph H. Cummins, formerly a civil engineer and contractor, was appointed inspector of buildings January, 1909; he has one assistant, who devotes most of his time to office work.

Permits and Records.—An application must be made and a permit obtained before any building

operations may be commenced. Applications are accompanied by plans and specifications, except in the case of repairs or slight alterations. Before erecting or altering any factory or tenement, or building on a lot with a tenement, plans and an application must be submitted to the State departments concerned. Applications, plans and specifications, stubs of permits and copies of notices to correct violations are filed and well indexed in the office of the building department in the city hall; State records of tenement and factory construction are kept in the office of their respective departments.

Inspections.—All buildings for which permits have been issued are inspected as often as considered necessary for proper enforcement of the laws. State inspections of factories and tenement construction are made by inspectors of the respective State departments concerned.

BUILDING LAWS.—State Laws.—A law of 1911 provides that every factory, workshop or mill shall be provided with proper means of egress or escape, and be protected as far as prac-

ticable against the origin and spread of fire. In new buildings, the stairways and elevator shafts must be within fire-resisting walls, from foundation through the roof, with fireproof doors at all openings; proper fire stops must be placed in floors, walls and partitions. Specifications for fire escapes are good. Fire alarm gongs, water and sand pails must be provided and monthly fire drills practiced. The commissioner of labor must require additional safeguards, including fire towers.

The Tenement House Act, with an amendment and several supplements, agrees in most features with corresponding clauses of the National Board Building Code. Variations from this code, affecting the fire hazard, include: Heights of buildings are limited to 1½ times width of widest adjacent street, instead of 5½ feet. Tenements of 6 stories and over, instead of 5 stories, must be of fireproof construction. In non-fireproof tenements, the public hall and stair partitions, ceiling of cellar or lowest story, and stair soffits, may be protected with metal lath or approved plaster board with two coats of plaster, instead of requiring fireproof partitions. Only 4 inches of masonry is required between the ends of beams entering a wall from opposite sides. Where ranges are set within 10 inches of a furrow wall or studded partition, the wall must be protected with a metal shield one foot higher than the range, instead of 3 feet; heating stoves must be two feet from a partition, instead of 3 feet.

Municipal Ordinances.—The municipal building code, in effect November 30, 1910, has had few amendments. Buildings are divided according to construction into seven classes. Buildings over 3 stories erected or altered to be used as a theatre, lodging house, school, jail, public station, hospital or asylum, and hotels and apartments exceeding four stories, and all other buildings over five stories in height, and garages must be of fireproof construction. Buildings used above the ground floor as factories, warehouses or for mercantile purposes are limited to 100 feet in height, and no building may exceed 2½ times the width of widest adjacent street; frame warehouses must not exceed 2 stories or 35 feet. The requirements for concrete construction and fireproofing of steel members are good. Mill construction is incompletely defined, and not otherwise mentioned. Floor area restrictions are brief and incomplete.

All external openings above the first story, when exposure is within 35 feet, except in tenements, dwellings, hotels, and churches, must be protected by fireproof swinging shutters or wired glass windows and metal frames. Requirements for floor opening protection are below standard. Openings in interior walls must be provided with automatic fireproof doors where

deemed necessary by the inspector; party wall openings are also required to be properly protected.

Frame construction within the fire limits is restricted to temporary 1-story buildings in connection with building operations, sheds not over 15 feet high, additions to existing buildings when used as toilet rooms exclusively, grain elevators, coal elevators and pockets, ice houses and exhibition buildings. Combustible roof coverings are prohibited throughout the city; existing shingle roofs may be repaired but not renewed.

The required thickness of walls is only fairly satisfactory; 12-inch walls throughout are permitted in 3-story buildings of the warehouse class, and in the dwelling house class may be 12 inches thick throughout for 5 stories. Specifications for chimneys and heating apparatus are generally good. Suitable fire stops are required around chimneys and for wooden studded partitions, and furred walls. Parapets in most cases must be not less than 8 inches in thickness and 2 feet high; parapet requirements for warehouses, factories and commercial buildings are good. Good requirements are specified for quality and strength of materials, and for fire escapes. Requirements for theatres and their private fire protection and means of egress are mainly good. Four-inch standpipes and hose are required in existing buildings and those to be erected, excepting dwellings over 65 feet less than 100 feet in height; 6-inch standpipes are required for buildings exceeding 100 feet.

Fire Limits.—As shown on the accompanying map, the fire limits are extensive, including about half of the city and the brick mercantile, brick tenement house, and the wharf and warehouse districts.

Enforcement.—The building inspector is capable, but from inspections made it appears that no attempt has been made to enforce the retroactive features of the building code, fire escapes excepted.

LOCAL CONDITIONS.—The principal mercantile district includes 14 blocks and contains 8 buildings of fireproof or semi-fireproof, 331 of joisted brick construction and 84 frame structures, exclusive of the 34 frame sheds, additions and porches.

The fireproof and semi-fireproof buildings cover 54 per cent. of the area built upon. The highest is a 7-story office building of 5,000 square feet area, and the largest is a 2-story garage covering 9,500 square feet. Floor openings are partly protected in 5 of these buildings; and exposed windows are protected in 3 buildings and partly so in one other. Exposed bottom flanges and unprotected cast-iron columns form weakening features in several. Four have inside standpipes and hose.

The joisted brick construction covers 83.3 per cent. of the built-on area; half of the buildings are 4 stories or more in height, 56 being 5 or 6 stories high. Areas are mainly small; only 26 per cent. of the area covered by this class of construction is in fire areas in excess of 5,000 square feet, and 8 per cent. is in fire areas in excess of 10,000 square feet. The largest single area is the 3-story city hall of 13,700 square feet.

The frame construction, covering 11.3 per cent. of the occupied area, consists principally of old dwellings, low grade mercantiles and additions. Areas are small or moderate, except where grouped; in 2 instances large areas are subject to one fire. Seven structures are 4 or 5 stories high.

Including all classes of construction floor opening and window protection is negligible. Only one instance of standard protection on openings in party or division walls was noted; 8 are partly protected, and 15 unprotected communications between buildings form fire areas in excess of 5,000 square feet. There is a considerable number of party or fire walls, but about two-thirds of these are 8 inches deficient in thickness; 12-inch walls throughout for 4 and 5 stories are common. Many buildings are old and several cracked walls were noted, mainly of buildings on the made land on the river side that have settled. Parapets are generally low or lacking; and in many instances several adjoining buildings have a common roof and a continuous wooden cornice. Fire escapes were noted on about nine-tenths of the buildings where needed, mainly of stair and balcony type. Automatic sprinklers are installed in 3 buildings, and six have inside standpipes and hose.

CONCLUSIONS.—The building laws are comprehensive and conform in many particulars with modern methods of construction, but in regard to several matters of importance from a fire prevention standpoint they are not of sufficiently high standard; retroactive features of the code are not enforced. The fire limits are extensive and adequately protect the business district. The building department is fairly well organized. Structural conditions have not changed perceptibly in recent years, and are still weak from a fire prevention standpoint.

EXPLOSIVES AND INFLAMMABLES.

ORGANIZATION.—Supervision.—By State law, the municipal supervision and control of explosives and inflammables are vested in the Department of Public Safety. The State Department of Labor is responsible for the enforcement of the State laws covering the manufacture, storage and handling of explosives. The State Board of Utility Commissioners is empowered to

formulate regulations governing the intrastate transportation of explosives. A municipal ordinance of March 29, 1921, makes provision for the establishment of a Bureau of Fire Prevention in the fire department to enforce the laws relating to explosives and inflammables.

Personnel.—Lewis T. Bryant is State Commissioner of Labor; John J. Gilday is Chief of the Fire Department and in charge of the Bureau of Fire Prevention.

Permits and Inspections.—Permits are issued by the bureau of fire prevention to manufacture, store and handle explosives and inflammable materials. A captain of the fire department devotes full time to inspections; and 3 or 4 times a year 10 men are engaged in making a general clean-up of hazardous conditions. A record of each inspection made is filed in fire department headquarters.

LAWS AND REGULATIONS.—State Laws.

—The State tenement house act provides that no part of a tenement, or of a lot on which it is situated, may be used for the storage or handling of feed, hay, excelsior, feathers, rags or similar combustibles.

State laws adequately cover storage and shipment of explosives.

A law of March, 1912 provides that moving picture booths must be of fireproof material; specifications for construction are good. Plans and specifications must be approved by a proper municipal official; and no booth may be used until inspected and approved. This act, with several supplements, properly controls the hazard incident to the display of moving pictures, except in schools; an amendment of 1922 permits the use of flammable film in school rooms without a booth.

Municipal Ordinances.—An ordinance of May 17, 1921 controlling the hazards due to the manufacture, storage, sale, handling and transportation of explosives, pyrotechnics, pyroxylin plastics, motion picture film, matches, calcium carbide, paints, varnishes and lacquers and hazardous chemicals are generally satisfactory. The requirements also properly cover the operation of dry cleaning establishments, automobile garages, repair shops and oil burning equipments, storage of fuel oil, disposal of ashes and combustible rubbish. The requirements relating to gasoline, benzene, naphtha and kerosene are good, excepting that quantities up to 5 gallons of either may be kept in an ordinary can.

LOCAL CONDITIONS.—No dynamite, gunpowder, ammunition or fireworks were found in the business district. The hardware stores inspected all carried moderate quantities of paints in sealed packages, turpentine, alcohol, gasoline, kerosene, linseed and lubricating oils; hazards

are fairly well guarded, except in one establishment which has 50 gallons of kerosene in 2 ordinary cans.

There are many garages, repair shops and filling stations in the city. The garages recently constructed are of good type, but several of the older ones seriously violate the ordinances; and conditions were generally unsatisfactory. Two instances were noted where the dividing wall between the garage and the adjoining frame tenements had been constructed of masonry for only a portion of the distance, thus making the adjoining frame building a part of the garage and endangering the lives of the people living in the tenements. In one instance a frame dwelling section was located over a garage without proper ceiling cut-off. Gasoline and kerosene in small ordinary cans seem to be in general use by retailers such as grocers.

Conditions found in the one dry cleaning establishment in the city are very poor. The cleaning room is not properly cut off from the remainder of the plant, and is only about 10 feet from an electric motor and about 30 feet from the boiler. Owing to the non-standard fire doors of the wash room, absence of fire protection, lack of an exhaust fan, and to the fact that the communications remain open, a flash from either of these sources is possible, and a resulting fire might involve adjoining buildings.

A good sized motion picture theatre is located in a 3-story frame building, with the upper floors occupied as tenements.

Considerable combustible rubbish was noted in rear of buildings, especially in the frame tenement section, and conditions of cellars are poor in many instances. There are no wholesale oil storages in the city.

CONCLUSIONS.—The State and municipal laws on the subjects of explosives and inflammables are in general good, and practically all the special hazards are included. The recent enactment of the ordinance controlling special hazards and providing for a fire prevention bureau is a step in the right direction; but the bureau has not been fully organized, and the laws have not been operative for a sufficient length of time to demonstrate their full value. The condition of several garages and the dry cleaning establishment are very unsatisfactory, and the presence of 50 gallons of kerosene in ordinary cans in a hardware store is a direct ordinance violation. Frequent accumulations of combustible rubbish were noted, and local conditions as a whole are poor.

ELECTRICITY.

ORGANIZATION AND CONTROL.—No municipal department supervises electrical wiring. Inspections of new installations are made

by the Public Service Corporation before current is supplied. Inspections are also made on owner's or contractor's special request by the Fire Insurance Society of Newark. Old work receives practically no attention.

LAWS AND REGULATIONS.—There are no city ordinances regulating the installation or inspection of electric wires. The inspectors of the underwriters and the lighting company use the National Electrical Code as the standard.

INSIDE WORK.—In December, 1922 a number of representative installations were inspected to ascertain the general condition of inside wiring. The new work is in generally fair condition; most of the old work installed for five years or longer is in poor to very poor condition. Many of the defects were due to: Misuse of flexible cord; circuit overloaded; fuses too large and not in cabinets; switches not properly installed, not accessible and not enclosed; wires close to signaling wires, close to each other, and in contact; and service wires not terminating in cabinet. The average number of defects per centimeter of the new and old work was 4.4 and 9.5, respectively.

OUTSIDE WORK.—All wiring is overhead, except the main lines of the telephone company and those of the lighting company in Washington, First and Fourteenth streets. Overhead wires in most of the closely-built districts would offer serious obstructions to fire department operations. High and low tension wires are in some cases on the same pole.

The Public Service Corporation of New Jersey operates the street railway and supplies current for commercial lighting and power. Alternating current at 13,000 volts is transmitted to the street substation through an overhead line from the generating stations at Marion and Essex, N. J. At the substation it is transformed to 2,200 volts for commercial light and power and converted to 500-550 volts direct current for street railways and power; there are two all-metallic 550-volt, direct current, power circuits. Secondary circuits for lighting and power are 110-220 and 440 volts. Street lighting is from incandescent lamps connected in series with maximum line voltages of about 3,000, alternating current.

ELECTROLYSIS.—Little is known of the condition of the water piping as affected by electrolysis. The telephone cable sheaths are bonded to street car rails; and the company makes regular tests.

CONCLUSIONS.—The city exercises no supervision over electrical wiring; the lighting company makes inspections only of the new work

before supplying current, and the underwriters make inspections upon special request. The new work is in fair condition, but the old work is in poor to very poor condition, receiving practically no attention; it shows the urgent need of re-inspection and regular supervision. Overhead wiring obstructions are serious, and would interfere with fire department operations. No serious trouble from electrolysis has been reported.

CONFLAGRATION HAZARD.

PRINCIPAL MERCANTILE DISTRICT.—

The district is located in the southeastern part of the city and bounded by Bloomfield, Fourth, Hudson, Third, River, Hudson Place, Hudson, and Ferry streets. It contains 14 blocks and covers 35 acres, of which 41 per cent. is in streets; of the block area 77 per cent. is built upon. Streets are practically level and well paved; Washington street is 100 and Hudson street 80 feet wide; the intersecting streets are 50 feet in width, excepting New York street which is 75 feet. Blocks are small to moderate in area, and several are divided by alleys, but in 9 blocks accessibility for the fire department is poor. Sixty-one of the buildings are more than 4 stories high; but the units of area are generally small, only five being of excessive size. Walls are generally light and poorly parapeted; and there are several instances where adjoining buildings have a common roof and continuous cornice. The highest values are in the mercantile establishments along Washington street; many of the buildings have tenements above the first floor. Exposure to the district is severe on the north, mild on the east and moderate on the south and west.

The fireproof and fire-resisting construction are relatively small in amount and are not material factors in the conflagration hazard. Most of the construction throughout the district is light joisted brick and conducive to the spread of fire, as floor, window and party wall openings are practically all unprotected. As the mitigating features are few the potential hazard is high.

Private fire protection is small in amount, only 3 buildings in the district being equipped with automatic sprinklers. The fire department is efficient, fairly strong and well equipped; and powerful outside aid is available. The water supply is reliable, but the quantities available to fight serious fires are only fair. The high potential hazard combines with high winds, overhead wire obstructions and deficiencies of the water supply to make serious fires probable. The blocks in which the conflagration hazard is especially marked are as follows:

Block bounded by First, River, Newark and Hoboken (Sanborn, page 15, block 228). A small block with practically no vacant space. Buildings are of small or moderate area, but a 1-story

frame building adjoins and communicates through frame rear additions with six buildings, forming a combined fire area of about 15,000 square feet. The buildings are mostly 4 stories in height, of joisted construction and without protection to vertical openings. There is no window protection, walls are light and parapets low. Owing to weak construction, lack of private protection and serious rear exposures from the frame construction, the block is subject to one fire, which would threaten the block to the northeast.

Block bounded by Second, Hudson, First and Washington (Sanborn, page 16, block 212). A compactly built block subdivided by a 20-foot alley. Buildings are 2 to 6 stories high and of small to moderate area, the southern part of the block being mostly frame with low grade occupancies. Two buildings have partly protected windows and the alley gives good accessibility, but there are many frame rear, light wells, cornices, and roof structures, severe mutual exposures and weak internal construction, making serious fires probable.

In the block mentioned in the 1914 report, bounded by Third, River, Second and Hudson streets conditions have been materially improved by replacing a 2-story frame livery stable by a 2-story, fireproof garage of 9,500 square feet and extending nearly through the block, forming a good fire stop near the middle of block; there is no longer a marked conflagration hazard in this block.

OUTSIDE THE PRINCIPAL MERCANTILE DISTRICT.—Minor Mercantile Districts.

—Along Washington street from Fourth to Fourteenth, around Fourteenth and Washington streets and on First between Hudson and Marshall streets are important minor mercantile sections. With only a few exceptions the buildings consist of tenements above the first floor. Areas are generally small and construction is similar to that of the principal district, except along First street where there is a considerable number of frame buildings. These sections are all subject to serious fires and sweeping fires are probable along First street because of the large frame tenement district adjoining on the north.

Wharf District.—This extends along the river front the entire length of the city; except from Hudson to Park streets, in the northern part of the city, the steamship and railroad companies own the frontage mostly to the nearest street, providing a clear space of 100 feet or more to the nearest city block. Except two large frame pier sheds, the construction on all the piers in the southern half of the water front is superior; a few have adequate private fire protection, as given on pages 16, 17 and 18; one ferry house and train shed and the bulkheads for four piers are fireproof. At the foot of Sixth street between the

piers and the Shore railroad is a large frame freight shed and five 6-story brick general storage warehouses, the latter having all exposing windows protected. Between Tenth and Twelfth streets are several large 1-story frame warehouses, and at the foot of Fourteenth street is a frame ferry house containing several hazardous occupancies, including marine repair and paint shops.

The warehouses, bulkheads and pier sheds, at times, contain very high values in transit. The potential hazard in the district is fairly high and the danger of serious group fires is imminent, but on account of the improved construction in the southern section, and the low heights of other buildings, ready accessibility to both water and land fire apparatus, the excellent private protection in some of the properties, the absence of serious mutual exposures and the fact that the prevailing direction of the winds tend to carry a fire toward the river, the probability of a general conflagration in this district is small. The most serious conditions exist in the northern part of the district where the frame dry-docks and yacht piers are located; they are usually crowded during the winter, have practically no private protection, are not readily accessible to the fire department, and are subject to one fire.

Manufacturing District.—Most of the manufacturing plants are located in the northern part of the city west of Willow avenue and north of Seventh street; there are several factory groups elsewhere, but they are mostly sprinklered or of fireproof construction. The blocks bounded by Fourteenth, Willow, Tenth and Grand streets are almost solidly built with factories, a large portion of which are frame; owing to narrow streets and a deficient water supply, parts of any two blocks in this district would probably be involved in any fire gaining headway; and under

adverse wind conditions there is sufficient congestion to cause a sweeping fire. Serious individual fires may occur in the several unsprinklered factories of large area containing highly combustible contents. All of the large factories in the residential districts are sprinklered.

Other Districts.—The remainder of the city is mainly 3- to 4-story tenement and dwelling in character. The frame construction is largely grouped in the western part of the city and is generally of light mercantile and tenement occupancy, principally with a foreign population. The high potential hazard due to the large amount of combustible material in conjunction with the frequent high winds, inadequate water supply and the absence of fire stops, results in a high conflagration hazard.

CONCLUSIONS.—In the brick and frame mercantile districts, except for the few fireproof buildings, construction is decidedly weak, particularly as to light walls and exposed windows; blocks are small to moderate in size, but compactly built; high winds are frequent; private fire appliances are generally lacking. As the fire-fighting facilities are somewhat inadequate, fires beyond the control of the fire department are probable in many sections, especially in the frame mercantile and tenement district west of and adjoining the brick mercantile district, where all elements are present and conditions favorable for a sweeping conflagration; the powerful outside aid available tends to slightly reduce the hazard.

Most of the large manufacturing plants are sprinklered and the others are subject to individual or group fires. In the wharf district the conflagration hazard is moderate, group fires only being probable.

RECOMMENDATIONS.

Recommendations marked with a star (★) are deemed of most importance and their early adoption is urged.

WATER SUPPLY.

Organization.

★1. That a competent superintendent be appointed, and a survey be made of the distribution system, all gate valves and hydrants and connections between large and small mains carefully located, and that records of these details be filed.

2. That response be made to all alarms of fire in congested districts and to second alarms elsewhere, equipped to operate gate valves and otherwise cooperate with the fire department.

Supply Works.

★3. That the New Milford pumping station be rendered more nearly fireproof by the removal of all unnecessary combustible material. Pending these changes, conditions could best be improved by installing automatic sprinkler systems throughout pump and boiler rooms.

4. That filter capacity be increased prior to the time when the demands of consumption will prevent maintaining full storage in the distributing reservoirs.

Pressures.

★5. That pressures be improved:

Immediately, by perfecting arrangements whereby in case of a serious fire the main valves, which are normally closed for the purpose of meter-measurement of the supply, shall be promptly opened.

Permanently, a. By utilizing the total elevation of Reservoir No. 2 without a reducing valve.

b. By elimination of the large losses of pressure which now obtain in the meters by the installation of meters of greater capacity.

Gate Valves.

7. That the distribution system be equipped with a sufficient number of gate valves, so located that no single break will necessitate shutting from service a length of main greater than the side of a single block, or a maximum of 500 feet, in high value districts, or a length greater than the side of two blocks, or a maximum of about 800 feet, in other districts.

8. That a complete inspection be made of all valves, any necessary repairs be made and an index compiled, showing the size and location of each valve, its condition and date of operation; after which all valves shall be inspected annually and the larger sizes more frequently, and the index record be kept up to date.

Mains.

★6. That the distribution system be strengthened by the early installation of the cross-sections given in the table below:

CONNECTIONS RECOMMENDED.

Locations	Mains
Ferry and Washington Sts.	16- and 8-inch
Newark and Bloomfield Sts.	24- and 6-inch
2nd and Bloomfield Sts.	16- and 6-inch
2nd St. and Park Ave.	16- and 6-inch
2nd St. and Willow Ave.	16- and 12-inch
2nd and Grand Sts.	16- and 6-inch
2nd and Adams Sts.	16- and 6-inch
4th and Washington Sts.	16- and 12-inch
5th and Bloomfield Sts.	16- and 6-inch
5th St. and Park Ave.	16- and 6-inch
5th St. and Willow Ave.	16- and 12-inch
5th St. and Willow Ave.	16- and 6-inch
5th and Clinton Sts.	12- and 6-inch
8th and Clinton Sts.	12- and 6-inch
9th and Madison Sts.	16- and 8-inch
10th and Washington Sts.	12- and 12-inch
11th and Bloomfield Sts.	30- and 16-inch
12th St. and Willow Ave.	16- and 12-inch
13th and Bloomfield Sts.	30- and 6-inch
13th St. and Park Ave.	30- and 12-inch
13th St. and Willow Ave.	30- and 16-inch
13th St. and Willow Ave.	30- and 12-inch

Hydrants.

★9. That a survey be made of all hydrants and necessary changes in type or connection be made so that each hydrant in service will furnish a sufficient supply for any of the engines in service.

FIRE DEPARTMENT.

Organization.

10. That the department be placed under civil service regulations.

11. That a competent inspector of motor apparatus be appointed, who shall make periodic tests of pumps and have charge of their operation at large fires.

Companies, Apparatus and Equipment.

12. That the present Hose Company 4 be changed to an engine company, equipped with pumper and separate automobile hose wagon, carrying chemical tank.

13. That each hose-carrying vehicle be fitted with divided hose body and carry at least 200 feet of 3-inch hose, with a total of at least 1,000 feet of 2½- and 3-inch hose.

14. That each engine company carry 2, and each ladder company, 4 waterproof covers.

Operation.

15. That salvage work be made a part of the regular duties of the fire department.

★16. That engines be tested periodically and after extensive repairs, those delivering less than 90 per cent. of their rated capacity be over-hauled or their operators instructed, or both.

17. That the same response be made to telephone and A. D. T. alarms for fires in buildings as to box alarms from the same locality.

FIRE ALARM SYSTEM.

Headquarters.

★18. That fire alarm headquarters be removed to a fireproof building or addition to a fire station, especially constructed to reduce, as far as possible, all liability to interruption of service. In the new location, all apparatus to be placed on incombustible mountings, and no unnecessary combustibles to be permitted in fire alarm rooms. Until this is done every effort should be made to safeguard the present quarters by providing wired glass in exposed windows, removing all unnecessary combustibles from the apparatus room and making all wiring permanent and in accordance with the National Electrical Code.

Apparatus.

19. That new apparatus be installed as follows:

AT FIRE DEPARTMENT HEADQUARTERS:

A time stamp and a non-interfering break-wheel transmitter, with wheels for each box, at the telephone switchboard.

AT EACH FIRE STATION:

A large gong and the trip magnet on a normally-closed alarm circuit, and a punch register and taper on a box circuit.

Boxes.

20. That additional modern succession boxes be installed so that a box shall be within 300 feet of every building in mercantile and manufacturing sections, and elsewhere within 800 feet of every important group of buildings; boxes in important districts to have red lights to indicate locations at night and all boxes and a band on supporting poles to be painted red annually.

Circuits.

★21. That the condition of circuits be improved:

a. By arranging circuits so that not more than 20 boxes and instruments in more than 5 fire stations shall be on any circuit, and as far as possible, only one side of a circuit will be in one cable or along one street.

RECOMMENDATIONS.

HOBOKEN, N. J.

b. By installing separate closed alarm circuits, separate from box circuits, to connect gongs and trip magnets in fire stations and instruments elsewhere.

c. By placing circuits underground where ducts are available, using rubber-covered wire of proper size, in lead sheath; wires to be installed in duct systems carrying signaling wires only.

d. By removing circuits from poles carrying other than signaling wires.

Operation.

22. That more frequent tests be made of batteries and circuits, and boxes be tested monthly and after electrical storms; records of all tests, troubles and inspections to be kept and an up-to-date map of box locations and circuits to be provided.

23. That telephone and A. D. T. alarms for fires in buildings be transmitted as box alarms, after first notifying the nearest company by telephone.

FIRE DEPARTMENT AUXILIARIES.

24. That by cooperation of the water front interests, including those in Jersey City, a separate fire main system be provided, with a pipe at least 16 inches in diameter connecting all existing piping on piers and terminals. Connections to be provided along the pier heads for tugboats and fireboats. Signaling system to be provided to each pumping plant and arrangements to be made for raising pressure at every alarm of fire along the water front.

BUILDING DEPARTMENT.

25. That the building laws be revised to conform more closely to modern requirements for construction and fire prevention as given in the National Board Building Code, particularly as to limitation of heights and areas, protection of floor openings and required wall thicknesses.

EXPLOSIVES AND INFLAMMABLES.

26. That more assistance be furnished the fire department captain, permanently assigned to fire prevention work, in the way of more frequent and systematic inspections for the removal of hazardous conditions.

ELECTRICITY.

27. That the National Electrical Code be adopted by ordinance as the standard for all electrical work.

28. That all overhead wires, except trolley wires, in the streets and block interiors of the closely-built sections, be placed underground.

RECOMMENDATIONS.

CONFLAGRATION HAZARD.

29. That owners of existing defectively constructed buildings, which are so located as to form conflagration areas, be required to suitably protect floor, party wall and exposed window openings.

30. That automatic sprinkler equipments, with outside siamese hose connections and controlling valve near main in street, be required in all buildings which, by reason of their size, construction or occupancy, singly or combined, might act as conflagration breeders.

HOBOKEN, N. J.

GENERAL SUMMARY

CITY IN GENERAL.

Population about 70,000. Important shipping and transportation center. Streets generally paved and in good condition. High winds frequent; winter temperatures and snowfall, moderate; hot, dry weather infrequent. Number of fires moderate; loss per fire very high and loss per capita high, with incomplete record of losses.

FIRE-FIGHTING FACILITIES.

Water Supply.—Supply purchased at city line from private company and distributed by the city in one service. City organization without superintendent or dependable records. Supply from adequate source pumped to filters and repumped to two services with equalizing reservoirs; pumping capacity adequate; no reserve filters; equipment well maintained; stations not fireproof. Distributing reservoirs of good size at fair elevations. Consumption moderately high. Most services metered. Pressures fair to low, not well sustained. Arterial system well arranged and of adequate capacity; lack of connections between large and small mains greatly weakens the distribution system. Valve spacing wide; condition poor. Hydrant distribution good; some small; condition fair to good.

Fire Department.—Full paid; on 2-platoon basis; under generally satisfactory supervision and competent officers. Methods of appointment and promotion unsatisfactory; pension and retirement provisions good. Companies well distributed and sufficient in number; manning good except at night. Two-piece engine companies. Apparatus motorized, of good type and, except for pumps, mainly in good condition. Minor equipment and heavy stream appliances good; fire boat needed. Hose supply adequate and well cared for; some 3-inch hose. One fire station unsuitable; others good. Repair facilities adequate. Discipline appears good. Satisfactory school and drills held. Response to box alarms, good; to telephone alarms, inadequate. Fire methods mainly good; no salvage work done. Building inspections by company members infrequent, but fairly effective. Records fairly complete.

Fire Alarm System.—Automatic system; under fairly good supervision, with sufficient maintenance force. Headquarters apparatus incomplete, poorly maintained and insecurely housed. Circuits mostly aerial, poorly installed on high tension poles; much twisted-pair construction; small amount of good underground construction. Boxes of good type and in fair condition, but inconspicuous and dingy; distribution fair to good. No separate alarm circuits. Two circuits overloaded. Tests infrequent and inadequate. No records or maps.

Fire Department Auxiliaries.—Fire and police departments investigate causes of suspicious fires; no recent arrests or convictions for arson. Police cooperation with the fire and building departments, fair. Public service corporations render aid only on request. Telephone service good; much used for transmission of alarms. Most waterfront property provided with private protection; much of this dependent on city water pressure, which is low. Powerful outside aid quickly available.

Summary.—Water supply works ample; pumping stations not fireproof; good elevated storage; poor distribution; quantities available fair. Fire department well equipped, fairly strong and efficient. Fire alarm system contains many serious defects liable to render service unreliable.

STRUCTURAL CONDITIONS AND HAZARDS.

Building Department.—State laws governing factories and tenement houses good; municipal building code mainly good, but deficient in some important respects. Fire limits extensive and adequately protect the business district. Shingle roofs prohibited. Enforcement of State laws good; municipal laws enforced except retroactive features. Structural conditions poor.

Explosives and Inflammables.—State and municipal laws good and provide for control of practically all special hazards. Fire prevention bureau not completely organized. Local conditions poor as a whole.

Electricity.—No municipal supervision. Lighting company inspects new work before supplying current; some inspections by underwriters. New work in fair condition; old work in poor to very poor condition. Overhead wiring obstructions serious. Little known of electrolytic action.

National Board of Fire Underwriters
COMMITTEE ON FIRE PREVENTION
AND ENGINEERING STANDARDS
HOBOKEN, N.J.
MARCH 1923

