

38
**TAMPA,
FLA.**

JUNE, 1923

Report No. 38

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

REPORT
ON THE
CITY OF TAMPA, FLA.
(SUPERSIDING THAT OF 1913)

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The investigations of conditions in Tampa, Fla., was made during March, 1923 by Engineers Arthur F. Ballou, J. H. Arnold and C. G. Lauber.

Acknowledgment is made of valuable assistance rendered by the Hon. Charles H. Brown, Mayor; the Tampa Water Works Company; the Florida Rating and Inspection Bureau; the officials of the various departments concerned, and others.

Office Engineers

ROBERT C. DENNETT

CLINTON T. BISSELL

JUNE 15, 1923.

TAMPA, FLA.

REPORT NO. 38

(Superseding that of 1913)

CITY IN GENERAL

The commissioners of the commission government are: Hon. Charles H. Brown, Mayor; S. L. Lowry, W. A. Adams, W. J. Barritt and James McCants. W. Leslie Brown is City Manager.

Population estimated to be 55,000; the 1920 United States census showed 51,608. There is also a large transient population during the winter. The city is an important gulf port and distributing center and is the terminus of two railway systems. The principal industry is the manufacture of cigars.

The city has an area of 11.98 square miles, of which 4.74 square miles is submerged. Of the land surface about 60 per cent. is built upon. The surface is practically level. Elevations range from 0 to 50. Principal streets are 80 feet wide; in Ybor City, 50 to 60 feet, and in outlying districts 30 to 80 feet. The fire department is notified when streets are to be closed. The Hillsborough river, intersecting the city, is crossed by 3 highway bridges. Grade crossings at rail-

roads are numerous and at these the fire department is liable to serious delays. There are 181 miles of streets, of which 114 miles are paved and in good condition; the remainder are generally deep in sand. Wood, bituminous coal and crude oil are used as fuel; gas is also used for domestic purposes.

Records of the local United States Weather Bureau station show that winds of 25 miles per hour and over occur about 21 times a year, Winter temperatures are mild, seldom reaching freezing.

The gross fire loss for the past 5 years, as compiled from fire department records, was \$1,425,584, the annual losses varying from \$200,836 in 1918 to \$363,986 in 1919. The average annual number of fires was 284, with an average loss per fire of \$1,005, a high figure. The average annual number of fires per 1,000 population, based on an average population of 51,600, was 5.5. and the average loss per capita was \$5.53, both high figures.

FIRE-FIGHTING FACILITIES.

WATER SUPPLY.

OWNERSHIP.—Works owned and operated by the Tampa Water Works Company supply practically all built-up portions of the city and deliver the supply to West Tampa at the eastern boundary of that city. The works were first started in 1889 and enlarged at various dates since.

The city has voted bond issues for the purchase of the works and an increased supply and will probably take possession by August, 1923. A consulting engineer has been employed to recommend a new source of supply and his report will be available at an early date.

ORGANIZATION.—Edward R. Wood, Jr. is president of the company; Chester R. McFarland, secretary and general manager, has been in direct charge of maintenance and operation since 1902; A. W. Squires has been acting superintendent for the past two years. There are 20 permanent employees; long tenure of office has prevailed.

Records.—Duplicate maps of the distribution system show sizes of mains and general locations of gates and hydrants; details are shown upon atlas sheets and detail locations of gate valves

are in two books, one for field use. The operation of gates is recorded in card index. There are plans of the supply works and records are kept of operation of pumping stations.

Quarters.—The office and meter shop are at 610 Florida avenue. Pipe yard is at Henderson avenue and Jefferson street.

Fire Service and Emergency Response.—Fire alarms sound upon gong at the main pumping station. The raising of pressure at this station for all alarms of fire has been discontinued. Upon request the standpipe can be shut off by controls at the pumping station and pressures raised to 80 pounds; a raise above that point would automatically shut off the pumps in operation at the well stations. One employee responds to all box alarms. Telephones are maintained at office and main pumping station. An automobile repair truck is at the main pumping station and several employees live nearby who are available for emergency response.

GENERAL OUTLINE OF SYSTEM.—Supply, obtained from flowing wells and a spring, is pumped directly from a main station into the distribution system which is in one service with an elevated tank as an equalizer. The supply is augmented continuously from wells remote

WATER SUPPLY.

from the main station, each equipped with an electrically-driven pump discharging directly into the distribution system at various points and operated automatically by the variations of pressure. The surface of the city is mainly level, with elevations ranging from 0 to 50. Elevations in this report are in feet above mean sea level.

SUPPLY WORKS.—**Flowing Wells.**—Near Highland and Henderson avenues are 28 driven wells, 10 inches in diameter, cased to the solid rock, and with an average depth of 200 feet, and one spring. Nine wells are not used. The others are equipped for air-lift and discharge through 6 cast-iron pipe lines to a circular brick receiving well, capacity 33,000 gallons, from which a concrete conduit, 70 feet long, extends to a concrete suction well, 14 feet deep, capacity 54,000 gallons, adjacent to the main station. The longest line is 2,000 feet and carries the flow of 9 wells. The spring discharges into a covered brick basin near a reserve station and is connected by pipe line to the receiving well. The supply available from the spring is about 1,000,000 per day. The flowing supply from the wells averages 4,500,000 gallons with a maximum of 5,000,000 and, if required, can be practically doubled by air-lift, but forcing the wells is apt to make them saline. Emergency suction supply is maintained in a reinforced concrete covered reservoir of 3,500,000 gallons capacity and 20 feet deep, opposite the main station and connected to the concrete suction well by a 20-inch pipe. This storage is drawn down about 2 feet during the day and refilled during the night from the force mains.

Deep Wells.—Wells from 200 to 400 feet deep furnish a supplemental supply. These are mainly 12 inches in diameter; one is 16 inches. Locations are shown on the accompanying plan. One is in an artificial ice plant in the central eastern portion of the city; three are in the northeastern portion in Ybor City, only two of which are operated simultaneously, and three are beyond the northern city limits. Two of the last will not be ready to operate for 2 and 4 months, respectively. Each well has an electrically-driven pump with discharge equipped with a Venturi meter. For capacities, see Table 1. The aggregate capacity of the 5 wells in service is 5,400,000 gallons per day, of which 1,400,000 gallons is in reserve; the capacities of the two wells to be equipped are 500,000 and 1,000,000 gallons.

PUMPING STATIONS.—**General.**—The main and reserve stations are steam driven and operated by 3 shifts of at least 2 men each under the direction of a chief engineer who resides nearby. Oil used for fuel is delivered by rail and pumped through 1,600 feet of pipe to two storage tanks

of 8,000 and 12,000 gallons capacities, 100 feet from the main station and 20 feet from the reserve station. It is pumped to the boilers, the pumps at the main station being in a small brick building 10 feet from boiler room with discharge lines in duplicate. Oil is purchased by contract and a large supply is always on hand at Port Tampa, 10 miles distant. Wood can be used in emergency.

Main Station.—*General.*—Built in 1903 and enlarged in 1910, at Highland and Henderson avenues, on the eastern bank of the Hillsborough river about $\frac{3}{4}$ mile north of the principal mercantile district; elevation of floor about 8. The 3,000,000-gallon pump and one 5,000,000 have independent suctions from the receiving well, the other from the suction well, average lift about 8 feet. Each has independent discharge, with gate and check valve into a 20-inch main in Highland avenue which is equipped with one division gate. Operation is in 3 shifts of at least 2 men. The station is mainly secure against floods but in October, 1921, an extraordinary wind-tide entered the station and temporarily prevented its operation.

Equipment.—See Table 1. The two 5,000,000-gallon pumps are alternated in service, the idle unit being kept under steam and with an air compressor is started upon receipt of box alarms of fire. The 3,000,000-gallon unit is operated sufficiently to assure its operative condition. There are two compressors with capacities of 350 and 1,700 cubic feet of free air per minute. The pairs of boilers are alternated in service for periods of 3 weeks. Steam piping is in duplicate to each boiler, pump and compressor. Equipment is well maintained.

Construction.—Station is a high, 1-story, brick building, consisting of pump and boiler rooms separated by a brick wall with unprotected communications; total area 5,120 square feet. Roof is peaked, slate covered wooden sheathing on wooden trusses; open ceilings. Floors cement and tile on concrete. End of boiler room is of corrugated iron on wooden studs.

Hazards.—No exposures. Lighting by electricity from private dynamo; wiring in fair condition. Fuel oil pumped to boilers; other oils in small frame building 100 feet distant. Outside concrete stack; breeching well installed.

Protection.—One hundred feet of $1\frac{1}{2}$ -inch hose for cleaning purposes; nearest fire station $1\frac{1}{3}$ mile distant; 3 hydrants available, one on station grounds.

Reserve Station.—Built in 1890 about 250 feet east of the main station. Contains 3 horizontal, non-condensing, duplex, double-acting pumps, 2 of 1,000,000 gallons per day capacity each and one compound of 2,000,000 gallons and one 125 h.p. Scofield fire tube boiler. Equipment has not been recently operated and is in poor condition. Each pump has independent suction from

WATER SUPPLY.

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TABLE 1.—PUMPING STATIONS—EQUIPMENT.
PUMPS.

Station	Number and Make	Class	Date of Manufacture	DIAM. IN INCHES		Stroke, Inches	Rev. per Minute	Water Pressure, Pounds	Rated Capacity Gallons per Day
				Steam Cylinder	Water Plunger				
Main	1 Barr	{Horizontal, triple-expansion, condensing, duplex, double-acting}	1903	10, 16, 25	15	18	40	63	3,000,000
	2 Wood.....	Ditto.....	{1904 1909}	12, 19, 31	{19 $\frac{5}{8}$ 19 $\frac{1}{2}$ }	24	30	63	5,000,000
Well No. 2	1 American.....	{Vertical deep-well pump, driven by General Electric motor, 75 h. p. 3-ph., 60 cyc., 220 v. ....}	.....	.....	.....	.....	1,120	74	1,400,000
Well No. 3	1 Allis-Chalmers	{Horizontal centrifugal, driven by Allis-Chalmers 75 h. p. motor, 3-ph., 60-cyc., 220 v. ....}	.....	.....	.....	.....	1,710	70	1,400,000
Well No. 4	1 American.....	{Vertical deep-well pump, driven by Lincoln electric motor, 75 h. p., 3-ph., 60-cyc., 220 v. ....}	.....	.....	.....	.....	1,200	70	1,400,000
Well No. 5	1 Layne & Bowler	{Vertical deep-well pump, driven by General Electric 75 h. p. motor, 3-ph., 60-cyc., 220 v.}	1922	.....	.....	.....	1,200	54	900,000
Ice House..	1 Allis-Chalmers	{Horizontal centrifugal driven by Allis-Chalmers 20 h. p. 2-ph., 60-cyc., 220 v. ....}	.....	.....	.....	.....	1,740	72	300,000

BOILERS

Station	Number and Make	Type	Date of Manufacture	Grate Surface Sq. Ft.	Heating Surface Sq. Ft.	Rated Horse Power Each	STEAM PRESSURE		Fuel	Insurance
							Max. Allowed	Average		
Main...	1 Scofield	Fire Tube....	1910	33	1,280	150	130	120	Oil	Hartford
	3 Erie City....	Ditto.....	{1915 1920 1921}	33	1,440	150	130	120	Oil	Hartford

the spring basin, lift about 14 feet, and independent discharge into a 12-inch main with one division gate.

Deep Well Stations.—See Table 1. These stations were built at various dates from 1917 to 1923. Operation is automatically controlled by the pressure in the distribution system. Current for power is purchased from the Tampa Electric Company through aerial commercial circuits to transformers on poles outside each station. Each station is visited daily and equipment is well maintained. Two of the stations are substantial brick buildings, the others are galvanized iron on wooden frame. All have tar and gravel roofs on wooden sheathing and rafters. None is exposed.

EQUALIZING TANK.—Built in 1889 at Henderson avenue and Jefferson street; of riveted wrought iron 30 feet in diameter and 21 feet deep; capacity 125,000 gallons; supported on steel tower; elevation of top about 168. Inlet and outlet are through two 10-inch pipes each equipped with a hydraulically-operated valve

with controls at the main pumping station about 2,000 feet to the west. One of these valves has a by-pass with a check-valve set against flow into the tank.

CONSUMPTION.—See Table 2. Statistics are based upon plunger displacement with allowance for slip at the main pumping station and Venturi meters at the deep well stations and at the boundary line of West Tampa. Some large consumers of water in the city have their own wells.

TABLE 2.—CONSUMPTION.

Year Ending Dec. 31	AVERAGE DAILY CONSUMPTION, GALLONS			Estimated Population Supplied	Gallons Per Capita
	Total	West Tampa	Tampa		
1918	5,202,000	678,000	4,524,000	48,843	93
1919	5,376,000	667,000	4,709,000	50,226	94
1920	6,061,000	702,000	5,359,000	51,608	104
1921	7,118,000	734,000	6,454,000	52,991	122
1922	7,559,000	714,000	6,845,000	54,373	126

WATER SUPPLY.

Maximum.—The maximum consumption occurs during the dry season from November to June. The largest consumption for 24 hours was 9,952,000 gallons on April 19, 1922, which included West Tampa and was 32 per cent. greater than the average for the year.

Meters and Service Connections.—On January 1, 1923, there were 10,504 active services, mainly $\frac{3}{4}$ inch; 3,161, including all large consumers, are metered. There are 20 connections for fire protection, none of which is larger than 4-inch. Three employees of the company are continuously engaged in making house to house inspections for the detection of leakage and waste.

PRESSES.—Recording gages are maintained at the main pumping station, elevation 13; at Hyde Park avenue north of De Leon street, elevation 26; at the water company office and at Franklin and Madison streets; the last two are in the principal mercantile district at elevation 26. Charts show that pressures of 68 pounds are steadily maintained at the main station with pressures in the principal mercantile district ranging from 54 by day to 58 by night and west of the river from 55 to 62 pounds. The pressures observed at the 14 residual hydrants during the flow tests ranged from 49 to 60 pounds with an average of 56 and are representative of the whole city.

DISTRIBUTION SYSTEM.—See accompanying plan. From the main pumping station a loop of 10-, 12- and 20-inch mains extends easterly embracing the equalizing tank. From this loop two 16-inch, one 12- and one 10-inch extend southerly, supplying enroute two 12-inch mains which cross the Hillsborough river and two 12-inch and one 10-inch which extend southerly near and through the principal mercantile district, where they are cross-connected by one 10- and two 12-inch pipes, one 12-inch supplying a 16-inch which crosses the river. The northern part of the city is supplied by two 12-inch and two 10-inch mains which extend northerly from the loop first mentioned and supply a 10-inch and two 12-inch pipes which extend easterly through Ybor City, are cross-connected and are also supplied from the deep well stations. West of the river the principal main is a 12-inch reducing to 10-inch which extends nearly to the southwestern city limits. Cross-connections of 10- and 12-inch pipes between these mains make them mutually supporting and complete loops about mainly small areas. Minor distributers are mostly 6-inch with a good proportion of 8-inch and a small amount of 4-inch. In the principal mercantile district, of 13,480 feet of pipe 33.2 per cent. is 6-inch, 19.3 per cent. 8-inch, 20.2 per cent. 10-inch and 27.3 per cent. 12-inch. The average length of 6-inch pipe on

the long side of the city block between cross-connections is 775 feet. About 3.6 miles of 6-inch mains, or 4.7 per cent. of the total mileage, are in dead ends supplying hydrants.

PIPES.—Length and Age.—See Table 3, which is as scaled from the map of the distribution system. Four-inch mains do not supply hydrants directly. Pipes are tar-coated cast iron. The first were laid in 1889; sixty-six per cent. of the mileage has been installed during the past 15, and 30 per cent. during the past 10 years.

TABLE 3.—PIPES IN DISTRIBUTION SYSTEM,
JANUARY 1, 1923.

Diameter, Inches	Length, Miles	Per Cent. of Total	Increase since January 1, 1913 Miles
4	2.84	3.6	*0.51
6	34.28	44.2	10.24
8	17.76	22.9	5.29
10	9.02	11.6	2.54
12	11.94	15.4	4.16
16	0.95	1.2	0.73
20	0.80	1.1	0.57
Totals....	77.59	100.0	23.02

*Decrease.

Condition and Cover.—The interior of the mains becomes somewhat tuberculated from use. No serious trouble is experienced from sediment. Mains are flushed semi-annually and upon request. Discharges during the flow tests were generally turbid. Mains are covered $2\frac{1}{2}$ feet. Frost penetration is slight. One of the 12-inch mains crossing the river is laid upon the bed of the stream, the other 12-inch and the 16-inch are in trenches with rock fill above the 16-inch.

Specifications.—Pipe is purchased under specifications of the American Water Works Association, Class B. It is inspected upon receipt and at the trench before laying.

Electrolysis.—See Electricity, page 15.

GATE VALVES.—Number and Type.—On January 1, 1923, there were approximately 600 valves in the distribution system. All open clockwise. Two 20-inch are geared; others are direct acting.

Location and Spacing.—Valves are located on the property lines at street intersections and are operated through cast-iron extension boxes. The average length of main which would be shut off in consequence of a single break in the principal mercantile district is 1,170 feet with a maximum of 2,100 feet. In a representative residential district embracing 230 acres the average was found to be 1,420 feet with a maximum of 2,440 feet. The average spacing on mains 10 inches and larger is 1,150 feet.

Inspections and Condition.—Valves are inspected semi-annually when each is opened and closed and any repairs found necessary are made. Record is kept in card index of valve operation and the number of turns required to open and close the valve. An inspection of 13 valves from 6 to 12 inches in diameter was made by a National Board engineer in March, 1923. All were readily accessible; one valve could not be completely closed on account of a bent spindle; the others were in good operative condition.

Closing of Valves.—The fire department is notified by telephone when valves affecting hydrant supply are to be operated.

HYDRANTS.—Number and Type.—On January 1, 1923 there were 853 hydrants in service, all R. D. Wood post type, opening counter-clockwise. The majority have 6-inch connection with the main, 4½-inch foot-valve and two 2½-inch outlets; 140 have an additional 4½-inch outlet; and 141 have 4-inch connection with the main. About 15, which are supplied directly from the larger mains, have gated branch.

How Located.—Locations are authorized by ordinance and determined by the water company and fire chief. The typical arrangement is one hydrant at each street intersection.

Drainage.—All have automatic drip valve and the sandy soil provides quick drainage. There is little danger of freezing.

Inspection and Condition.—Hydrants are inspected annually by the water company when each is flushed and caps are greased. Report is made by the fire department to the company of any hydrants found in need of repairs. The 70 hydrants operated during the field work of the National Board inspection were in good condition.

Distribution.—In the principal mercantile district there is one hydrant at each street intersection and four intersections have two hydrants and the average area served by each is 58,000 square feet. In a representative residential district embracing 230 acres the average area served by each hydrant is 144,000 square feet.

Of the 13 hydrants within and 26 upon the boundaries of the principal mercantile district, each has two 2½-inch outlets and 36 have a third outlet 4½ inches in diameter. Two have 4-inch connection with the main.

Use by Street Department and Others.—The general use of hydrants is not permitted. When their use is required for street work, the contractor must obtain a permit signed by the water company and the fire chief.

FIRE FLOW TESTS.—See Table 4. Tests were made on March 17, 1923, between 8:30 a. m. and 2:15 p. m. under normal conditions of operation with tank equalizing. The consumption

for the day was 8,318,280 gallons, including West Tampa.

IMPROVEMENTS.—Since the 1913 report improvements made include at the main pumping station 3 boilers replaced by new, new breeching and outside concrete stack and an emergency suction reservoir of 3,500,000 gallons capacity which is maintained nearly full. Pumping capacity has been increased 5,400,000 gallons per day at 5 deep well stations and two additional wells are to be immediately equipped with pumps of 1,000,000 and 500,000 gallons, respectively. The distribution system has been widely extended and 23 miles of mains laid, 8 miles of which are 10 inches and larger; 250 hydrants and about 200 gate valves have been installed.

CONCLUSIONS.—Organization.—Company organization is good and records are satisfactory. Plans for the municipal organization have not been developed.

Supply Works.—Under normal operation a 5,000,000- and a 3,000,000-gallon pump with suction storage at the main station and one well station with a 1,400,000-gallon pump are in reserve. The supply from the wells can be forced to meet the additional demands of fire-flow at a time of maximum consumption but this procedure would jeopardize the future use of the wells as a satisfactory domestic supply. All four boilers are required for full operation of the main station. Two additional well stations are to be equipped at once and the city intends to acquire a new and major source of supply in the immediate future. Pumping equipment is well maintained. The header into which the pumps at the main station discharge is poorly gated and a single break might prevent the operation of two pumps, leaving only one 5,000,000-gallon unit available for service. Oil and steam supply piping is in duplicate. Fire hazard at the pumping stations is slight but additional protection should be provided at the main station. Current for operation of the deep well stations is dependent upon single aerial lines; service record is good.

Consumption.—The per capita consumption is fairly high and has increased considerably during the past three years. Only a small proportion of the services are metered.

Pressures.—Pressures are sufficiently high for supply to automatic sprinklers and for fair streams directly from hydrants; under heavy draft the use of pumper is necessary for effective fire streams.

Protection.—Fire flow tests indicate that in the principal mercantile and warehouse districts the quantities available for supply to pumper range from 53 to 66 per cent. of those required for reasonable protection. In minor mercantile

FIRE DEPARTMENT.

TABLE 4—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 Warehouse	1. Franklin and Cass Sts.....	490	700	790	1070	3,050	58	35	7,000 *4,800
	2. Franklin and Washington Sts.....	750	750	810	820	3,130	57	29	7,000 *4,400
	3. Franklin St. and Carew Ave.....	500	530	560	730	2,320	60	19	3,500 *2,700
Minor Mercantile	4. 7th Ave. and 14th St.....	610	650	700	810	2,770	60	45	4,000 4,700
	5. Franklin and Scott Sts.....	520	630	980	1310	3,440	64	53	3,500 7,300
Residential	6. Twigg St. and Nebraska Ave.....	520	650	670	750	2,590	59	26	3,000 2,800
	7. Scott and Governor Sts.....	580	580	670	930	2,760	59	30	2,500 3,200
	8. 19th St. and 13th Ave.....	680	690	720	750	2,840	52	27	2,500 3,300
	9. Taliaferro St. and Ross Ave.....	490	630	730	750	2,600	51	35	2,000 3,700
	10. Highland and Amelia Aves.....	550	570	670	830	2,620	52	27	2,000 3,000
	11. W. Lafayette St. and Crescent Pl.....	440	490	590	730	2,250	56	24	2,500 2,400
	12. Magnolia Ave. and Bay St.....	310	480	490	540	1,820	55	6	2,000 1,500
	13. Morrison and S. Rome Aves.....	500	610	.....	.....	1,110	49	15	2,000 1,000
	14. Grand Central and Oregon Aves.....	410	540	.....	.....	950	49	18	2,000 900

*Location of Groups shown on accompanying plan by corresponding numbers.
*With 80 pounds pressure at main station.

and residential districts the quantities available are generally sufficient except west of the river where there are extensive areas in which only about one-half the requisite quantities can be obtained.

Mains.—The main arteries are generally well arranged for mutual support and are supplying the demands of consumption without excessive friction losses. They are mainly small in diameter and the aggregate capacities are not sufficient for the delivery of the full fire flow required in addition to the consumption. Six-inch pipe is the minimum size used for supply to hydrants and a considerable proportion of the minor distributors is 8-inch. Gridiron is generally complete but the average length of 6-inch pipe between cross-connections is somewhat high. Tuberculation occurs to some extent in the mains. Many services are destroyed each year by electrolysis but no mains have been affected.

Gate Valves.—Valve spacing is generally wide and the average length of main which would be affected by a single break is considerably in excess of reasonable requirements. Valves are regularly inspected and are in good condition.

Hydrants.—Hydrant spacing is satisfactory for the use of pumper in the principal mercantile district; in residential districts the area served per hydrant is slightly in excess of the desirable. In important districts hydrants are usually equipped with an engine outlet; in residential districts two $2\frac{1}{2}$ -inch outlets are the prevailing type and a considerable proportion have 4-inch connection with the main. Gates in the connections are not provided except in a few cases where the supply is directly from the largest mains.

Improvements.—Improvements made since the previous report have added materially to the strength of the distribution system and the reliability of supply has been increased by the operation of the deep well stations and by the emergency suction storage which is maintained at the main station.

FIRE DEPARTMENT.

ORGANIZATION.—**Basis.**—Full paid since 1895; on two-platoon system in 1919.

Supervision.—Under the supervision of the City Manager and the Board of Commissioners.

Officers.—The chief is the executive head of the department and has direct control over men and apparatus, with disciplinary power, subject to the approval of the city manager. The chief is appointed by the city manager for an indefinite term and can be removed only for cause. In the absence of the chief, the first assistant assumes command. Chief J. B. Holton joined the department in 1899, and was appointed to his present position in 1921. First Assistant Chief Ben Torres joined the department in 1900, and Second Assistant Chief J. D. Ross in 1903; both were appointed to their present positions in 1921. Chief officers have all risen from the ranks and appear well qualified for their positions. The chief is on continuous duty; the assistants work on opposite platoons.

Membership.—Total active force 58, an increase of 10 since 1913.

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

FIRE DEPARTMENT.

TAMPA, FLA.

Year Ending May 31st	Salaries	Total Maintenance	New Apparatus
1918	\$63,387	\$72,683	\$ 1,892
1919	68,180	79,261	29
1920	77,656	85,159	12,979
1921	83,666	96,893	25,682
1922	88,148	101,622	4,445

This is a per capita expense for maintenance in 1922 of \$1.88, based on an estimated population of 54,000; it was \$1.05 in 1912.

Enlistment and Promotion.—Appointments and promotions are made by the chief from certified civil service lists prepared by the Civil Service Board after competitive mental and physical examinations. Physical examinations are made by the city physician. For appointment, age limits are 21 to 35 years; height limits, 5 feet 7 inches to 6 feet 4 inches, and minimum weight limits of 135 to 180 pounds. Appointees are on probation for 6 months. Credit is given for length of service, merit, and efficiency in rating candidates for promotion.

Retirement and Pension.—A pension fund established by State law is supported by an assessment on the salaries of firemen and by city taxes. Members who have been in continuous service for a period of 20 years may be retired on half pay upon application, and any member upon reaching the age of 65 must retire, if physically unfit. The same pension is provided for any member, if disqualified physically or mentally in the performance of his duties. Salaries are continued in case of sickness or injury incurred in service, and pensions are paid to dependent families of deceased members. A Firemen's Benevolent Association, to which all members are eligible, pays sick and death benefits.

Companies. — Organization.—Four engines, three hose and a ladder company are in service in six stations. Each company has an officer on duty at all times, except during vacation. Each piece of apparatus has two regular drivers.

Maintenance.—The department is divided into two platoons; shifts work 10 and 14 hours, changing every week. No time off is allowed for meals. Members receive 10 days annual vacation; no substitutes are provided. Men of the off-platoon are required to respond to extra alarm fires, and only 5 members are allowed to leave the city at a time. The fire whistle at the pumping station provides means of notification, and the telephone address of each member is kept at headquarters and two outlying stations. Continuous watch is maintained in all except one station.

Distribution.—No company is stationed within the principal mercantile district, but headquarters, containing an engine and hose company, is

within 1,600 feet of the center of the district; two additional engine companies and the ladder company are within 1 mile of this point. Two engine companies are within 3,000 feet of the wholesale and warehouse district.

Within Ybor City mercantile district there is one hose company, and an engine company is within 1,600 feet of the center of this district. The ladders carried on hose wagons and pumper are mainly adequate for use in residential districts. Chemical equipment is well distributed, but ladder and chemical protection is in general only fair.

SUMMARY OF APPARATUS

	1923		1913	
	In Ser- vice	In Re- serve	In Ser- vice	In Re- serve
Fire Engines:				
Pumpers—				
900 gallons.....	1	0	0	0
800 gallons.....	1	0	0	0
750 gallons.....	2	0	0	0
Steamers—				
900 gallons.....	0	0	1	0
850 gallons.....	0	0	1	0
300 gallons.....	0	0	2	0
Total Fire Engines ..	4	0	4	0
Hose Wagons:				
Automobile Combination.....	3	2	4	0
Horse-drawn Combination.....	0	0	1	1
Horse-drawn, Plain.....	0	0	0	3
Horse-drawn Reels.....	0	0	0	1
Total Hose Wagons ..	3	2	5	5
Ladder Trucks:				
Aerial, Automobile.....	1	0	0	0
Aerial, Horse-drawn.....	0	0	0	1
Chemical Engines, Horse-drawn.....	0	0	0	1
Chief's Automobiles.....	2	0	1	0
Fuel and Exercise Wagon.....	0	0	0	2
Fire Alarm Automobile	1	0	0	0
Horses.....	0	0	11	3
Hose, 2½-inch.....	11550'	0	12350'	0
Hose, 1 and ¾-inch for chemical.....	1000'	400'	1050'	300'
Ladders, total length	554'	92'	178'	292'
Ladders, short, on hose wagons, etc.....	14	4	10	8
Portable Extinguishers.....	16	19	10	32
Deluge Sets	1	0	1	0
Siamese Connections.....	1	0	3	0
Turret Nozzles.....	1	2	0	0
Ladder Pipes.....	1	0	0	1

EQUIPMENT.—See Table 5. The engines in service are automobile pumbers; three have rotary pumps, and one has a multiple piston pump. Each pumper has an automatic relief valve, pressure and suction gauges and carries hard and soft suction with adapters to fit both the 4½ and 2½-inch hydrant outlets.

Engine Tests.—All the pumbers were tested at draft in March, 1923, by an engineer of the National Board to ascertain their condition and

FIRE DEPARTMENT.

TABLE 5—FIRE COMPANIES—LOCATION AND EQUIPMENT.

Company	Location	Members Each Platoon	APPARATUS			Hose Carried, Feet	2½" Spare Hose, Feet	Ladders Carried	Extinguishers and Tanks, Gallons
			Type	Motor h. p.	Put in Service				
Engine 1 <i>hv</i>	Headquarters, Zack and Jefferson Streets.....	4 or 5	800-Gallon Pumper	73	1920	1000-2½"	1350†	1-22 1-12	2-3
Engine 3	Magnolia Ave. and Platt St.....	4	750-Gallon Pumper	73	1920	1000-2½" 250-1"	700	1-30 1-12	1-35 2-3
Engine 4	9th Ave. and 18th St.....	4	750-Gallon Pumper	73	1914	1000-2½" 150-1"	550	1-30 1-16	1-35 2-3
Engine 5 <i>hv</i>	Florida Ave. and Palm St.....	4	900-Gallon Pumper	73	1916	1000-2½"	800	1-28 1-14	2-3
Hose *1 <i>hv</i>	Headquarters.....	2	Hose Wagon	27	1920	600-2½" 200-1"	.....	1-32 1-16	1-35 1-2½
Hose 2	8th Ave. and 14th St.....	4	Hose Wagon	32	1910	1000-2½" 200-1"	750	1-30 1-12	1-35 2-3
Hose 6	22nd and Linsey Sts.....	2	Hose Wagon†	32	1915	1000-2½" 200-1"	750	1-32 1-12	1-35 2-3
Ladder 1 <i>hv</i>	With Engine 5.....	2	75' Spring Balanced Aerial	73	1920	50-2½"	8 ladders total length 256'	.....	2-2½

*Designated as Chemical Company in Department.

†Includes 1000' on reserve hose wagon.

†Equipped with Turret Pipe.

hv—Company located in or near High Value District.

TABLE 6—FIRE ENGINES.

Engine No.	Make	Type	Put in Service	Type of Pump	Reasonable Capacity Gallons per Minute	RESULTS OF ENGINE TESTS			
						Gallons Obtained at Test	Per Cent. of Rated Capacity Obtained	Net Water Pressure, Pounds	Speed, Re- volutions per Minute
1	Robinson.....	Gasoline	1920	Piston	800	803 387	100 48	113 196	.....
3	Am.-La France	Gasoline	1920	Rotary	750	823 427	110 57	113 205	673 374
4	Am.-La France	Gasoline	1914	Rotary	750	733 401	98 53	112 206	641 387
5	Am.-La France	Gasoline	1916	Rotary	900	936 459	104 51	120 209	464 316

the ability of the operators. See Table 6. Engines 3, 4 and 5 were found in excellent condition and easily delivered or exceeded their rated capacities. Engine 1 on the first trial broke the clutch lock, and the test was discontinued. After repairing the clutch, a second test was made with satisfactory results. Operation in all cases was good.

Ladder Truck.—See Table 5. An American-La France, 75-foot quick-raising aerial ladder truck is in service. It carries, in addition to the aerial ladder, a 45-foot extension and 6 other ladders, including 2 with roof hooks.

Hose Wagons.—See Table 5. In addition to the 4 motor pumper carrying hose, three automobile combination hose wagons are in service. Two automobile hose wagons are in reserve; one is kept loaded with 1,000 feet of 2½-inch hose.

Chiefs' Automobiles.—Two touring cars, carrying electric hand lanterns, gas masks and first aid appliances, are provided for the use of chief officers.

Hose.—All 2½-inch hose is double, or triple-jacketed cotton, rubber lined, purchased under the usual pressure and service guarantees. Hose is tested upon delivery and twice yearly to 200 pounds; sections showing slight leaks are transferred to Hose 6, an outlying company, and sections failing are discarded. Hose is well cared for, washed and dried on racks; it is shifted on apparatus at least once each month. The amount on hand allows about 1,500 feet for each hose-carrying vehicle in service, and the supply on a reserve hose wagon. Chemical hose is ¾- or 1-inch rubber in good condition.

Couplings.—Hose couplings of this and neighboring cities are of the usual screw type and of the following dimensions:

Connection	Nominal Size, Inches	Outside Diameter, Male Thread, Inches	Threads Per Inch
Tampa Hose.....	2 $\frac{1}{2}$	3	8
Tampa Hydrants.....	2 $\frac{1}{2}$	3	8
West Tampa Hose	4 $\frac{1}{2}$	5 $\frac{3}{4}$	4
Jacksonville Hose	2 $\frac{1}{2}$	3 $\frac{1}{2}$	8
National Standard	2 $\frac{1}{2}$	3 $\frac{1}{16}$	7 $\frac{1}{2}$

Minor Equipment.—Each hose wagon and pumper is fairly uniformly equipped, carrying 2 to 4 shut-off nozzles with 1 $\frac{1}{8}$ -inch tips, axes, plaster hook, crowbar, hose straps, nozzle holder, portable extinguishers, rope, lanterns, double male and female 2 $\frac{1}{2}$ -inch connections, hydrant wrenches and spanners. Two pumpers and one hose wagon carry in addition a door opener, and one hose wagon a deluge set. The ladder truck carries axes, buckets, crowbars, a door opener, forks, shovels, lanterns, life net, life belts, roof cutters, picks, plaster hooks, rope, battering ram, and wire cutters. The aerial ladder is equipped with a ladder pipe.

Repairs.—Repair work and motor overhauling is done by the master mechanic, Charles Weber, assisted by members of the department. A repair shop, equipped with a lathe, drill press, forge, and ordinary bench tools, is maintained in the rear of Station 5. A fair supply of minor repair parts are kept in stock.

Fire Stations.—The stations are all of joisted brick construction, mainly well arranged and in good repair, with the exception of one station which is to be abandoned. All have electric lights; lighting switches are operated automatically. Sanitary conditions are good. Apparatus floors are cement; doors are sliding, manually operated. Hose-drying racks are provided at all stations.

OPERATION.—Discipline.—There is no printed up-to-date and complete code of rules and regulations. General orders are issued covering important matters. The chief is responsible for discipline and has full power to reprimand, transfer or discharge members. Few cases calling for disciplinary action are reported.

Drills and Training.—No regular drills are arranged. New men are generally assigned to Headquarters and given instruction in such fire duty and practice in the use of appliances as the captain may direct. The ladder truck is taken to the various stations at intervals and men drilled in the use of the aerial and in placing ladders. Motors are started twice daily.

Response to Alarms.—The usual response to first alarms in the business district is two, engine, one hose and the ladder company, with an

additional company on each subsequent alarm. The total response to a general alarm would include all except two hose companies, which would respond to a second fire. In residential districts one engine and a hose company respond to all first alarms and an additional company on each subsequent alarm. Special signals are frequently used for calling out apparatus. The chief and one assistant respond to all alarms. For a telephone alarm, the response is the same as to a box alarm; each company has a prescribed district in which to respond. For verbal alarms, the company notified responds after notifying headquarters by telephone. Provisions are made in the running card for subsequent alarms and for moving in to cover unprotected sections after extra alarms. Grades are few and easy and streets are mainly paved and in good condition for quick response. There are many grade railroad crossings where fire apparatus may be delayed.

Fire Methods.—Good records of the methods used in extinguishing fires are kept. During 1922, approximately 49 per cent. of the actual fires were extinguished with chemicals; 34 per cent. with hydrant streams; 15 per cent. with buckets of water; and 2 per cent. with engine streams. At least one piece of apparatus carrying a large chemical tank responds to each first alarm fire, and in most cases, two pieces. Lines of 2 $\frac{1}{2}$ -inch hose are laid to back up chemical lines. Shut-off nozzles with 1 $\frac{1}{8}$ -inch tips are used on single lines for all fires of ordinary proportions. First lines laid are generally taken direct from hydrants, the hose carriers stretching from the hydrant to the fire. For serious fires, or where lines are of excessive length, engine streams are used. Hose is carried up stairways and ladders to upper stories; roof lines are hoisted by means of ropes. Outside standpipes and sprinkler connections are seldom used. Most officers are familiar with the location of shut-off and drain valves on sprinkler equipments. Little salvage work is done. Hose is rolled up and placed on wagons before returning from fires, and as much replaced with dry hose on return to quarters as the limited supply will permit. After serious fires, a man is left to watch for re-kindling until owner or agent can be notified.

Building Inspection.—No systematic scheme of building inspection by the fire department is in force. Irregular inspections are made in the business district, mainly for noting and correcting hazardous conditions in block interiors. Building inspections are made generally only upon the receipt of a complaint.

Records and Reports.—Company officers make daily morning reports of the condition of companies and a detailed report on each fire attended. The chief makes a daily report to the city manager of the condition of the department and the

FIRE ALARM SYSTEM.

work done. He also makes a semi-annual report, which contains a summary of apparatus, summary of fire service, losses, expenses, etc. It also contains recommendations for improvements.

IMPROVEMENTS. — Since the National Board 1913 report the fire department has been placed on the two-platoon system; and all apparatus has been motorized. The apparatus in service, except one hose wagon, has been purchased. One additional fire station, with a hose company therein, has been established. It is proposed to build a new fire station in the vicinity of 12th street and Michigan avenue and move Hose 2 to the new location; the present quarters of Hose 2 have been sold.

CONCLUSIONS. — The department is a well organized, but weak force, in charge of experienced and capable officers. Appointments and promotions are under civil service protection. A good pension system is provided.

Engine and hose companies are sufficient in number and fairly well located, but hose companies should be provided with motor pumper. Manual strength of companies is weak; the provisions for the response of the off-shift to extra alarm fires only slightly offsets this deficiency. Ladder and chemical service is fair. Apparatus is mainly in good condition. Hose is well cared for and properly tested semi-annually; the supply on hand is inadequate; no 3-inch hose is provided. Minor equipment and heavy stream appliances are fairly well provided, but deficient in a few essential pieces. Repair facilities are good. Stations are well arranged and in fair to good condition.

Major matters of discipline are well handled and in general discipline is good. No drill tower is provided, and no regular drills are held. The response to alarms is mainly well arranged, and the method of covering unprotected districts is good. The fire methods employed are such as to be effective for small fires, but to efficiently handle all classes of fires, engine streams should be habitually used. Inspection work is poorly arranged and is not producing the desired results. Records are mainly complete and well kept.

FIRE ALARM SYSTEM.

ORGANIZATION. — The fire alarm system is a part of the fire department; and is maintained by Superintendent of Fire Alarm A. E. Fraser, who has had about 24 years experience in fire alarm, police alarm, telephone and telegraph work. He is well qualified for the position. Extra help is hired when needed.

HEADQUARTERS. — On the ground floor of city hall, an 8-story fireproof building erected in 1915; exposure is moderate and internal hazards are, in general, slight. Apparatus, except batteries, is jeopardized by an adjoining office and assembly room from which it is separated by a frame partition.

EQUIPMENT. — **Apparatus at Headquarters.** — Apparatus is of automatic type and Gamewell make, consisting of a 6-circuit slate switchboard purchased in 1898 and moved to its present location in 1915; a 6-circuit, non-interfering automatic repeater, installed in 1915; a motor generator set and control board, storage batteries, an electro-mechanical gong, and punch register. The fire alarm circuits enter from underground to a cabinet in the operating room where they are protected by Argus lightning arresters and 5-ampere fuses. The circuits are in rigid metal conduits between the switchboard, motor generator, repeater and batteries. A gang switch for cutting out the repeater and throwing all circuits in series, individual switches for each circuit, and the usual devices for testing, charging and operating with storage batteries in duplicate are provided on the switchboard. Conductors between apparatus and on the switchboard are No. 14 rubber-covered copper wire. Wooden mountings are used for the repeater and switchboard.

Batteries. — Current is supplied by storage batteries in duplicate sets of 180 six-ampere-hour cells of the chloride accumulator type, mounted on glass and porcelain supports on wooden racks in a separate, well-ventilated room. Batteries are clean and in fair condition. They are charged on alternate days from a 220-volt circuit from a motor-generator set, through lamp resistance. Protection consists of 30-ampere plug fuses at the line switch of the 220-volt a.c. circuit, a 10-ampere fuse on the control board, and a 5-ampere fuse on the operating board for the 220-volt d.c. charging circuit.

Apparatus at Fire Stations. — Each station is provided with a combined gong and visual indicator, automatic lighting switch, a stop clock, and a call bell on a local open dry battery circuit. All alarm instruments are on the box circuits. A belt line telephone fire circuit connects stations and the public exchange; all companies are called simultaneously. Each station has an additional telephone on a direct line to the exchange which is used for ordinary business.

Boxes. — **Description.** — Total number, 60; all are street boxes, located on or near street corners. All are of Gamewell make, spring-actuated, with trigger pull; and are non-interfering. Fifteen have brush breaks and the remainder, double point key breaks; 30 have the successive feature. Each box is provided with a door and movement

FIRE ALARM SYSTEM.

TAMPA, FLA.

shunt, test switch, Morse key, terminal plate and a test bell or tapper; lightning arresters and box cases are not grounded. Nine boxes have keyless self-acting doors; all others have keys attached under glass guard. Twenty-five boxes are directly connected to the underground circuits and are mounted on iron pedestals of good design; all other boxes are on telephone poles. Boxes and pedestals are painted red, but at the time of this inspection many were dingy; most of the supporting poles lack red bands.

An inspection and test of 20 boxes showed them to be in good operative condition and exceptionally well maintained; they are timed to send blows at approximately 1½-second intervals.

Distribution.—Boxes are mainly well distributed in the principal mercantile and wholesale and warehouse districts. In Ybor City mercantile district, distribution is fair. The residential district boxes are widely distributed, and some sections are practically without fire alarm protection. It is estimated that at least 50 additional boxes are needed.

Circuits.—Four, all-metallic and normally-closed circuits are in use, to which boxes and alarm instruments are connected. The maximum number of instruments on a circuit is 18 boxes and 6 gongs. The total length of circuits approximates 32 miles, of which about 18 miles is in underground cable. Underground conductors are No. 14, rubber-covered copper wire in lead-sheathed cables, in ducts owned by the telephone company, and in armored cables of the boulevard type laid without duct. The aerial lines are No. 10, copper-clad, steel wire with triple-braided weatherproof insulation. Wires are carried on bracket extensions on the top of telephone poles. Leads down poles are No. 14, single-braided, rubber-covered, copper wire in rigid metal conduit from above bracket. Cables are brought up into each pedestal and several terminal posts, and are provided with good terminal connections. A small amount of underground cable is reported in poor condition, and some aerial circuits are in need of replacement; but circuits are mainly in good condition and well maintained. All underground cables have spare conductors. Conductors are protected at junction of overhead and underground construction by 3-ampere fuses and carbon-block lightning arresters. Wiring in fire stations is No. 14, rubber-covered and braided copper wire, fairly well installed.

OPERATION.—Routine and Maintenance.—The superintendent's time is divided between the maintenance of the fire alarm and police signalling systems. He is in the operating room at least three times a day and makes tests for voltage, current and grounds. Test blows are

sent out twice daily. Individual cells of batteries are tested whenever a group shows up low. Boxes are tested about once each month; boxes are shunted out and operated and necessary repairs or adjustments made. Line troubles are said to be infrequent. A light automobile truck is provided for inspection and repair work. Records, except a map of circuits, are lacking.

Alarm Transmission.—Four rounds of box alarms are automatically transmitted over the system. Telephone alarms are received at all stations simultaneously over the fire call circuit; the location of these alarms is not transmitted over the fire alarm telegraph circuits, but three taps are sent out from fire headquarters to notify companies that there has been a telephone alarm.

RECENT IMPROVEMENTS.—Since the report made by the National Board in 1913, the following important improvements have been made: Headquarters apparatus has been moved to the new fireproof city hall; a new 6-circuit, non-interfering, automatic repeater installed, and about 9 miles of circuits placed in underground cable. Seven successive boxes have been added to the system, and 12 brush-break boxes rebuilt with key breaks.

CONCLUSIONS.—The fire alarm system is under good supervision and well maintained. Headquarters apparatus is properly located in a building of fire-resisting construction, but is jeopardized by considerable unnecessary wood-work. The lack of duplicate alarm circuits to fire stations and the use of visual indicators form unreliable features. Circuit construction is mainly good and the present policy of extending the underground construction each year is excellent. Boxes are accessible and in good condition, but many are of an old, inferior type with poor shunts and contacts; one-half have the successive feature. The distribution of boxes is fairly good in the business districts, but very poor elsewhere. The fire department telephone system is fairly good, but the method of handling telephone alarms would be much improved by confirming them over the fire alarm telegraph system. Tests and inspections are good, but records are incomplete.

FIRE DEPARTMENT AUXILIARIES.

FIRE MARSHAL.—Suspicious fires are investigated by the fire and police departments, and all available evidence submitted to the proper prosecuting officials. All fires of suspicious origin have been investigated and several arrests have recently been made; cases are pending.

BUILDING DEPARTMENT.

POLICE DEPARTMENT.—Chief, F. M. Williams. Total active force, 65.

Equipment.—One motor patrol is stationed at police headquarters in the city hall. Nine motorcycles and several automobiles are provided for the use of the department. A signalling system is maintained under the direction of the superintendent of fire and police alarm telegraph, consisting of 30 boxes on 3 metallic circuits. Boxes are of Gamewell make, of 4 call and telephone type. Twelve boxes are equipped with flashlights and gongs. Patrolmen report hourly, signals being received on punch registers.

Fire Service.—Alarms of fire are received at headquarters on a gong and visual indicator, and a telephone on the special fire department line. A patrolman on a motorcycle is dispatched from headquarters; more men are sent for if needed. The patrolman on the beat also responds. Co-operation with the fire department is good.

PUBLIC UTILITIES.—The Tampa Street Railway and Lighting Company sends a man on a motorcycle to all alarms to look after company property and co-operate with the fire department. Alarms are received on a tapper connected to a fire alarm circuit. Upon the receipt of a telephone alarm the location is secured from the fire department.

An employee of the Tampa Gas Company responds to all serious fires to look after the company's interest and assist the fire department.

TELEPHONE SERVICE.—The Peninsular Telephone Company serves about 11,000 telephone stations in Tampa through an automatic exchange located in a 4-story fireproof building just outside the principal mercantile district. All lines in the principal mercantile district and for some distance outside are underground, and are properly protected. The exchange is connected to all fire stations over a special fire circuit, the number of which is conspicuously printed on the front of telephone directories.

PRIVATE FIRE APPARATUS.—The Seaboard Air Line Railway, for the protection of its terminal on Green Island, has installed a 750-gallon electrically-driven fire pump, with yard hydrants in houses equipped with hose and nozzles. Thirty plants and establishments in the city are protected by automatic sprinkler equipments.

OUTSIDE AID.—Substantial outside aid is remote. West Tampa, Plant City, Lakeland and St. Petersburg could all render assistance within 2 hours. Jacksonville, 210 miles distant, would render valuable aid after considerable delay.

STRUCTURAL CONDITIONS AND HAZARDS.

BUILDING DEPARTMENT.

ORGANIZATION.—*General.*—The Building Department was organized in 1913; prior to that time the chief of the fire department had been *ex-officio* building inspector, and is still responsible for the enforcement of ordinances concerning auxiliary fire appliances in certain buildings. The Building Inspector must have technical and practical knowledge of building construction, perform all duties specified and enforce the building requirements. He is appointed by and serves during the pleasure of the city manager, with the consent of the city commission; provision is made for the appointment of assistants under civil service regulations.

Personnel.—Asher Bassford, an experienced builder and architect, was appointed building inspector September 1, 1916, and served until April 7, 1921; he was reappointed October 1, 1922. He has no assistants; motor transportation is provided.

Permits.—Application must be made and permit obtained before the construction, repair or enlargement of any building may be started. Plans in duplicate of large construction must be submitted, one set of which is stamped and returned to be used as working sheets; the other

is filed. A permit card must be posted during construction. All permits are issued in triplicate, one of which remains in the book as a record.

Inspections and Records.—It is reported that all buildings are inspected when foundations are completed and as often thereafter as time will permit. The inspector spends at least 4 hours daily in the office, and owing to lack of time and assistants it is evident many buildings are not inspected. Records of inspections are not made. A card index, triplicate of permit, a book record of all information covering the construction, and plans of large construction are filed in fireproof cases in the fireproof city hall.

BUILDING LAWS.—The present buildings laws are a revision of the 1912 building code with amendments to February, 1923, and follow closely the National Board requirements. Provisions affecting the fire hazard that have been changed or omitted are as follows: Heights of fireproof buildings with steel skeleton are limited to 200 feet; reinforced concrete skeleton, to 160* feet; with masonry bearing walls to 140 feet or 10 stories. Mill, joisted brick and frame construction are limited to 90, 55, and 35 feet, respectively, but the number of stories are exces-

sive. Parapets are required only on commercial or manufacturing buildings. Area of frame construction is not limited. Elevator enclosure walls may be 8 inches in thickness in non-fireproof buildings; in fireproof buildings they may be 3 inches and need not extend to the roof. Openings above the first floor of buildings in the fire limits need not be protected if more than 20 feet from another building. Fireproofing structural member requirements are generally good and structural steel must comply with American Steel Manufacturer's specifications. Within the fire limits, buildings 3 stories or over must have standpipes and fire escapes; and cornices, porticos, and verandas must be of non-combustible materials. The anti-shingle roof ordinance was reenacted May 10, 1921, requiring non-combustible roof coverings throughout the city but permitting 10 per cent. repairs; and, if damaged 20 per cent., must be removed.

Fire Limits.—The fire limits, as shown on the accompanying map, were extended February, 1923, but do not include a section of the Ybor City district covered by the previous limits. Frame construction except sheds and additions, is prohibited and if damaged 50 per cent. must be removed.

Enforcement.—From inspection of several buildings of recent construction, it is evident that enforcement of the laws is lax; office duties of the inspector and lack of assistance prevent his having sufficient time for inspection purposes.

Proposed Laws.—Proposed laws governing private and public garages and partitions in fireproof buildings are about to be placed before the commission for adoption.

LOCAL CONDITIONS.—The 20 blocks or part blocks comprising the principal mercantile district contain 10 building of fireproof, 127 of joisted brick and 15 of frame construction, exclusive of sheds and additions, and cover 14, 80 and 6 per cent. of the built-on area, respectively.

Fireproof buildings include an 11-story office building, a department store and 2 hotels of 8, 9 and 10 stories, respectively. One hotel and the department store are of excessive area; the others are of large area. Seven buildings are of reinforced concrete; an office building and bank are of steel frame construction. All have exposed windows protected and elevator shafts partly protected.

Of the frame buildings, 7 are 2 stories and one is 3 stories high; only 4 exceed 2,500 square feet in area. One has a combustible roof; 29 are iron-clad and one is brick-veneered.

The joisted brick buildings include 118 three stories high or less, 7 are 4 stories, and 2 are 5 stories in height. Eighty-nine are of small or moderate area, 34 are of large and 4 of excessive

area; the largest are a 2-story department store and small shops of 22,500 square feet and a 5-story Y. M. C. A. building of 11,000 square feet area.

Unprotected communications form large and excessive areas in 13 and 6 cases, respectively, the largest being a 4-story brick and 8-story fireproof sprinklered department store of 22,500 square feet, a group of 2-story mercantile and office buildings of 13,200 square feet and a group of 2-story mercantile buildings with hotel above, of 12,500 square feet. In only one case are communications protected. Window protection is generally lacking. Walls 4 inches thin are common; parapets are general, but low. Vertical openings are protected in 7 buildings. Open light wells were noted in five buildings. About 50 per cent. of the skylights are protected; most of the others are of thick glass in metal frames. Fire escapes are lacking on about 50 per cent. of the buildings requiring them. There are 2 full and one partial automatic sprinkler equipments; and one building has windows partly protected by open sprinklers. Nine buildings have inside standpipe with hose and 9 have outside standpipes in connection with fire escapes. Chemical extinguishers or water pails are distributed in moderate amount. Permanent awnings exist on buildings for 60 per cent. of the total street frontage.

CONCLUSIONS.—The building laws are comprehensive but slightly deficient in that heights and frame areas are not sufficiently restricted, fire stops are not required and exposed window protection is deficient; enforcement is lax owing to lack of time and assistance. The fire limits are fairly extensive, but slightly deficient for the Ybor City district. Non-combustible roof coverings are required throughout the city. Structural conditions although generally weak have been somewhat bettered by the improved construction.

EXPLOSIVES AND INFLAMMABLES.

ORGANIZATION.—**Supervision.**—Ordinances place the control of explosives and inflammables in the hands of the Commission and the Chief of the Fire Department.

Permits.—Permits for the storage of carbon bisulphide, calcium carbide, inflammable liquids, dry cleaning and burning of combustible materials are issued by the chief of the fire department.

Inspections.—Irregular inspections are made by the chief of the fire department, and officers make inspections on days off for rubbish conditions. Thorough inspections are made upon complaint. The only records kept are those of obstinate cases.

ELECTRICITY.

LAWS AND ORDINANCES.—Five pounds of gunpowder may be kept by individuals in a metal canister or stone jar; retailers may keep 30 pounds stored in the same manner. Dynamite, nitro-glycerine or gun-cotton may be kept in amounts up to 10 pounds; provisions relating to transportation, sale during certain hours and storage in certain places are good, but incomplete. Generally good requirements are specified for the capacity and type of storage tanks or receptacles for naphtha, carbon bisulphide, gasoline, benzole and coal tar products; quantities up to 5 gallons may be stored outside buildings after obtaining permit, and stored in cans with screw top; one gallon may be kept in building if in screw top can. Regulations governing the storage of calcium carbide are good. Plans for dry cleaning establishments must be approved, buildings be of fireproof type and located 15 feet distant from other buildings, but this is not enforced. Weeds and rubbish are not permitted within the city limits. Bonfires or burning of combustible materials are prohibited except by permit of the fire department. Motion picture booths must be of fireproof materials, and operators licensed; inspection of booths and chimneys are provided for, but are not made.

LOCAL CONDITIONS.—No dynamite or gunpowder was found in the principal mercantile district. A hardware dealer carries a moderate amount of fixed ammunition. Two wholesale druggists carry inflammable and explosive drugs in vaults which have fire doors at openings; one is sprinklered, but poor conditions at packing rooms exist; acids in carboys are stored outside. At times wholesale grocers carry matches in carload lots; conditions at these locations were found to be good. A large hardware store carries turpentine and linseed oil in standard tanks with pumps attached; at other paint and hardware stores drums of turpentine and oils on tap were noted. Printers, tailors and plumbers carry gasoline in quantities up to one gallon, usually in ordinary cans. Gasoline is stored in underground tanks at garages. Much rubbish was noted in buildings, in alleys and block interiors.

There are 3 dry cleaning establishments in or adjacent to the principal mercantile district; at one, washing is done in an open tub at the side of an excessive area joisted brick hotel; at the others it is done in washers in galvanized iron sheds; one exposes a laundry and the other a rooming house; protection is lacking and conditions are hazardous.

Two motion picture theatres are conducted in poorly constructed joisted brick buildings and have metal booths with no bracing or supports, protection is lacking at openings, films are poorly stored and electrical defects increase the hazard; offices are located above each.

There are 4 wholesale oil storage plants located within the city limits; two are located on the bank of the river about one-fifth of a mile from the principal mercantile district and are about 30 feet apart; tanks are mounted on brick piers or concrete bases at ground level and are surrounded by concrete walls. The buildings are of joisted brick or iron-clad frame construction, with exposed windows partly protected. The plants form mutual exposures with an extensive shingle roof frame dwelling section on the east. Other plants are in generally isolated sections.

CONCLUSIONS.—The laws, except for some on inflammable liquids, are incomplete. The fire department lacks the personnel for adequate inspection and enforcement. Permits are required for various hazardous substances. Local conditions are only fair; hazardous conditions exist at motion picture theatres, dry cleaning establishments; and many accumulations of rubbish were noted.

ELECTRICITY.

ORGANIZATION AND CONTROL.—The city has supervised electrical installations since 1904. An ordinance of 1922 recreates the electrical department as a subdivision of the Department of Public Works, working under the direction of the electrical inspector and electrical examining board. The electrical inspector must have technical and practical knowledge of electrical wiring; and is appointed by the city manager with the consent of the city commission. He has control and management of all electrical devices installed by the city, except police and fire alarm systems, and regulates light and power wires in and on buildings. Provision is made for the appointment of assistants from civil service lists.

Personnel.—Robert Peyinghaus, a practical electrical and mechanical engineer, was appointed electrical inspector August 15, 1922; he has no assistants. Motor transportation is provided.

Inspections.—New inside work is inspected when roughing-in is completed and again when fixtures are installed; additional inspections are made of large installations or when defects are noted. An approval must be obtained before service connection can be made. Old inside work is inspected only when additions are made or serious defects are apparent.

Permits and Records.—An application must be made and permit obtained before the installation of new work or the alteration or change in old work may be started. Original of application is used as inspector's working sheet. A book record of all installations, copies of permit and applications are filed by number.

LAWS AND REGULATIONS.—The National Electrical Code is adopted as the standard for all electrical work. Electrical work must be done under the direct supervision of a licensed electrician. Underground feed wires must have weatherproof fuse boxes and fuses at the pole terminus of the conduit. Overhead feed wires entering buildings over 15 feet from switch must be run in conduit. Conduit work is required in all buildings in the fire limits and in all brick buildings of the city and have underground feed.

INSIDE WORK.—In March, 1923, 14 new and 20 old representative equipments were inspected to ascertain the quality of the supervision maintained and the general condition of inside wiring. In the new work inspected, consisting of equipments under installation and those recently approved, an average of 4 defects per equipment was found. These were due mainly to the misinterpretation of code rulings which had become general practice, but an earnest endeavor is being made to correct these practices by the present inspector; other defects were due to faulty maintenance and misuse of flexible cord.

In the old work, a total of 229 defects were found, an average of 11.5 defects per equipment, and included 97 violations of the National Electrical Code. About 29 per cent. of the defects were due to the misuse of flexible cord; the remainder were due to faulty maintenance and use, indicating the need of regular and systematic reinspections.

OUTSIDE WORK.—The main cables of the telephone company are underground in mercantile and the more congested sections of the city; distribution is from poles in block interiors. With the exception of multiple street lighting and a short section on Washington street all lighting and power lines are overhead. In practically all streets, alleys and block interiors wires form serious obstructions to fire department operations. High- and low-tension wires are frequently on the same poles. Low-tension signalling wires are well protected. Neutrals of secondaries are grounded.

The Tampa Electric Company supplies current for commercial lighting and power. Alternating current is transmitted at 6,600 volts, from a power house outside the city limits, to a substation within the city, where it is stepped down to 2,300 volts, and also generated at this voltage. It is transformed to 110-220 volts for lighting and 220 volts for power. Street lighting, except for the multiple system, is on alternating current circuits with voltages up to 4,000.

ELECTROLYSIS.—The water company reports the destruction of about 200 service connections, but no trouble to mains has been noted.

The electric company reports the destruction of the private water system at the car barn, and the telephone company replaced a cable on Hyde Park avenue. Cable sheaths of the telephone company and the fire alarm system are bonded together and to the return feeder of the trolley system. Rails of the trolley system are bonded and cross bonded and a negative return feeder has been installed. Periodic tests are made for rail bonding by the electric company and for current by the telephone company.

CONCLUSIONS.—Good municipal control and supervision of electric wiring is provided. The National Electrical Code is adopted as the standard; and under the present inspector misinterpreted rulings are being corrected and enforcement improved. New work is in fair condition, but the poor and hazardous old equipments indicate the need of systematic reinspections. Overhead wire obstructions are serious in practically all parts of the city. Considerable electrolytic damage is reported; partial tests are made periodically.

CONFLAGRATION HAZARD.

PRINCIPAL MERCANTILE DISTRICT.—
Limits.—Beginning at Florida and Whiting streets; Whiting, Franklin, Jackson, Tampa, Cass, alley west of Franklin, Hillsborough, and Florida to place of beginning.

General.—The district extends along Franklin street for 11 blocks, and is 1 to 2 blocks wide; it contains 20 blocks or part blocks and covers 34.6 acres. It is practically level; streets are paved. Occupancies are mainly grade floor mercantiles, with offices, rooms or hotels above, interspersed with an occasional department store or office building. Values vary from low to moderately high, the higher values being along Franklin street. The district is exposed on the south and west by the warehouse and wharf district and on the other sides by minor mercantiles and frame residential sections. The blocks are small, mainly about 210 feet square; several are intersected by narrow alleys and there is some open space in block interiors, but frontages are solidly built. Streets are mostly 80 feet wide, but their effective width is much reduced by numerous wooden awnings. Of the total area, 47 per cent. is occupied by streets; of the block area, 85 per cent. is covered by buildings. There are many obstructions from overhead wires and the numerous permanent awnings would interfere with the use of ladders. A small square in front of the court house forms a fair fire break in the southern part of the district.

Fireproof construction is found in 8 of the blocks and in 4 cases forms local fire breaks.

CONFLAGRATION HAZARD.

Frame construction covers 6 per cent. of the area built upon, but is well scattered. In the joisted brick construction, little attention has been paid to fire prevention and practically every block in the district has 1 to 3 buildings or groups of large or excessive area, several with highly combustible contents. There is much defective electrical wiring. Vertical, horizontal, exposed and communicating openings are largely unprotected. Party walls are often light, especially on upper floors, and parapets are often low or lacking, especially on exposed rears. There is little private fire protection. Considerable rubbish was found in block interiors. The fire department is weak and the water supply moderately inadequate. However, blocks are small, buildings mainly low, streets of fair width and high winds infrequent. Serious individual or group fires are probable in almost every block, but the probability hazard for the district as a whole is moderate.

Blocks in which the hazard is most pronounced are as follows:

Block bounded by Twiggs, Franklin, Madison and Tampa, (Sanborn, page 11, block 58). Two- and 3-story structurally weak joisted brick buildings with iron-clad additions at the rears cover practically all of the block area; communications and exposed windows are unprotected and occupancies hazardous. The block interior is inaccessible, and a fire originating in almost any of the seriously exposed buildings could readily involve the entire block, but should be prevented from crossing the street.

Block bounded by Tyler, Franklin, Cass and Florida (Sanborn, page 16, block 7). An excessive area 2-story brick department store with iron clad and stuccoed second story occupied as offices and dwellings covers half of the block area; although other buildings have exposed windows generally protected, a fire originating here could readily involve the entire block.

In the four blocks mentioned in the previous report, bounded by Tyler, Florida, Hillsborough and Tampa streets (Sanborn, page 16, blocks 7, 8, 13 and 14), further improvement has been made since 1913 by the replacement of frame construction. While these blocks are not pronounced conflagration breeders their hazard is slightly above the average hazard of the other blocks of the district.

OTHER DISTRICTS. — Warehouse and Wharf District.—Bounded roughly by the Hillsborough river, Polk, Ashley, Zack, Tampa, Whiting, Morgan, Bell, Garrison, Franklin, and Krause streets. The district adjoins the principal mercantile district on the west and extends along the river front. Occupancies are mainly wholesales and warehouses, with some manufacturing and lumber. The buildings between

the A. C. L. Railroad and Tampa street and between the S. A. L. Railroad and Whiting street are nearly all joisted brick of generally good construction. Along the water front, practically all of the frame and iron-clad buildings have been removed. Along Tampa street are several 3- to 4-story buildings and one 7-story fireproof office building; elsewhere buildings are mainly 1 and 2 stories high; areas are generally large to excessive. Eight buildings are sprinklered and a few have standpipes and hose and shutters. Construction in this section has been somewhat improved by the sprinkler installations and the removal of frame construction, but at several locations, a fire might readily get beyond control and spread to the principal mercantile district.

Ybor City Mercantile District.—This lies along Seventh avenue from Thirteenth to Twenty-third streets, along Fourteenth street from Sixth to Tenth avenues and along Fifteenth street from Sixth to Ninth avenues. It is closely built from Thirteenth to Eighteenth streets, with some vacant spaces between Nineteenth and Twenty-first streets. Construction is about one-fourth frame; the newer and larger buildings are brick. Buildings are mainly 2 and 3 stories, of moderate size; there are good fire walls or open spaces in nearly every block, and accessibility is good. Streets are 50 to 60 feet wide, decreased to 32 to 40 by many wooden galleries or permanent awnings. The district is exposed by a sprinklered woodworking plant on the south and a sprinklered cigar factory on the north, and is completely surrounded by frame dwellings. The blocks containing principally frame buildings create considerable hazard. Any fire originating in the district should be confined to one or two blocks, but with the flying brand hazard in the neighborhood, a large section might be swept.

Minor Mercantile Districts.—Extending along Franklin street from the principal mercantile district to Henderson street and along Fortune street from Franklin to Ashley streets and on Central avenue from Cass to Emery streets are districts of 1- and 2-story buildings, occupied by small mercantiles with hotels and apartments above. Construction is chiefly frame between Henderson and Constant streets and brick elsewhere. Franklin street is 64 feet wide, with effective width reduced to 40 feet by frame galleries or awnings; Fortune street is only 40 feet, with an effective width of 22 to 28 feet. There are some good dividing walls in the brick buildings, but cross exposures are severe. A fire gaining headway could readily involve parts of two blocks, but should not develop into a conflagration.

Residential Districts.—The residential districts consist largely of closely-built frame dwellings, mainly with shingle roofs, subject to flying

CONFLAGRATION HAZARD.

TAMPA, FLA.

brand fires. Conditions are specially hazardous in the congested district, bounded by Polk, Pierce, Scott, Nebraska, Third avenue, Maryland, Scott, Nebraska and Newcomb streets. This district is closely built, nearly all frame with shingle roofs, and there are some frame rows. Streets are narrow and sandy. With high prevailing winds, a conflagration here would endanger the principal mercantile district.

CONCLUSIONS.—In the principal mercantile district, the general weak construction, the weak fire department, moderately inadequate

water supply and lack of private fire protection render serious fires probable in nearly every block. However, structural conditions have been somewhat improved by the erection of fire-proof buildings, the removal of frame construction and the installation of a few sprinkler equipments so that the probability is moderate for the district as a whole. In other districts, while group fires are probable, no fire should involve more than parts of two blocks. The residential districts consist mainly of closely-built frame dwellings with shingle roofs, highly congested in some sections and exposing the mercantile districts.

RECOMMENDATIONS.

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

WATER SUPPLY.

Supply Works.

1. That in the development of the supply, pumping and boiler equipment and emergency storage be provided in such amounts that at least a 20,000,000 gallon rate can be sustained for a period of 10 hours with the 2 largest pumps and one boiler out of service.

2. That piping at the main station be so arranged and gated that any single break in a main or repair to a valve will not affect the operation of more than one pump or boiler.

3. That protection in the main pumping station be provided by the installation of chemical extinguishers and inside standpipe and hose in pump and boiler rooms.

Mains.

4. That the distribution system be strengthened by the installation of the mains listed in the table below and that the following be adopted as the standard minimum sizes of mains used for hydrant supply for all future construction:

RECOMMENDED MAINS

Diameter, Inches	Along	From	To
*16	Franklin St.....	Scott St.....	Cass St.
*16	Grand Central Ave., Magnolia Ave. and Cleveland St.....	Hyde Park Ave.	S. Rome Ave.
*12	Whiting St.....	Ashley St.....	Jefferson St.
12	Ashley St.....	Lafayette St...	Whiting St.
*12	Magnolia Ave.....	Cleveland St...	Azeel St.
*12	South Rome Ave.....	Grand Central Ave.....	Swann Ave.
8	As shown on accompanying plan.		

a. In residential districts, 8-inch, 6-inch to be used only where it completes a good gridiron, and in no case in blocks 600 feet or more in length.

b. In mercantile and manufacturing districts, 8- and 12-inch, the former to be used only in localities where they complete a good gridiron, and the latter for long lines not cross-connected.

Gate Valves.

5. That additional gate valves be installed so 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.

Hydrants.

6. That additional hydrants be installed where necessary so that the area served shall not exceed 70,000 square feet per hydrant in high value districts and 110,000 square feet in residential districts.

All hydrants installed in the future to have 6-inch gated connection with the main and at least 6-inch barrel with one 4½-inch and two 2½-inch outlets.

FIRE DEPARTMENT.

Organization.

★7. That sufficient men be permanently assigned to companies so that eventually the least number present at all times shall be as shown in the following table:

	Least No. of Men on Duty	
	Day	Night
Engine Companies 1 and 5, Ladder Company 1 and the recommended engine company to replace Hose Company 1-----	6	8
Engine Companies 3 and 4 and the recommended engine company to replace Hose Company 2 -----	4	6
Recommended ladder company-----	5	7
Hose Company 6-----	3	5

Companies and Apparatus.

8. That service be improved as follows:

★a. Provide Hose Companies 1 and 2 with motor pumpers of at least 700 gallons capacity and maintain present hose wagons, equipped with turret pipes and chemical tanks, as hose tenders for the pumpers with Engines 1 and 5.

b. Move Ladder 1 to Headquarters and establish with Engine Company 5 a ladder company equipped with a city service truck carrying a chemical tank.

Hose.

9. That hose wagons and pumpers carry at least 200 feet of 3-inch hose, with a total of at least 1,000 feet of 2½-inch and 3-inch, with a complete extra shift in quarters; all hose to be fitted with 2½-inch couplings, properly beveled and of National Standard dimensions.

Equipment.

10. That the following equipment be furnished, where not already provided:

a. To each pumper or hose wagon: A door opener, hose clamp, siamese connection, burst-hose jacket and 2 waterproof covers.

b. To the ladder truck: A smoke helmet, 2 hose rollers, pompier ladders, portable search-light and 4 waterproof covers.

Operation.

11. That reliance upon hydrant hose lines be discontinued where effective streams are required and engine streams be habitually used.

★12. That a complete course of drills be instituted under the supervision of a competent officer, who shall be a graduate of some modern drill school, with especial attention given to new men and to companies drilling as units; drills to include the use of all appliances, quick handling of hose, salvage work and life saving.

13. That members make regular inspections of all premises and buildings, except dwellings, making a complete report of each inspection.

FIRE ALARM SYSTEM.*Headquarters.*

14. That all unnecessary combustibles be removed from the fire alarm room; and that chemical extinguishers and sand pails be provided in the apparatus and battery rooms.

Apparatus.

15. That the following additional equipment be installed:

AT FIRE HEADQUARTERS:

a. A break-wheel transmitter connected to a box circuit, with a wheel for each box and assigned location.

b. A gong on a normally-closed alarm circuit and a punch register, time stamp and tapper on a box circuit.

AT FIRE STATIONS:

A gong on a normally-closed alarm circuit, and a punch register and tapper on a box circuit.

Boxes.

16. That boxes be installed so that a box shall be within 500 feet of every building in mercantile districts, and in all other sections within 800 feet of every important group of buildings.

17. That boxes installed in the future be of modern successive type, with protected key or handle or single-acting door. Centrally located boxes of inferior type to be shifted to outlying sections or replaced.

18. That boxes in important districts have red lights to indicate locations at night, and all

boxes and a band on supporting poles be painted red annually.

Circuits.

19. That conditions be improved by placing fire alarm circuits underground as rapidly as possible.

Operation.

20. That telephone alarms be sent out manually over the telegraph system.

21. That complete records of all tests, troubles and defects be kept.

BUILDING DEPARTMENT.

22. That the building laws be amended to conform to modern requirements for construction as given in the National Board Building Code, especially as to restriction of heights and frame areas, protection to vertical, horizontal and exposed openings.

23. That sufficient assistance be provided the building inspector to properly inspect all construction and enforce the laws.

EXPLOSIVES AND INFLAMMABLES.

24. That a complete code of regulations covering the manufacture, sale, storage and transportation of explosives and inflammables be adopted by ordinance, the chief of the fire department to be held solely responsible for enforcement and the keeping of records; and that members of the fire department make regular and frequent inspections of all buildings and premises in their respective districts, filing complete records of each inspection.

ELECTRICITY.

25. That an inspection of old wiring be made, defects corrected, and that all wiring be subsequently reinspected at regular intervals.

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

27. That systematic tests be made for electrolysis and dangerous conditions eliminated.

CONFLAGRATION HAZARD.

28. 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.

29. 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.

GENERAL SUMMARY.

CITY IN GENERAL.

Population about 55,000. Important shipping and distributing center. Surface practically level. Streets of fair width; important streets paved and in good condition; others very sandy. Winter temperatures mild. High winds infrequent. Number of fires, loss per fire and per capita, high.

FIRE-FIGHTING FACILITIES.

Water Supply.—Private ownership; about to be taken over by the municipality; management good. System direct pumping at a main and 5 auxiliary stations. Supply and pumping capacity barely sufficient for present needs; new supply to be obtained in the immediate future. Fire hazard at pumping stations slight. Consumption fairly high; few services metered. Pressures fair; not well sustained under heavy draft. Arteries mutually supporting; lack of strength in some portions; minor distributers of good sizes, gridiron somewhat wide. Gate valves widely spaced, regularly inspected and in good condition. Hydrants well maintained; some small; spacing good to fair.

Fire Department.—Full paid; two-platoon basis. Companies mainly well distributed; under-manned. Apparatus motorized and generally in good condition; pumping equipment inadequate. Chemical and ladder service fair. Hose of good grade and well cared for; supply inadequate; no 3-inch hose. Minor equipment and heavy stream appliances fairly well provided. No regular drills. Fire methods fair; little salvage work done. Response to alarms well arranged. Inspection work ineffective. Records good.

Fire Alarm System.—Automatic system; under competent supervision; well maintained. Equipment fairly adequate and well housed. No duplicate alarm circuits; and alarm instruments at fire stations deficient. Boxes in good condition; many of inferior type. Box distribution fair to poor. Circuits well constructed and maintained; 57 per cent. underground. Tests good; records incomplete.

Fire Department Auxiliaries.—No State fire marshal; fire and police department investigate suspicious fires. Police co-operate well with fire department. Automatic telephone service. Public utilities assist fire department. Substantial outside aid remote.

Summary.—Direct pumping water supply attended by some unreliable features; quantities available fair in principal mercantile district; elsewhere, good to fair. Fire department weak. Fire alarm system fairly reliable, but inadequate.

STRUCTURAL CONDITIONS AND HAZARDS.

Building Department.—Laws mainly comprehensive, but slightly deficient in scope; enforcement lax. Fire limits extensive; incombustible roof coverings required throughout the city. New construction fairly good; old construction weak.

Explosives and Inflammables.—Laws inadequate; numerous hazardous materials not regulated. Control mainly with the fire department; inspections not thorough or systematic. Local conditions only fair; hazardous conditions exist at dry cleaning plants and motion picture theatres; much combustible rubbish noted.

Electricity.—Under municipal control. National Electrical Code adopted. Enforcement for new work good; old work needs complete inspection. Overhead wire obstructions serious. Some damage from electrolytic action; partial tests made.

Conflagration Hazard.—In the mercantile district serious group fires are probable because of general weak construction, some excessive areas, weak fire department and moderately inadequate water supply. However, buildings are low, winds moderate, and streets of fair width; there is only moderate probability of very extensive fires. In the warehouse and wharf district conditions have improved by the removal of frame construction, and only group fires are probable. The residential districts are mainly closely built, shingle-roofed frame dwellings presenting the usual flying-brand hazard, accentuated by congestion in several localities.

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National Board of Fire Underwriters

COMMITTEE ON FIRE PREVENTION AND ENGINEERING STANDARDS.

TAMPA, FLA.

JULY, 1923

