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SHREVEPORT,
LA.

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APRIL, 1924

Report No. 163

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

REPORT
ON THE
CITY OF SHREVEPORT, LA.
(SUPERSEDING THAT OF 1911)

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The investigation of conditions in Shreveport, La., was made in December, 1923 by Engineers Geo. D. Suter and Geo. A. Knight, in cooperation with Engineer W. K. Grant of the Louisiana Fire Prevention Bureau.

Acknowledgment is made of valuable assistance rendered by the Hon. L. E. Thomas, Mayor; the officials of the various city departments concerned, and others.

ROBERT C. DENNETT

Office Engineers

CLINTON T. BISSELL

APRIL 10, 1924.

WATER SUPPLY.

TABLE 1.—PUMPING STATION.—EQUIPMENT.
PUMPS.

Number and Make	Class	Date of Manufacture	DIAMETER, IN INCHES		Stroke, Inches	Revolutions Per Minute	Water Pressure, Pounds	Rated Capacity Each, Gallons Per Day	Slip Per Cent.	Condition
			Steam Cylinders	Water Plunger						
1 Snow-Holly..	Horizontal, cross-compound, condensing, crank and fly-wheel, duplex, double-acting	1923	18, 40	15	36	40	82	6,000,000	....	New.
2 Worthington.	Horizontal, triple-expansion, condensing, duplex, double-acting	1898 1905	{ 12, 19 30 }	16½	24	32	82	4,000,000	....	Good
1 Blake.....	Horizontal, compound, condensing, duplex, double-acting	Overhauled 1908	12, 23	14	20	28	82	2,000,000	....	Good
1 Worthington*	Vertical, triple-expansion, condensing, duplex, double-acting	1894	12, 18, 29	15	18	45	22	5,000,000	....	Good
1 Epping-Carpenter*..	Ditto	1923	9, 15, 24	21	24	48	22	6,000,000	....	New
1 Worthington* (In Reserve)	Horizontal, compound, non-condensing, duplex, double-acting	1903	14, 20	21	15	25	22	5,000,000	....	Fair

*Low-lift pump.

BOILERS.

Number and Make	Type	Date of Manufacture	Grate Surface, Square Feet	Heating Surface, Square Feet	Rated Horse Power, Each	STEAM PRESSURE		Fuel	Insurance	Condition
						Maximum Allowed	Average			
3 Heine.....	Water Tube.....	1917	.....	2050	205	175	135	Gas (Coal and Oil for emergency)	Casualty Co. of America	Good

near the city limits, is filtered and pumped from a single station to the distribution system which is in one service, with an equalizing standpipe.

SUPPLY WORKS.—Source.—A 30-inch syphon line was laid in 1912 from the Red river to the suction well at the pumping station. In 1919 Cross Bayou was dredged and opened for navigation, and four 16-inch gated lines were laid in the bed of this stream on piling, connecting with the 30-inch main at the banks. A 20-inch connection from the header which receives the 16-inch mains allows water to be taken direct from the bayou. Sixteen- and 20-inch suction lines extend from the new and the reserve low-lift pumps, respectively, to the suction well and to the bayou. Suction well, 100 feet north of the station, is 15 feet in diameter and 52 feet deep; bottom at elevation minus 14. Cross Bayou now has an estimated minimum flow of about 30,000,000 gallons daily, and the Red river about 100,000,000 gallons.

Pumping Station.—General.—Built in 1887 on the south bank of Cross Bayou, about 3,000 feet north of the center of the principal mercantile district, and enlarged at different times. Pump

room floors at about elevation 55; flood stage of river 29 feet; highest known water 35.7 feet; lowest minus 7.0. Natural gas is used for fuel; 6 supply lines from fields to distributing tanks in city; single line to station. Coal and oil can be used in an emergency with 3 days' supply of each on hand; about 15 minutes required to change from gas to coal or oil. Station is operated in 3 shifts of at least 2 men each.

Equipment.—See Table 1. The two vertical low-lift pumps are in separate circular pump pits in the new section of the station. Elevation of bottom of pits 6.65; pump cylinders at about elevation 15. Independent 20-inch suction lines from each pump to suction well through a pipe tunnel; discharge to aerator fountain in sedimentation basin. A reserve low-lift pump is in a water-tight concrete pit, 25 feet in diameter, 36 feet deep with bottom at elevation 2, near the suction well. Pump can take suction from either suction well or bayou and discharges into 20-inch line to settling basin.

The old high-lift pumps take suction through independent lines from the old clear water well; normal lift 6 feet, maximum 25 feet. The new pump takes suction from small sump. Discharge

is to 16- and 20-inch mains which are cross-connected just east of the station; the repair of the valve in the cross connection would cut off the entire supply to the city.

Two of the boilers are ordinarily used and are sufficient to operate plant at full capacity. Steam lines are partially looped, but a break could put out of service 10,000,000 gallons of high-lift capacity or 11,000,000 gallons of low lift.

Construction.—The old section is a 1-story, large-area brick building, divided into filter, boiler, pump and storage rooms, and connects with a 1-story fireproof addition, completed in 1923, and housing one high-lift and two low-lift pumps. Slate roof on wooden sheathing on wooden trusses over old section; concrete slab roof supported by steel trusses over new section. Wooden floor in old pump room; others brick or concrete except wooden operating floor around filters.

Hazards.—Exposures slight; metal breaching too close to wood roof in boiler room; stack outside. Oils in barrels in storage room; oily waste burned. Electric wiring in conduit well installed.

Protection.—Two 2½-inch standpipes on basin embankment along south side of station and two 2-way hydrants with 1½-inch connection on one outlet on north side; about 300 feet of 1½-inch hose in storage room. Nearest fire station 4,000 feet distant.

Sedimentation Basin.—Built in 1887, adjacent to main station. In excavation and embankment, brick-lined and plastered; in two bays. Capacity 2,500,000 gallons for depth of 20 feet; about 1,000,000 gallons above outlet to filters; elevation when full 62. Supplied from low-lift pumps discharging to aerators; connections are provided for cutting out either bay for cleaning or for by-passing supply to filters. Condition good.

Filters.—Twelve filters of the gravity mechanical type in two groups; seven of iron tank construction and 5 of concrete; capacity 6,500,000 gallons per 24 hours. Supplied from sedimentation basin or direct from low-lift pumps; separate influent and effluent pipes for each group; all discharge to clear water reservoir with connections to two suction wells.

Clear Water Reservoir.—Built in 1922 just west of the station; of concrete construction in excavation and embankment with concrete roof; and 22 feet deep; capacity 3,000,000 gallons. Twenty-inch supply line from filters with branches to old circular high-lift suction well of 74,000 gallons capacity located adjacent to station, and to small suction pit in new section of station.

Standpipe.—Built in 1887, on Texas avenue south of Hope street, about one mile from the center of the principal mercantile district. Of riveted steel on brick foundation on firm clay. Capacity, 275,000 gallons for water depth of 120

feet; elevation of bottom 124.4 feet. Used as an equalizer of pressure; connected to the distribution system by 16-inch gated connection. Condition good.

CONSUMPTION.—See Table 2. Statistics of consumption are based on pump plunger displacement with allowance for pump slippage and water used for washing filters.

The maximum consumption for the past two years occurred on June 27, 1923 and reached 5,853,300 gallons. There are about 9,022 active services, 92 per cent. of which are metered.

TABLE 2.—CONSUMPTION.

Year	Average Daily Consumption, Gallons	Total Population	Gallons per Capita	Per Cent. of Metered Services
1919	3,604,300	42,800	84	76
1920	4,296,200	45,200	95	.....
1921	4,452,200	47,600	93	.....
1922	4,445,900	50,000	89	.....
1923*	4,364,200	52,400	83	92

*To December 1, 1923.

PRESSURES.—Recording pressure gages are maintained at the pumping station at elevation 60; at the office of the superintendent, elevation about 63 and at the meter shop, elevation 119.5. Charts show average pressures of 77, 73 and 45 pounds, respectively, with a maximum range of about 10 pounds. Pressure readings taken throughout the city during this inspection by a National Board engineer, showed the average to be 67 pounds, with a maximum of 89 and a minimum of 44 pounds; the average in the principal mercantile district was 81 pounds.

DISTRIBUTION SYSTEM.—As shown on the accompanying plan, a 12-inch main reducing to 10-inch, a 20-inch reducing to 16-inch, and a 16-inch, extend southerly from the pumping station; the two latter mains cross the end of the principal mercantile district, one extending to the standpipe in the central part of the city where it reduces to 12-inch, and the other continuing south in the eastern section; a 12-inch line supplied by the two 16-inch mains extends the length of the principal mercantile district. A plan for greatly needed strengthening of the western part of the city, by laying a 16-inch main from the pumping station, has been approved. Minor distributors are 6- and 8-inch, generally well gridironed in the more closely-built portions of the city. There is no 4-inch pipe in the system, and only about 2 miles of pipe is in 6-inch dead ends supplying hydrants, but there are about 28 miles of 2-, 2½- and 3-inch pipe supplying domestic consumers where there should

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be hydrant protection. In the principal mercantile district, the proportion of 6-inch pipe is too great.

PIPE.—Length and Age.—See Table 3. The oldest pipe in the system was laid in 1887; nearly one-half of the pipe has been laid since the 1911 report. All pipe is tar-coated cast iron.

TABLE 3.—PIPES IN THE DISTRIBUTION SYSTEM,
NOVEMBER 1, 1923.

Diameter, in Inches	Length, in Miles	Per Cent. of Total	Increase Since April 1, 1911
6	32.40	48.3	10.67
8	21.68	32.2	13.31
10	7.32	10.9	5.27
12	2.81	4.2	1.83
16	2.69	4.0	1.40
20	.28	.4	.28
Total.....	67.18	100.0	32.76

Condition and Cover.—In 1910 and 1912 about 11 miles of mains were cleaned and in 1919 about 4 miles. This included practically all pipe laid previous to 1902. Pipes become badly incrustated after 15 or 20 years' service, and it is planned to clean the mains about every 20 years. Mains are laid with a minimum cover of 3 feet; no trouble from frozen mains.

Specifications.—All pipe laid for hydrant supply is Class B, American Water Works Association specifications. Pipe is hammer tested at the trench and tested under pressure before back filling.

Electrolysis.—See Electricity, page 15.

GATE VALVES.—Number and Type.—The number of the various sizes is not recorded. All except 12 open to the left and, with the exception of one, are covered with standard extension boxes.

Location and Spacing.—Valves are generally set on property lines. Measurements of locations are on file, convenient for field use. In the principal mercantile district, the average length of main that would be shut out of service in case of a single break is 910 feet, with a maximum of 1,650 feet. In a representative residential district the average was found to be 1,130 feet, with a maximum of 2,550 feet.

Inspection and Condition.—No regular inspection of gate valves is made. An inspection of 31 valves, 6 to 20 inches in diameter, showed them to be in fair to good condition; 6 had valve boxes full of ground water, 3 others were full of dirt, 2 were below street grade and one other had the valve box too close to stem.

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

HYDRANTS.—Number and Type.—There were 624 public fire hydrants in service November 1, 1923. All are of the post type, open to the left and have 6-inch connections to mains. About 30 of the Holyoke pattern have 4-inch barrels, and two hose outlets, and the remainder are of the Ludlow, Eddy or Columbia pattern, 120 with two hose outlets, and about 474 with one steamer and two hose outlets, 6- or 7-inch barrel and 4- to 5-inch valve opening; only a few on the large mains have gate valve in the branch.

How Located.—Hydrants are mostly located at street or alley intersections. It was formerly the policy of the water company to set hydrants at about 250-foot intervals in important districts and 500-foot intervals in other sections.

Drainage.—All hydrants are provided with automatic drip valves and are set on open brick piers.

Inspection and Condition.—It has been the policy in the past to inspect all hydrants annually, but due to the excessive amount of work in the past year, this has not been done. Of the 105 hydrants operated during this inspection, 10 needed packing, 10 had loose nipples, 2 were set too low, 3 did not drain and 1 had the stem twisted off.

Distribution.—In the principal mercantile district, the average area served by each is 70,000 square feet, and in residential sections the average area is 250,000 square feet. Of the 59 hydrants in and bordering on the principal mercantile district, 10 have two 2½-inch outlets and 49 have one 4-inch and two 2½-inch outlets.

Use by Street Department and Others.—Hydrants are used indiscriminately by the street department and considerable trouble is reported from this use. Contractors are permitted to use hydrants under the supervision of the water department.

FIRE FLOW TESTS.—See Table 4. Tests were made in December, 1923, between 8:30 a. m. and noon, with consumption at a 5,800,000-gallon rate; the standpipe was not shut off. Pressures were well maintained at 80 pounds with the 6,000,000-gallon pump operating.

RECENT AND CONTEMPLATED IMPROVEMENTS.—Since the 1911 inspection of the city by the National Board, the source of the supply has been made more reliable by the laying of a suction main to the Red river and by the dredging out of Cross Bayou. A fireproof addition has been added to the pumping station, the old boilers have been replaced, a 6,000,000-gallon high-lift and a 6,000,000-gallon low-lift pump have been installed; the filter capacity has been increased to a daily capacity of 6,500,000 gallons and a 3,000,000-gallon clear water reservoir has been constructed. The per capita rate of consumption has been materially reduced by the

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	Hydrant Streams	
Principal Mercantile....	1. Texas and Common Sts.	730	830	1140	1600	4300	71	65	7000	7000	.....
	2. Crockett and Market Sts.	800	1000	1250	.....	3050	78	27	7000	3300	700
	3. Fannin and Spring Sts.	760	1140	1210	.....	3110	86	23	7000	3200	1200
Manufacturing Minor Mercantile....	4. Texas Ave. and Jordan St.	500	850	890	.....	2240	53	37	3000	3300	.....
	5. Texas and Pierre Aves.	150	400	500	.....	1140	53	15	3000	1100	.....
Residential....	6. Greenwood Rd. and Missouri Ave.	440	.....	.....	.....	440	50	18	2000	400	.....
	7. Allen Ave. and Anna St.	470	480	570	.....	1520	62	23	1500	1600	800
	8. Laurel St. and Oxford Ave.	420	420	.....	.....	840	52	10	1000	700	.....
	9. Fetzer and Missouri Aves.	230	420	.....	.....	650	50	7	1000	500	.....
	10. Samford Ave. and Kingshighway.	660	800	.....	.....	1460	72	44	2000	2000	1300
	11. Southern and Dalzell Aves.	690	730	780	.....	2200	72	26	2000	2300	1500
	12. Kingshighway and Thornbill Ave.	680	800	.....	.....	1540	63	33	1500	1900	1000
	13. Kingshighway and Wesley St.	720	770	.....	.....	1490	77	26	1500	1600	1000
	14. Line Ave. and Olive St.	820	1380	.....	.....	2200	67	43	2000	3200	1800
	15. Stoner and Highland Aves.	680	750	820	.....	2250	67	33	2000	2700	1600
	16. Howell and Baker Sts.	820	900	.....	.....	1720	73	48	2000	2600	1600

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

increase in the percentage of services metered from 20 to 92 per cent. The distribution system has been increased by 32.76 miles of pipe, 8.78 miles of which have been larger than 8-inch; 226 additional hydrants have been set.

A bond issue authorizing the expenditure of \$1,000,000 for improvements to the water supply and sewerage system has been approved, and plans have been prepared for building a dam and impounding the flow of the main stream supplying Cross Bayou about 3½ miles west of the pumping station, storage capacity about 9,000,000,000 gallons, the supply to flow by gravity through a 36-inch pipe to the pumping station. It is also planned to increase the filter capacity and remove some of the combustible material from the pumping station, including the roof over the boiler room. Plans for strengthening the distribution system as shown on the accompanying plan have also been approved.

CONCLUSIONS. — Supply Works. — The source of the supply is adequate and generally considered reliable, but at times the quality of the water is such that the settling basin has to be cleaned frequently and the filter beds have to be washed often. The pumping station contains much combustible material and is insufficiently protected; the boiler capacity is adequate, but there is not sufficient reserve high or low-lift pump capacity. The necessity of the latter will be removed by the completion of the Cross Lake project. The discharge and steam piping are not arranged and gated to give the desired reliability.

Consumption. — Consumption is moderate and the per capita rate has been decreased about 25 per cent. by the installation of meters.

Pressures. — Pressures are sufficiently high for the use of automatic sprinkler protection, and in some localities will furnish a few streams direct from hydrants.

Protection. — Fire flow tests indicate that the supply mains are adequate to deliver the required quantity of water to the principal mercantile district, but the small mains in this district limit the quantity to about one-half the required in the northeastern half.

In most of the closely-built sections, outside the principal mercantile district, sufficient quantities are available for engine supply; the quantity was noticeably deficient in the vicinity of tests 5, 6, 8 and 9, and there are some sections where little or no protection is provided, due to lack of mains and hydrants.

Mains. — The main arteries to the central portion are sufficient in carrying capacity and mainly well arranged. But in outlying sections they are inadequate, particularly in a rapidly growing residential section to the southwest, but plans are under way for laying a new supply main to this district. The laying of no pipe less than 6 inches in diameter for hydrant supply and the use of considerable 8-inch pipe are commendable features. Gridironing is generally good in the built-up portions of the city, and the percentage of dead ends is small. Mains are badly incrustated where they have been in use over 15 or 20 years without cleaning.

Gate Valves. — Valve spacing is fair to poor; they are in fair condition.

Hydrants. — Hydrant distribution is good in the principal mercantile district and fair in other closely-built sections; some sections have only domestic supply through 2-inch pipe and are

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without hydrant protection. Hydrants are mainly of satisfactory type but considerable misuse is reported, and several of those used were found in unsatisfactory condition.

FIRE DEPARTMENT.

ORGANIZATION.—Basis.—Full paid since 1891; on two-platoon basis January 1, 1920.

Supervision.—Under the supervision of the Commissioner of Public Safety, R. L. Stringfellow.

Officers.—Chief S. J. Flores, the executive head of the department, was appointed in August, 1923, having previously served in all lower grades; 36 years old; originally appointed to the department in 1906. He is a graduate of the New York Fire College in 1920, and a competent and aggressive officer. Assistant Chief Floyd Kendrick, 38 years old, was originally appointed to the department in 1905. He is drill master of the department and has served as fireman, department mechanic, and captain previous to his appointment as assistant chief.

Membership.—Total force 83, of which 77 are active fire force, consisting of the chief, assistant chief, master mechanic, 12 captains and 62 firemen. The force also includes a clerk, superintendent and assistant superintendent of fire alarm, and 3 operators.

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

Year	Salaries	General Expenses	Total Maintenance	New Apparatus	New Stations and Sites
1919	.....	.....	\$ 70,254	.....	.....
1920	.....	.....	102,972	\$ 13,400	.....
1921	.....	.....	115,601	24,000	.....
1922	\$112,147	\$ 22,449	134,596	.....	\$223,000
1923	127,911	22,089	150,000	2,800	.....

This is a per capita expense for maintenance in 1923 of \$2.86 based on an estimated population of 52,400. In 1921 bonds to the amount of \$225,000 were issued to cover the cost of a new headquarters' station, a station in a residential district and for new fire alarm headquarters' equipment, additional boxes, extensions and renewals of the fire alarm system.

Appointment and Promotion.—The chief is appointed by the commissioners for a 4-year term; the previous chief was in command of the department for 21 years. Appointments and promotions are made by the chief. Age limits are 21 to 30 years; minimum height, 5 feet, 7 inches; minimum weight, 150 pounds. Appointees must pass a physical examination and are on proba-

tion for one month. There is no examination for promotion, but seniority is given consideration.

Retirement and Pension.—No age limit has been set for retirement; no member is over 50 years of age. Pensions are provided by the Firemen's Relief Association, of which all firemen are members. This is supported by 1 per cent. of all salaries, 1 per cent. of insurance premiums until the fund reaches \$100,000, and donations. Members may retire on half pay after 20 years' service or on two-thirds pay if permanently disabled. Hospital bills are paid if injured in line of duty. Pensions are provided for dependents. Men receive full pay if injured in performance of duty.

Companies.—*Organization.*—Six engine, one hose and one ladder companies are in service in six stations. Engine Company 3 operates as a two-piece company. A captain is assigned to each platoon at each station. A member of each platoon is assigned as driver of each piece of apparatus; other members are qualified drivers and pump operators.

Maintenance.—The department is divided into two platoons working 10 and 14 hours, respectively, shifts changing twice monthly; officers work with both platoons. Mess facilities are provided at all stations. A total of 30 men sleep at stations when off duty and, with exception of off-duty men at Headquarters' station, are required to respond to all alarms received while they are in the station. Off-duty men at headquarters man reserve hose wagon on receipt of second alarm. Watch is maintained at headquarters station. Extension telephones are installed in dormitories of other stations.

Distribution.—Two engine companies and the ladder company are located at headquarters station bordering on and within three quarters of a mile of all points in the principal mercantile district; two other engine companies and one hose company are within 1½ miles. All points in the city are within 1½ miles of an engine or hose company. Hose 3 and Engine 7 make runs of 2 to 3 miles, to the South Highlands district, outside the city limits. Some points, notably in the important residential district in the vicinity of Centenary College, are more than 2 miles from a ladder company. Chemical service is good.

EQUIPMENT.—*Fire Engines.*—See Tables 5 and 6. Six motor pumpers with rotary pumps are in service. Each has compound suction gage, engine siamese, 2 sections of 4½- or 6-inch hard suction and 2 sections of 2½-inch soft suction, a suction strainer and a reducing double female connection.

Engine Tests.—The engines were tested in December, 1923 by a National Board Engineer to determine their condition and the ability of the operators. Engine 2 on first trial ran hot, blew out spark plugs and failed to deliver capacity; after installing new spark plugs and

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SHREVEPORT, LA.

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 2 <i>hv</i>	Headquarters: Common and Crockett Sts.	5	750-Gallon Pumper	73	1921	1200-2½"	900	1-24'	1-40
Engine 2a <i>lv</i>		3	1000-Gallon Pumper	94	1916	250-¾"		1-12'	2-3
Engine 3 <i>hv</i>	Texas Ave., near Jordan St.	7	Hose Wagon	48	1912	1200-2½"	1000	1-24'	1-40
			750-Gallon Pumper	73	1920	250-¾"		1-12'	2-3
Hose 4	Garden St., near Pierre Ave.	3	Hose Wagon	32	1913	1000-2½"		1-24'	1-40
Engine 5	Stoner Ave., opp. Nutt St.	5	750-Gallon Pumper	73	1921	1200-2½"	1200	1-12'	2-3
Engine 6	Fetzer Ave., near Portland Ave.	4	600-Gallon Pumper	48	1912	250-¾"		1-24'	1-40
Engine 7	Line Ave. and Wilkinson St.	5	600-Gallon Pumper	48	1912	1200-2½"	800	1-12'	2-3
Ladder 2 <i>hv</i>			Headquarters.	5	75' Quick-Raising Aerial	73		1918	1000-2½"	1-24'	1-40
							8 Ladders; total length, 252'	1-12'	2-3

†Equipped with Turret Pipe.

hv—Company located in or near High Value District.

TABLE 6.—FIRE ENGINES.

Engine No.	Make	Type	Put in Service	Renewals	Pump	Reasonable Capacity, Gallons per Minute	RESULTS OF ENGINE TESTS			
							Gallons Obtained at Test	Per Cent. of Rated Cap. Obtained	Net Water Pressure, Pounds	Speed, Revolutions per Minute
2	Amer.-La France	Gasoline	1921		r	750	731	97	95	677
2a	Amer.-La France	Gasoline	1916		r	1000	383	51	218	436
3	Amer.-La France	Gasoline	1920		r	750	1092	109	109	.....
5	Amer.-La France	Gasoline	1921		r	750	575	57	212	341
6	Amer.-La France	Gasoline	1912		r	600	786	105	97	692
7	Amer.-La France	Gasoline	1912		r	600	390	52	237	412
							803	107	96	678
							401	53	229	394
							416	69	80	751
							389	65	94	778

r—Rotary.

being overhauled it ran satisfactorily. Engines 6 and 7 experienced trouble with spark plugs, but after new ones were installed engines were not able to deliver their rated capacity; these engines have only one transmission ratio and cannot deliver high pressure. Engines 2-A, 3 and 5 ran satisfactorily.

Hose Wagons.—See Table 5. In addition to the 6 pumpers carrying hose, 2 motor hose wagons are in service, one of which is mounted on a 1914 model commercial chassis and is deficient in horse power; one has a turret pipe. All hose carriers have divided hose bodies and all with chemical tanks have 2½-inch hose connection to tanks. Two combination hose wagons,

each loaded with 1,000 feet of 2½-inch hose, are in reserve.

Ladder Trucks.—See Table 5. A 75-foot American-LaFrance quick-raising aerial with front wheel drive purchased in 1918 is in service. In addition to the aerial it carries 7 other ladders, including a 45-foot extension ladder, and 2 with roof hooks. A rebuilt Seagrave truck, with a Knox-Martin tractor, and carrying 8 ladders including a 50-foot extension, is in reserve. Trucks are in good condition.

Chief's and Other Automobiles.—**Fuel.**—The chief has a 1923 model Cadillac and the assistant chief a 1922 Buick runabout, both of which are in good condition. Two Ford light trucks are

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provided for the fire alarm superintendent and assistant. They are also used for other fire department business and for supplying gasoline to pumpers at fires.

Underground gasoline storage tanks with inside pumps are provided at headquarters and two other stations.

Hose.—All hose is 2½-inch, cotton jacketed, rubber-lined and of well known makes. It is purchased by the chief under the usual trade guarantees; and is tested to 300 pounds on delivery and yearly thereafter to 200 pounds; 17,350 feet of hose tested November 8, 1923 was in good condition. Defective hose is turned over to other city departments. The amount of hose in service allows about 2,000 feet to each hose carrier. Hose is dried and stored in hose towers or on inside racks; it is relaid in hose wagons monthly unless previously used.

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

Connection	Nominal Size, Inches	Outside Diameter, Male Thread, Inches	Threads, per Inch
Shreveport Hydrants.....	2½	3¼	7½
Shreveport Hose.....	4	4½	6
Texarkana, Texas.....	2½	3¼	7½
National Standard.....			
Marshall, Texas.....	2½	3¼	8
Alexandria.....	2½	3¼	8
Monroe.....	2½	3¼	8

Minor Equipment.—The minor equipment carried on pumpers and hose wagons is fairly uniform and complete, consisting of axes, portable extinguishers, crowbars, door openers, hose shut-offs, hydrant wrenches, lanterns, shut-off nozzles, plaster hooks and ropes. Equipment carried on the ladder truck in service includes much of the above and, in addition, bale hooks, brooms, cellar pipe, forks, gas keys, life net, rope gun, picks, pompier belts, ram and wall cutter, roof cutter, sledge, shovel, squeegees, gas masks, first aid kit, large portable light, wall hook and chain, wire cutters and gated wye.

Repairs.—A well equipped repair shop at headquarters is in charge of Master Mechanic S. B. Page, a member of the department for 15 years, and a steam engineer. He makes repairs and adjustments to motor equipment, assisted by the operator. The equipment of repair shop consists of a lathe, drill-press and grinder driven by individual motors; forge, welding outfit, battery charging equipment, hydraulic hose expander, and trolley and falls for removing engines and pumps. A good assortment of hand tools is also provided. A fair stock of repair parts is kept.

Heavy repair parts are obtained from Dallas, Texas or Atlanta, Georgia, in from 24 to 48 hours.

Fire Stations.—Two old stations in the principal mercantile district have been abandoned and apparatus transferred to the new fireproof headquarters station, built in 1922. A new fireproof station was built in 1922 for Engine Company 7. The four other stations are 2-story brick, in generally good condition. General repairs and reinstalling electric wiring in accordance with standard methods were in progress in Station 5 at time of inspection. Houses are generally well located and on paved streets, with exception of Station 6 which is ½ block from hard pavement.

Drill Tower.—A drill tower was built in 1922 in connection with the new headquarters station. It is 4 stories high, with stairway on the inside, a ladder fire escape on one side, a balcony and stair fire escape on another side, and windows on a third side. It is also equipped for use as a hose tower.

SUMMARY OF APPARATUS.

	1923		1911	
	In Service	In Reserve	In Service	In Reserve
Fire Engines:				
Steam—				
1,000 gallons.....	0	0	1	0
900 gallons.....	0	0	1	0
800 gallons.....	0	0	0	1
Automobile—				
1,000 gallons.....	1	0	0	0
750 gallons.....	3	0	0	0
600 gallons.....	2	0	0	0
Total Fire Engines.....	6	0	2	1
Hose Wagons:				
Automobile Combination....	2	2	0	0
Horse-drawn Combination....	0	0	4	1
Horse-drawn Plain.....	0	0	1	1
Ladder Trucks:				
Aerial, Automobile.....	1	0	0	0
Aerial, Horse-drawn.....	0	0	1	0
Ordinary, Automobile.....	0	1	0	0
Chief's Automobile.....	2	0	1	0
Fire Alarm Automobile.....	2	0	0	0
Horses.....	0	0	19	3
Hose, 2½-inch.....	15350'	2000'	9800'	0
Hose, ¾-inch for chemical....	1750'	500'	850'	0
Ladders, total length.....	540'	254'	436'	48'
Ladders, short, on hose wagons, etc.....	16	4	8	0
Portable Extinguishers.....	18	3	13	2
Deluge Sets.....	2	0	1	0
Siamese Connections.....	2	0	3	0
Turret Nozzles.....	1	0	1	0
Ladder Pipes.....	1	0	0	0
Cellar Pipes.....	1	0	1	0
Distributing Nozzles.....	0	1	0	0

OPERATION.—Discipline.—Discipline is entirely in the hands of the chief, who makes such rules as he deems necessary; there are no printed regulations; new rules are issued as typewritten bulletins to each company. For minor offences men are suspended without pay; and for second or more serious offences are discharged. One man was suspended during 1923. Discipline is apparently excellent. Stations are inspected weekly by the chief or assistant chief. At change of shift men are lined up and inspected by company officers, motor is started by driver going off duty and shut down by incoming driver.

Drills and Training.—Drills are in direct charge of the assistant chief, but are supervised by the chief who is a graduate of the New York Fire College. Drills are held monthly on the drill tower, consisting of pompier ladder work, raising extension ladders, taking hose lines to roof and general maneuvers in the use and handling of tools and equipment.

Response to Alarms.—One hose and three engine companies, with 5 pieces of apparatus, and the ladder company respond to all alarms in the principal mercantile district. In most residential districts 3 hose or engine companies respond. The response to telephone alarms is the same as to box alarms. Engine 7 and the hose wagon with Engine 3 regularly respond to South Highlands, a residential suburb adjoining Shreveport on the south, necessitating runs of $1\frac{1}{2}$ to 3 miles. The usual response to second alarms is two additional engine companies. Provision is made for companies to move up on second alarms to cover territory assigned to companies at the fire. The chief attends all alarms in high value districts and most others; the assistant chief responds to all alarms. The master mechanic and superintendent of fire alarm receive alarms at their homes and respond to second alarms. The assistant superintendent of fire alarm sleeps at headquarters station, responds to all alarms and cuts wires interfering with fire operations. All firemen are required to have a home telephone, the numbers of which are listed at fire alarm headquarters, and the off duty men are required to report at fire when notified. Off duty men sleeping at stations are required to respond to alarms; those at headquarters man the reserve hose wagon on second alarm. Paved streets are in good condition; unpaved streets in outlying and in low value districts are very bad in wet weather and delay response. Many of the railroad crossings are at grade and have delayed response. Overhead wires and transformers, particularly in alleys, and permanent awnings form serious obstructions to fire department operations throughout the mercantile districts.

Fire Methods.—Two lines are laid simultaneously from hose carriers when required. Hydrant streams are generally used. Water lines are laid to back up chemical lines. Hose is carried up stairways, ladders, or fire escapes. Shut-

off nozzles with 1- or $1\frac{1}{8}$ -inch nozzles are generally used. The records indicate that about 25 per cent. of the working fires are extinguished with chemical equipment. Buildings are ventilated to locate fire, or after fire is under control, to prevent smoke damage. Engines, when used, are generally connected to hydrants by $2\frac{1}{2}$ -inch, siamesed, soft suction. Turret nozzle, ladder pipe, deluge set and siamesed lines are used where heavy streams are required.

Ladder work in the mercantile districts is confined to that which can be performed by the undermanned ladder company. In other districts the only ladder protection is that afforded by the short ladders on hose carriers. Damaged premises are cleared of water and rubbish.

Building Inspections.—Off shift men of each company inspect mercantile buildings in their districts about quarterly, report being made on duplicate forms, one copy of which is forwarded to the State fire marshal. Reinspections are made in 24 hours to 4 or 5 days according to the hazard of the conditions found. If owner refuses to correct hazardous conditions the matter is referred to the building inspector, a deputy State fire marshal, who serves formal notice demanding correction under the state law. Conditions are said to have been bettered by department inspections. Theatres are inspected by the building inspector. Firemen are detailed to special performances at theatres. Two hundred seventy-nine building inspections were made between August 15 and December 15, 1923.

Reports and Records.—Fire record, showing alarms received, losses and equipment used in extinguishing fires, records of hose, service records, expenditures and journal showing various events in connection with the department are kept by the chief's clerk. Company journals are kept at all stations. The captain of each company makes a form report of each fire responded to. The chief makes an annual typewritten report to the commissioner, with estimate for expenses of the department for the coming fiscal year and recommendations for betterment of the department.

RECENT AND CONTEMPLATED IMPROVEMENTS.—A fireproof headquarters station housing 3 pieces of apparatus, repair shop, and fire alarm system, a drill tower, and a fireproof station in a residential district were built in 1922. Apparatus has been motorized. The Fehy hose couplings have been replaced by screw couplings with National Standard threads. Houses have been repaired and put in generally good condition. The purchase of a 750-gallon pumper, to replace Hose 4, is contemplated. It is proposed to secure a lot and eventually to build a station in the vicinity of Clairborne avenue and Velva street. A department paint shop is being built.

FIRE ALARM SYSTEM.

CONCLUSIONS.—The fire department is commanded by experienced and energetic officers. It is deficient in company officers. The chief is appointed for a four-year term, and without civil service protection. The manning of the individual companies is generally satisfactory during the day, but the night strength is deficient, particularly in the ladder company and the second section of Engine Company 2. Engine capacity is somewhat inadequate. Only one ladder company is provided, which is insufficient for the needs of the city. Chemical equipment is ample, but it is not used to the extent possible. Apparatus is generally of good type and standardized and well taken care of; but engines are not regularly tested by approved methods or after repairs. Hose is of good quality and regularly tested; the amount on hand is sufficient. The maintaining of loaded reserve hose wagons is a good feature; providing a supply of 3-inch hose would doubtless be to the advantage of the department. Appliances for handling heavy streams and minor equipment are somewhat deficient. The response to alarms is generally good and well arranged. Two fireproof stations were built in 1922 and other stations have been put in good condition. Fire methods appear to be generally good; but the efficiency of the department could be raised by a greater use of the chemical equipment provided. Salvage work is limited to cleaning up after fires. Building inspections are regularly made and their value is increased by the close cooperation of the State Fire Marshal's department. Records are generally well kept. Recent improvements have strengthened the department and contemplated projects are along good lines.

FIRE ALARM SYSTEM.

ORGANIZATION.—The system is a part of the fire department and is under the direct supervision of G. W. Jolliff, Superintendent of Fire Alarm, who has been in charge since 1909. He has one assistant who formerly was a telephone lineman. Three operators are provided. The personnel is experienced and competent. Two Ford light trucks are provided for maintenance work. The police call and signalling system is also maintained by the Superintendent of Fire Alarm.

HEADQUARTERS.—On the second floor of the fireproof fire headquarters, built in 1922. It is completely separated from the rest of the building by tile walls, and is entered by enclosed stairway from outdoors; all exposed openings are protected by wire glass in metal frames. All apparatus except telephone board are on incombustible mountings. Separate rooms are provided for superintendent's office, work shop and battery room. One tetra-chloride extinguisher is provided in operating room.

EQUIPMENT.—The system is of automatic type with manual provisions, and of Gamewell make, installed in 1922. It includes a 12-circuit operating and charging board, with the usual devices for operating and testing circuits and charging storage batteries; a 12-circuit, non-interfering repeater with contacts for 4 alarm circuits; a terminal cabinet; a protector board; a master register, and time stamp. Each circuit is provided with a punch register, take-up reel and Morse key. A 4-number manual transmitter and a wire chief's testing cabinet are mounted on the private branch exchange board.

Two 16- and one 8-conductor fire alarm cables and one 25-pair telephone cable enter the building from underground, through iron conduit in wall to a terminal cabinet in wall of operating room. Fire alarm cables have No. 14 copper conductors, rubber-insulated, with lead sheath; telephone cable is paper-insulated with lead sheath. Wiring in headquarters is No. 14 copper, with rubber and single-braid insulation, neatly cabled in rear of operating board. Protector board has lightning arrester, 3-ampere string fuse, plug cut out and telephone jack for each circuit, and volt meter and segmental switch for ground tests.

Batteries.—Current for fire alarm system and private branch telephone exchange is supplied by batteries of the chloride accumulator type in duplicate sets of 228 cells, mounted on porcelain knobs, on glass rods, on a metal frame in a detached, well ventilated room. Batteries showed a slight amount of sediment; plates were in good condition. Each set of batteries is charged on alternate days through lamp resistance; power is supplied by a 1-k.w., 110-volt and by a 1½-k.w., 220-volt motor generator; only one source of primary power is provided. Main line entrance switch is protected by 20-ampere and each battery by 3-ampere cartridge fuses; automatic circuit breaker is provided on operating board.

Apparatus at Stations.—Each station has a gong on one box circuit, and punch register and gong on a second box circuit. Automatic lighting switches are provided at all stations. Wiring is No. 14 copper with rubber and braid insulation, installed in conduit and protected by lightning arresters.

Boxes.—*Description.*—Total, 184, of which 13 are located in the adjacent residential suburb of South Highlands. One hundred twenty-eight are of the succession type and 56 are of the 4-round, non-interfering type; three have the unreliable brush-break contacts. Twenty-eight, mounted on pedestals, are marked by red lights; 152 boxes are mounted on poles with telephone and light wires, and 4 on poles with electric light wires only, one of which is on a pole carrying a 11,500-volt transmission line. Four boxes are on buildings and 1 in a building. All boxes have key under guard. Narrow red bands formerly painted on poles carrying a fire alarm box have

not been painted in recent years, and only a few were noticed during inspection of the system. The use of red bands to designate poles carrying high tension transmission lines has introduced an element of confusion, the red band generally being the accepted symbol of a fire alarm box. Each box is equipped with shunt, Morse key, tap bell or sounder, lightning arrester and telephone jack; a few lightning arresters are grounded. Lead wires are mostly No. 12 copper with triple-braided insulation, in pipe to a few feet above box, thence on knobs to cross-arm. About 10 per cent. of the boxes were inspected in December, 1923 by a National Board engineer, and were found to be in generally good condition, and uniformly timed at 1 second interval between strokes. Boxes were repainted in December, 1923 with a dark red paint.

Distribution.—Two instances in the principal mercantile district were noted where boxes are more than 1,000 feet apart; and twenty locations in residential districts were noted more than 800 feet from a box. One public school was noted more than $\frac{1}{2}$ mile, and one more than 1,200 feet from the nearest fire alarm box. Distribution generally is fair.

Circuits.—Eleven normally closed all-metallic box circuits are in use, to which the boxes and alarm instruments are connected and one local circuit to instruments in fire headquarters. The total length of circuits is approximately 62 miles, of which 16 miles are in underground cables. A large part of underground cables are No. 14 copper conductors, rubber-insulated with lead sheath, in underground conduit; the remainder is "Park cable," laid directly in trench, and has No. 14 copper conductors, rubber-insulated, and protected by jute and asphalt covering and metal armor. About 3 miles of circuit is in 20-conductor weatherproof aerial cable; 5 miles of aerial circuit are bare No. 12 copper wire; the remainder is No. 12 copper with triple-braid, weatherproof insulation. Lines are generally well constructed. Cables are in telephone company conduits; aerial lines are mostly on poles occupied jointly by telephone and electric light companies, and generally carried on brackets below telephone wires. Two instances were noted where wires are on poles with 11,500-volt power transmission lines. Wiring in stations is of No. 14 copper with rubber and braid insulation, installed in conduit. Two box circuits are carried to each fire station. Two circuits have more than 20 boxes connected to each. Three circuits tested just following a rain storm showed a heavy ground; the heaviest was located in a splice of underground cable, and action was taken to correct it.

TELEPHONE SYSTEM.—The private branch exchange has 2 trunks to each telephone company; one trunk to each is reserved for "fire only." Separate lines are provided to each fire

station reserved for "fire only", chief's office and residence, repair shop and offices at headquarters station. A direct line to new police station was in process of installation at time of inspection. Provision is made for simultaneous communication.

OPERATION.—Routine and Maintenance.—The superintendent has a tapper and telephone in his house; and the assistant superintendent sleeps at headquarters; both are provided with automobiles and are always available if needed. Three operators work in 8-hour shifts. Test blows are sent over the system 3 times daily. Boxes are inspected monthly. Circuits are tested for grounds twice daily; battery voltage tested twice daily; electrolyte weekly. A journal is kept by operator on duty, showing all alarms, tests, troubles, etc., time of going on duty and being relieved. A well arranged running card, showing nearest box to any street location and companies assigned, is provided for quick reference; a card record showing residence and telephone number of every member of the department is maintained and used for calling the off-shift for second alarm fires.

Alarm Transmission.—Four rounds of box alarms are automatically transmitted over the system. Telephone alarms are received at headquarters, and companies responding are notified by telephone simultaneously; and confirmed by transmitting number of nearest box over the system by manual transmitter. There were 419 alarms in 1922, of which 28 per cent. were box alarms; in 1923 up to December 14, subsequent to the reconstruction and extension of the system, there were 385 alarms, of which 34 per cent. were box.

RECENT AND CONTEMPLATED IMPROVEMENTS.—In 1922, entirely new headquarters equipment of automatic type with manual provisions was installed in a new fireproof headquarters building; 100 Peerless, succession, non-interfering type boxes installed, of which 13 are outside the city limits; a large part of the lines rebuilt. Orders have been placed for material to replace the 5 miles of bare wire in the system, and for reserve battery material. The installing of a gasoline driven generator set in repair shop, to furnish a second source of current for battery charging and for emergency lighting service in headquarters station, is being considered. It is planned to install 10 additional boxes in 1924.

CONCLUSIONS.—The system is under satisfactory supervision and is well maintained. Headquarters is in a fireproof building, with exposed openings protected. Headquarters equipment is new, is of good type and well installed. Box circuits were extended and largely rebuilt in 1922 and are in generally good condition except for some bare wire, some cir-

FIRE DEPARTMENT AUXILIARIES.

cuits on poles with high voltage transmission lines and two circuits overloaded. Alarm circuits, as distinguished from box circuits, are not provided for transmission of alarms to stations, a second box circuit being used instead. A department telephone system permits of simultaneous communication to all stations. Distribution of boxes in the principal mercantile and other high value districts is generally good; in some other districts it is from good to poor. Tests of circuits and batteries are satisfactory. A log is maintained by the operator on duty, but records of tests are not in detail. Diagrams and maps of circuits are not kept up to date. Boxes in the mercantile district and some others are conspicuously marked by red lights; boxes are painted with a dark red paint; and, except those provided with lights, are generally inconspicuous and are not provided with red bands on poles. Recent improvements have added greatly to the reliability and value of the system, and are reflected in its increased use by the public.

FIRE DEPARTMENT AUXILIARIES.

FIRE MARSHAL.—The office of State Fire Marshal was established in 1904; it is maintained by a tax on insurance premium receipts in the State. The present incumbent is Conrad J. Lecoq; he has 6 deputies. The city building inspector is a deputy fire marshal. The fire marshal, his deputies, or the chief of the fire department are required to investigate the origin and circumstances of all fires within 3 days of their occurrence, and report the circumstances within a week. For the purposes of investigating incendiarism, he has the powers of a committing magistrate; he or his representative may enter burned premises or adjoining premises at any time. One case of a suspicious nature was investigated by the chief and building inspector during 1923, but evidence was not sufficient to warrant prosecution.

POLICE DEPARTMENT.—Under the supervision of R. L. Stringfellow, Commissioner of Public Safety. Chief, D. D. Bazer. Total force, 51.

Equipment.—There is one motor patrol wagon and 12 Ford cars. Officers report hourly by telephone over a Gamewell system, consisting of 28 two-call boxes with visual and audible signals mounted on each pedestal. The system is maintained under the direction of the superintendent of fire alarm. Six officers in 3 automobiles patrol the principal streets of the city at night, in addition to the regular patrolmen.

Fire Service.—Police receive alarm on tapper and two officers respond to all alarms in high value districts in a Ford. The officer on beat responds to all alarms in his district. Ropes are not generally used but are obtained from ladder truck and used for serious fires. Co-operation with the fire department is good.

Traffic officers are stationed at 5 points in the principal mercantile district and assist in securing right-of-way for fire apparatus.

PUBLIC SERVICE CORPORATIONS.—The Southwestern Gas and Electric Company has a fire alarm register in their office. A trouble man responds to all alarms and render assistance to the fire department in cutting electric lines and shutting off gas. The Shreveport Railways Company does not receive alarms. The telephone companies do not have instruments connected to the fire alarm system, but respond to many alarms to protect the companies' property; they assist the fire department if requested.

TELEPHONE SERVICE.—The Cumberland Telephone and Telegraph Company serves about 7,500 telephones, about 500 of which are outside the city. The exchange is in a two-story, joisted-brick building with protected openings in the principal mercantile district. Standard Bell protection of waterproof and asbestos blankets, soda and acid extinguishers, and sand buckets, is provided. Wires are generally underground in the mercantile district and mainly in aerial cables elsewhere, distribution being generally from poles in block interiors. Two trunks are provided to fire alarm headquarters, one of which is reserved for fire calls, which are properly supervised and recorded.

The Shreveport Home Telephone Company serves about 2,200 subscribers, about 82 per cent. of which are on individual lines. The exchange is in a two-story, joisted-brick building adjacent to the principal mercantile district. Exposures are serious and internal hazards severe. A tetrachloride fire extinguisher is installed in the operating room, but waterproof or asbestos blankets are not provided. Fire calls are not supervised or recorded. Two trunk lines are provided to fire alarm headquarters; one is reserved for fire calls. Wires are generally underground in the mercantile district; distribution is generally from poles in block interiors.

About 66 per cent. of the fire alarms were received over the telephone in 1923.

PRIVATE FIRE APPARATUS.—There are 23 sprinkler systems in the city. One building has an electric-driven fire pump. Most of the manufacturing plants are provided with yard hydrants, large hose, water buckets and chemical extinguishers.

OUTSIDE AID.—Aid can be obtained from the following cities in from two to four hours:

City	Distance, Miles	Engines in Service	Probable Assistance
Monroe	86	3	1 pumper
Alexandria	125	3	1 pumper
Marshall, Tex.	42	2	1 pumper
Texarkana, Ark.-Tex.	75	3	1 pumper

STRUCTURAL CONDITIONS AND HAZARDS.

BUILDING DEPARTMENT.

ORGANIZATION.—Supervision.—A Department of Buildings, consisting of the commissioner of public safety, the fire chief and the building inspector, was created by ordinance in 1916. The inspector must be a competent architect, engineer or builder of at least 5 years' experience. He is elected by the council upon the recommendation of the commissioner of public safety, and may be removed only for cause.

The State Fire Marshal or his authorized representatives are empowered to have dangerous or dilapidated buildings repaired or removed; he and the State Labor Commissioner are charged with enforcing the State fire escape law.

Personnel.—J. T. Harrison, an experienced builder, was appointed building inspector on April, 1919. He is provided with motor transportation.

Permits and Records.—A permit must be obtained before the erection, alteration, demolition or repair of any building is started. Applications for permits are made on printed forms; and plans and specifications must be submitted for approval before construction is commenced. Except for public buildings, plans are returned when building is occupied. Duplicate copies of permits are filed in fireproof cabinets and a book record shows the value of permits issued daily, together with the location, class of building, owner and contractor.

BUILDING LAWS.—A State law of 1914 requires exterior or interior fire escapes on all buildings more than 2 stories high or with one or more galleries above the ground floor, whenever used as a public building, hospital, asylum or other institution, school or college, theatre, hall or public resort; on stores, workshops, or factories having employees above the second floor; on hotels, restaurants, apartments, flats, boarding or lodging houses in which persons reside above the second floor, except on buildings which the State Labor Commissioner considers adequately safeguarded.

In 1916 a new municipal building code was adopted which is practically a reprint of the 1915 edition of the National Board building code. It defines an inner and middle fire limits. Within the inner limits frame construction is prohibited, and it is also prohibited in the middle limits except for dwellings. All buildings constructed within both these limits must have incombustible roof coverings, and if damaged so that 10 per cent. has to be made new must be entirely covered with fire-resistive roofing; no time limit is set when all combustible roof coverings must be removed.

Fire Limits.—As shown on the accompanying plan, these include, but are insufficient in extent to protect the principal mercantile district. They also include a considerable portion of the minor mercantile districts.

Enforcement.—The provisions of the building code are well enforced, and a high grade of construction is being secured. However, the large amount of new construction going on precludes giving adequate inspection to residence building.

LOCAL CONDITIONS.—The principal mercantile district consists of 26 blocks or part blocks containing 296 buildings, including 30 of fireproof, 235 of joisted brick, and 31 of frame construction.

The fireproof construction covers 20 per cent. of the occupied area. Ten are bank and office buildings, often with grade mercantiles; 7 are retail mercantiles; 4 are public buildings; others are of diversified occupancies. The highest is a 16-story office building of 11,500 square feet area; the largest is a basement garage of 24,500 square feet. Other important fireproof buildings are 6- and 8-story hotels of 23,000 square feet area; others are of less area. Twelve are 6 stories or higher. Floor openings are protected in 14 of the 24 buildings requiring protection. Exposed windows are protected in 25 buildings.

Joisted brick construction occupies 76 per cent. of the area built upon. The highest are 3 of 5 stories and 9 of 4 stories. Sixty-four per cent. of the area covered by this type of construction is in fire areas in excess of 5,000 square feet; and 25 areas exceed 10,000 square feet. The largest are a 2-story wholesale grocery and seed establishment, covering 22,500 square feet, and a 2-story sprinklered wholesale dry goods store of 21,800 square feet. Unprotected or poorly protected communications form large or excessive areas in only 2 cases, as communicating openings are generally properly protected. Protection to vertical openings in this type of construction is mainly lacking except in 2-story buildings with stairways to the street. Twenty-six buildings having exposures within 50 feet have windows properly protected. There are a considerable number of fire walls, but over one-third are 4 inches deficient in thickness in some part; no 8-inch walls were noted. Parapets were generally noted on all division walls, the average height being 2 feet.

About 75 per cent. of the buildings requiring fire escapes are not equipped; many on the older buildings are of unsatisfactory type. Twelve buildings are equipped with automatic sprinklers. Including all classes of construction, 2 buildings have outside standpipes, 20 have inside standpipe and hose equipments, and a moderate number have chemical extinguishers.

EXPLOSIVES AND INFLAMMABLES.

The frame construction covers 4 per cent. of the area built upon; and consists mainly of dwellings and open sheds or additions. The largest is a 2-story boarding house of 5,000 square feet; the highest is a 3-story hotel of 2,800 square feet. Nineteen buildings have shingle roofs; and 22 per cent. of the linear street frontage has permanent awnings over the sidewalks.

CONCLUSIONS.—The city is to be commended for its excellent building laws and their strict enforcement. Local structural conditions, while still weak in the older section of the principal mercantile district, show considerable improvement over those reported in 1911. The fire limits should be extended to properly protect the rapidly growing business district.

EXPLOSIVES AND INFLAMMABLES.

ORGANIZATION.—**Supervision.**—State laws give the State fire marshal authority over hazardous accumulations of combustible materials; the State Board of Health, through its oil inspection service, supervises the quality of illuminating oil. The municipal ordinances provide for a fire marshal and place the enforcement of provisions regarding fire prevention with him, who is also building inspector. The city fire marshal, by virtue of this office, is also deputy State fire marshal.

Personnel.—Conrad J. Lecoq is State Fire Marshal. J. T. Harrison is city fire marshal and building inspector; he has no assistants except as he may call upon members of the fire department.

Permits.—Permits are issued for the installation of underground tanks at gasoline filling stations. Permits are also issued for the sale of fireworks, previous to the Christmas holiday period.

Inspections and Records.—The fire marshal or members of the fire department inspect all mercantile buildings quarterly, and report any dangerous conditions found to the State fire marshal, who sends notices to the occupants. Records of these notices are on file with the fire chief.

LAWS AND ORDINANCES.—**State Laws.** The State fire marshal and his deputies are authorized to inspect any dangerous building and order hazardous conditions remedied. All coal and petroleum oils brought into or manufactured within the State must be inspected and properly marked by the State oil inspector. Receptacles containing oil of flash point below 125 degrees Fahrenheit, must be marked "Dangerous and Explosive."

Municipal Ordinances.—The building code prohibits the keeping of ashes in any combustible receptacles; and rubbish, loose hay, trash, paper,

excelsior and like materials shall be kept in such enclosures or in such manner as is approved by the building inspector. Matches on any premises must be in metal receptacles. Trash burners are required for the burning of rubbish in the inner fire limits, and in the outer fire limits rubbish may be burnt in the open after notifying the fire department. Buildings occupied for a wood working establishment or like manufacturing, more than 1 story or 25 feet in height, shall have in connection a fireproof vault of sufficient capacity to hold 3 days' accumulation of sawdust or other refuse. Inflammable oils or explosives shall not be placed near any stairway or exit.

Other ordinances on these subjects not printed in the building code prohibit the sale of blank cartridges and toy pistols or the exploding of the same.

A permit or license must be obtained from the city council for the transporting, storing, manufacturing or selling of any explosive compound or mixture within the city limits; this does not apply, however, to the ordinary keeping and sale of small arms and ammunition in hardware and sporting goods stores. The use of fireworks is prohibited in Wards 1 and 2, which include the business district. A permit or license must be obtained from the city council for the storage, manufacture or keeping, within the city of any benzine, gasoline, or naphtha, except in safety metal cans of not exceeding 5 gallons capacity; greater quantities must be in underground tanks with pumps attached, except that wholesale distributors may store such liquids in properly constructed steel tanks located in the open air and not nearer than 20 feet to a building. Bales of cotton must not be stored or placed in streets or alleys except in the neighborhood of warehouses, and then only at the time of receipt and delivery; they must be removed by sundown of each day. Waste or rubbish of any kind is prohibited on any paved street or alley.

LOCAL CONDITIONS.—No dynamite or gunpowder was found in the principal mercantile district; one dealer maintains a magazine outside the city. Small to carload lots of fixed ammunition were noted in retail and wholesale hardware stores. Wholesale grocers carry an average of one-half carload lots of matches in original containers. Wholesale druggists carry moderate amount of carbon bisulphide, ether and chloroform in one-quarter to one pound cans, and at one location a steel drum of carbon bisulphide was stored in rear, 20 feet from a building and not labeled; barrel oils and carboys of acid kept in basement.

Hardware and paint stores carry small to moderate quantities of paints in sealed containers and oils generally in tanks with faucets; at one location five 5-gallon cans of gasoline were found in unapproved cans and ordered removed by the fire marshal. Tailor and pressing shops keep

gasoline in 1-quart to 1-gallon cans or bottles. Garages and filling stations keep gasoline in underground tanks with approved pumps. Lubricating oils in garages are usually kept in tanks of good type; buildings used for this occupancy have concrete floors and several are fireproof throughout.

There is one dry cleaning plant located in the principal mercantile district; construction is of fireproof materials and the hazards are well guarded. Two others outside of this district were inspected; at one, hazardous conditions exist, due to poor construction, improper handling of gasoline and the lack of fire extinguishing devices; at the other, which is protected by an automatic sprinkler equipment, conditions were generally satisfactory except that the clothes tumbler was located in main building outside the wash room, the latter being of fireproof construction and properly cut off.

There are five wholesale oil distributing stations in the city, three of which are mutually exposing and form severe exposures to nearby frame residential districts. Warehouses are of frame construction, tank wagons are generally kept loaded at night and none of the tanks are surrounded by dikes or embankments. Tanks are of riveted steel construction on substantial foundations, properly vented and generally electrically grounded.

A number of hazardous accumulations of rubbish were noted in buildings and in alleys in the business district.

CONCLUSIONS.—The State and municipal laws place the supervision and control of explosives and inflammables with the State and city fire marshals. While the inspections conducted by the departments of these officials have been effective, their value is greatly reduced by the lack of comprehensive regulations, as reflected in the only fair local conditions.

ELECTRICITY.

ORGANIZATION AND CONTROL.—**Supervision.**—The supervision over the installation of inside and outside electric wiring is placed with the city electrician, who is appointed by the city council for a 4-year term. Gus Burandt was appointed city electrician July 1, 1923. Previous to this time the local representative of the Louisiana Fire Prevention Bureau was the city electrician.

Inspections.—All work is inspected during installation and after completion. Old work is inspected only when extensive changes are made or occupancies change.

Permits and Records.—Applications for permits are made on forms requiring considerable data, a copy of which is kept on file by streets and number; notations of inspections are made

on these forms. Current may not be supplied until a certificate of approval has been issued. Where additions are made to old work the whole installation must be placed in good condition.

LAWS AND REGULATIONS.—The electrical ordinance was revised in 1923; it requires all new work to be in accordance with the National Electrical Code and all electrical fittings and materials used those approved by the Underwriters' Laboratories, Inc. Provision is also made for the examining and licensing of all contractors. The placing of poles in certain streets in the business district is prohibited. The building code requires all electrical wires within the inner and middle fire limits to be installed in conduit, except in dwellings in the middle limits.

INSIDE WORK.—In December, 1923, several new and old representative installations were inspected by a National Board engineer to ascertain the general condition of inside work. The new work inspected showed an average of 2.7 defects per equipment. Most of the defects were changes made subsequent to approval and included chiefly, fuses too large and the misuse of portable cord.

In the old work inspected an average of 4.4 defects per installation were noted. Conditions in general are fair and show the effect of long municipal supervision. Among the most prominent defects were: Circuits overloaded, wires not properly supported, sockets and switches broken and the misuse of flexible cord.

OUTSIDE WORK.—The Southwestern Gas and Electric Company furnishes current for light and power from a station north of the principal mercantile district. A 6,600-volt, 3 wire, 3-phase circuit, with 11,500 volts between legs, forms a loop around the closely-built portion of the city. Primary circuits are 2,300 volts alternating current; secondaries 110-220 volts. There is also a 500-volt direct current power circuit in the business district. Series arc lighting circuits are alternating current with a maximum voltage of about 2,800.

Wires of the municipality and main lines of the two telephone companies are underground in the business district, but practically all other outside wiring is overhead and forms serious obstructions in most of the streets and alleys.

The Shreveport Railways Company generates current at 600 volts d.c. and operates street railways with overhead trolley and rail return.

ELECTROLYSIS.—The water department reports some trouble from electrolysis along Market street from Caddo to Travis, where 60 feet of 6-inch pipe was destroyed in 1921; in 1923 some service connections were destroyed

CONFLAGRATION HAZARD.

on Texas avenue between Louisiana and Spring streets. Rails have been rebanded in these localities and the trouble eliminated. The telephone companies make infrequent tests; and report no trouble from this cause.

CONCLUSIONS.—Laws give the city good control over electric wiring which must conform to the National Electrical Code. A good class of new work is being secured; the old work is fair, showing the effects of long municipal supervision. Overhead wiring forms serious obstructions, particularly in the alleys. Some damage from electrolytic action has been experienced but the trouble is believed to be eliminated.

CONFLAGRATION HAZARD.

PRINCIPAL MERCANTILE DISTRICT.—

Limits.—Starting at Fannin and Commerce streets; Commerce, alley southeast of Crockett, Market, Crockett, alley between Market and Edwards, a line 150 feet southeast of Milam, alley between Milam and Crockett, Common, alley between Texas and Travis, McNeil, Travis, alley between Market and Edwards, and Fannin to place of beginning.

General.—The district is in the northern part of the city, extending southwesterly along Texas and Milam streets. It contains 26 blocks or part blocks, covering 75.8 acres, including the court house block, and is 7 blocks long and 2 to 4½ blocks wide. Values are moderate to high, the highest being along Milam and Market streets consisting of hotels, office and bank buildings. The northeastern end contains the principal wholesale mercantiles and the southwestern part is occupied by retail mercantiles, with rooms and offices above. The district is moderately exposed on the northeast and southwest sides by manufacturing and mercantile districts, respectively, and mildly elsewhere by frame residences.

The surface of the district slopes towards the river, with a difference in elevation of about 35 feet. The blocks are 320 feet square and are divided by 20-foot alleys. Streets are 66 feet wide, except Texas and Market streets which are 100 feet and 86 feet wide, respectively. The blocks are mostly solidly built and, excepting court house square, average 81 per cent. built upon; 36 per cent. of the district is occupied by streets.

The 30 fireproof buildings cover 20 per cent. of the built-on area. In the central portion along Marshall street they should form an effective fire break, together with the vacant space surrounding the court house and post office. Frame construction, covering 4 per cent. of the built-on area, is found in about half of the blocks but contributes only slightly to the general hazard. The remaining construction is joisted brick generally lacking in fire-resistive features. Few are

of excessive height but many are of large or excessive area. Party and fire walls are often of insufficient thickness and parapets are usually low; unprotected vertical openings are the rule but there is a fair amount of window protection in the newer portions of the district.

The probability of fires beyond control has been somewhat reduced in much of the district by the increased amount of fireproof and sprinklered construction; sprinklered buildings now cover 8 per cent. of the built-on area. However, in some of the blocks where large area and inferior constructed buildings are mutually exposing there is great likelihood of several buildings being involved in one fire. This condition is most serious in the northeastern section where the hazard is increased by the deficient water supply. However, wind velocities are low, streets are of fair width, the fire department is well trained and efficient and the heights of the poorly constructed buildings are mainly low. The probability of a general conflagration is low but severe block fires are likely to occur in a number of locations.

Hazards above the average for the district exist in the block bounded by Milam, Spring, Crockett and Market streets (Sanborn, page 25, block 49). This block consists of joisted brick buildings, including a 5-story office building, a 4-story hotel and a 2-story wholesale dry goods store, all of excessive area. A fire in the hotel could easily spread to a group of small stores to the north and might involve some small groups in the block adjoining on the north. The dry goods store is cut off from the rest of the block by alleys, is sprinklered and has protection on openings, but a fire here might spread across Crockett or Spring streets and involve other excessive area buildings, occupied as wholesale groceries and stables.

In the block bounded by Milam, McNeil, Crockett and Louisiana streets, mentioned in the 1911 report, the 4-story hotel and the large area laundry have been sprinklered, and other structural improvements made, so that the block no longer possesses conflagration probabilities above normal for the district.

OUTSIDE THE PRINCIPAL MERCANTILE DISTRICT.—Minor Mercantile District.

—Extending along Texas avenue from Milam to Levy streets is a minor mercantile district consisting of 1- to 3-story joisted brick buildings with frame and fireproof buildings interspersed. Values are generally low except for a few fireproof warehouses and there are many open spaces. Only small group fires should occur, except in the vicinities of Lawrence and Jordan streets and Pierre avenue, where there is considerable congestion.

Manufacturing Districts.—North of the principal mercantile district, and bounded, roughly, by Cross bayou, Red river, Fannin, Spring, alley

RECOMMENDATIONS.

northwest of Caddo, Marshall, Cypress, McNeil and Tomkies streets is a wholesale and manufacturing district, one portion of which is intersected by Commerce street, 125 feet wide. Buildings are mainly of brick, 1 and 2 stories high, the highest being a 4-story fireproof warehouse. Occupancies include cotton compress, meat packing, warehouses, foundries, railroad shops and freight houses, cotton seed oil and planing mills, lumber storage and a car barn. The car barn, packing house, part of the iron foundry and one warehouse are fireproof; some are equipped with sprinklers and there is considerable amount of private fire protection. Except for the group of buildings comprising the planing mill and lumber yard, which could be easily involved in one fire, the hazard is local.

East of Texas avenue, along the railroads from Jordan street to the city limits, are numerous detached manufacturing establishments, creosoting and fertilizer works, oil supply houses, oil and lumber storages, etc. Some are equipped with automatic sprinkler equipments; others are more than 1,000 feet from public hydrants and at these locations serious individual fires are probable; the general hazard is low.

Residential Districts.—The residential sections consist of detached shingled-roofed frame dwellings, often closely grouped and presenting the

usual flying brand hazard. In the outlying (colored) sections, no water supply is available and the fire alarm system is very inadequate.

CONCLUSIONS.—In the principal mercantile district, serious individual and small group fires are probable, especially in the northeastern part, because of the presence of numerous excessive area buildings, poorly guarded fire hazards and deficient water supply. In the southwestern part, nearly all blocks have large area fireproof buildings which serve as partial fire breaks; there are a considerable number of good fire walls and a fair amount of window protection, which together with the mainly low heights, adequate water supply and good street widths should enable the efficient fire department to ordinarily confine a fire to the building of origin.

In the minor mercantile district, areas are small, heights and values low and only group fires should occur.

The local hazard in the manufacturing districts is severe owing to the many excessive areas and hazardous occupancies; however, only individual or small group fires should occur. The residential sections involve the hazard of flying brand fires on shingle roofs; some outlying sections have no water supply.

RECOMMENDATIONS.

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

WATER SUPPLY.

Organization.

1. That all officials and employees of the water department be placed under suitable civil service rules, requiring proper qualifications with removal from office only for cause.

Supply Works.

★2. That the plans for a new supply, as proposed by the city, be carried out as soon as possible. These to include:

a. Development of the supply from Cross Lake.

b. Installation of a 6,000,000-gallon high-lift pump.

c. Arranging suction, discharge and steam piping so that the failure of any pipe would not put more than one unit out of service.

3. That conditions at the pumping station be improved by eliminating all combustible material from the station and minimizing internal hazards. In lieu of complete fireproofing, the conditions are best met by installing an automatic sprinkler system and protecting all communicating openings by standard fire doors.

Mains.

★4. That the distribution system be strengthened by the installation of the mains given in the table below and shown on the accompanying plan, and the following be adopted as the standard minimum sizes for mains used for hydrant supply for all future construction:

a. For residential districts, 6- and 8-inch; the former to be used only where they complete a good gridiron, and the latter in locations where dead ends and poor gridironing are likely to exist for some time and in any case in blocks 600 feet or more in length.

b. For mercantile and manufacturing districts, 8- and 12-inch; the former to be used only in sections where they complete a good gridiron.

All dead ends to be eliminated wherever practicable, and long unsupported lines cross-connected so that not more than one hydrant will be on a 6-inch main between intersecting lines, and not more than two hydrants on an 8-inch main between intersecting lines.

RECOMMENDED MAINS.

Size, Inches	Along	From	To
*24	Common St.	Pumping Station.	View St.
	View and Ford Sts., Pierre Ave., Templeman St., Perrin Ave., Norma and Hotchkiss Sts., Madison Ave., Laurel St. and Harriet Ave.		
*16		Common St.	Fetzer Ave.
*12	Cotton St.	McNeill St.	Market St.
12	Fannin St.	McNeill St.	Commerce St.
*12	Fetzer and Exposition Aves.	Arkansas Ave.	Greenwood Rd.
*12	Texas Ave. and Greenwood Rd.	Levy St.	Virginia Ave.
12	Olive and Dillingham Sts.	Alley, east of Line Ave.	Wilkinson St.
12	Line Ave.	Kings Highway	Columbia St.
12	Gary St.	Line Ave.	End of 12-inch.
*12	Norma St.	Harp St.	Hotchkiss St.
*10	Gilbert St.	Herndon St.	Robinson St.
10	Wilkinson St.	Highland Ave.	Gilbert St.
*10	Kings Highway and Pierre Ave.	Samford Ave.	V. S. & P. R. R.
*10	Market St.	Cypress St.	Cotton St.
8	As shown on accompanying plan.		

*Contemplated by Water Department.

Gate Valves.

5. That the distribution system be equipped with a sufficient number of gate-valves, so located that no single case of accident, breakage or repair to the pipe system in important mercantile and manufacturing districts will necessitate shutting from service a length of main greater than the side of a single block, or a maximum of 500 feet, or in other districts, lengths greater than two sides of a single block, with a maximum of 800 feet.

6. That all valves be inspected yearly and that records be kept of inspections, operation, and condition.

Hydrants.

7. That additional hydrants be installed in those sections not properly protected. For good hydrant distribution there should be at least one hydrant to every 70,000 square feet in high value districts and 110,000 square feet in residential districts.

8. That all hydrants in service with 4-inch barrels be replaced.

9. That the use of hydrants be confined to the water and fire departments.

FIRE DEPARTMENT.

Organization.

★10. That the Chief and Assistant Chief be appointed for an indefinite term with removal only for cause. All appointments and promotions to be made under civil service regulations after examinations; suitable physical requirements, age limits, and probationary periods to be prescribed for new members.

11. That sufficient officers be appointed so that an officer shall be on duty on each platoon of each company.

★12. That sufficient men be appointed so that the least number present will be as follows:

	Day	Night
Engine Companies 2, 2A, 3 and Ladder Company 2.....	6	8
Engine Companies 5, 6, 7 and Hose Company 4, changed to an engine company.....	4	6
Recommended ladder company.....	5	7

Companies and Apparatus.

13. That service be improved as follows:

a. By equipping Hose Company 4 with a motor pumper of at least 700 gallons capacity and with a 40-gallon chemical or water tank.

★b. By establishing in an addition to Station 3 or in that vicinity, a ladder company equipped with a service truck having a 40-gallon chemical tank.

Equipment.

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

a. To each pumper: Five-inch single or 3½-inch siamesed soft suction.

b. To each hose carrier: Open nozzles with tips from 1-inch to 1½-inch, tips for shut-off nozzles from ¾ to 1¼, a burst-hose jacket, extra chemical charges, a siamese, 2 waterproof covers and nozzle holders; and to Hose 3, a cellar pipe and deluge set.

c. To ladder trucks: Hose roller, revolving nozzle, rubber gloves, 4 waterproof covers and a modern gas mask.

Hose.

15. That at least 1,000 feet of 3-inch hose be provided for each reserve hose wagon and Engine 2A.

16. That other hose-carrying vehicles carry 200 feet of 3-inch hose with a total of at least 1,000 feet of 2½- and 3-inch hose, and with a complete spare shift in quarters; all 3-inch hose to be fitted with 2½-inch couplings properly beveled, and of National Standard dimensions.

Operation.

17. That engines be tested annually and after any extensive repairs, following methods published by the National Board of Fire Underwriters.

18. That the use of waterproof covers to protect property be made a part of the regular duties at fires.

FIRE ALARM SYSTEM.

Boxes.

19. That additional boxes be installed so that a box shall be visible within 500 feet of every point in high value districts; and within 800 feet of every important group of buildings in other districts.

20. That the location of boxes in high value districts, not already so marked, be indicated with a red light. Boxes and wide bands on poles supporting boxes to be painted with a brilliant red paint annually.

Circuits.

21. That the reliability of the system be increased:

a. By installing separate closed alarm circuits independent of box circuits to all stations, with not more than 5 instruments on any alarm circuit.

b. By removing circuits from poles carrying high tension wires.

c. By placing circuits underground where ducts in signaling subways are available, using rubber-covered copper wire in lead sheathing.

d. By providing an additional source of current for charging batteries.

Operation.

22. That detailed records of all tests, troubles and defects be kept and map and diagrams of circuits and box locations be provided.

BUILDING DEPARTMENT.

23. That assistants be appointed to the building inspector so that the construction of all buildings in the city, including dwellings, may be properly supervised.

★24. That combustible roof coverings be prohibited throughout the city on all new or repaired roofs.

25. That the inner fire limits be extended to include at least one block around the principal mercantile district.

BUILDING DEPARTMENT.

EXPLOSIVES AND INFLAMMABLES.

★26. That the ordinances be amended to form a complete code governing the manufacture, sale, storage and transportation of explosives and inflammables. It is recommended that the suggested ordinances on these subjects promulgated by the National Board of Fire Underwriters be used as a guide in framing new regulations.

ELECTRICITY.

★27. That all overhead wiring in closely-built sections, except trolley wires, but including street railway feed wires, be placed underground.

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 53,000. Important cotton, oil, and distributing center. Surface rolling. Street widths fairly good; well paved, except outlying districts. High winds infrequent. Winter temperatures mild. Periods of hot dry weather moderate. Number of fires, loss per capita and per fire, high.

FIRE-FIGHTING FACILITIES.

Water Supply.—Municipal works. Management capable. Records good. Source adequate and fairly reliable. Pumping capacity inadequate for safe reserve. Hazards at pumping station moderately severe; large part of station non-fireproof. Consumption moderate; well controlled. Pressures fair to good. Main arteries well arranged but secondary feeders lacking in some sections. Distribution system incomplete in outlying districts; few dead ends. Gate valve spacing fair to poor; condition fair. Hydrants of good type, but not properly maintained; spacing good in important districts; poor elsewhere.

Fire Department.—Full paid; two platoon basis. Suitable supervision. Chief competent and progressive. Insufficient officers and men. Distribution of companies generally good. Engine capacity and heavy stream appliances slightly deficient; additional ladder company needed. A fair amount of minor equipment provided. Apparatus standardized. Hose of good quality, regularly tested and well cared for; no 3-inch hose. Two loaded hose wagons in reserve. Chemical equipment good. Repair facilities good. Fire stations in generally good condition. Discipline well maintained. Fire methods generally good but insufficient use made of chemical equipment. Building inspections well organized and fairly effective. Records mainly good.

Fire Alarm System.—Automatic system with manual provisions, installed in 1922; well maintained. Headquarters in fireproof building; internal hazards slight. Equipment complete. Batteries in good condition. Duplicate box circuits to fire stations. Box circuits partly underground; circuits generally well constructed and protected. Wiring in stations and in headquarters good. Boxes generally well maintained; distribution generally good in mercantile district and good to poor in other districts. Transmission of alarms satisfactory. Telephone alarms confirmed over fire alarm system. Records and maps provided but not comprehensive.

Fire Department Auxiliaries.—State fire marshal's powers adequate; cooperation with local authorities good. Police cooperation good. Some public service corporations receive alarms and render assistance. Telephone service rendered by two companies generally good and largely used for transmitting alarms. Considerable private fire protection in the manufacturing district. A small amount of outside aid available in from 2 to 4 hours.

Summary.—Water supply works adequate and fairly reliable; inadequate quantities available in section of principal mercantile district supplied by small mains; elsewhere supply generally adequate except in the southwest district. Fire department efficient, but somewhat undermanned and lacking in equipment. Fire alarm system generally adequate, but deficient in boxes.

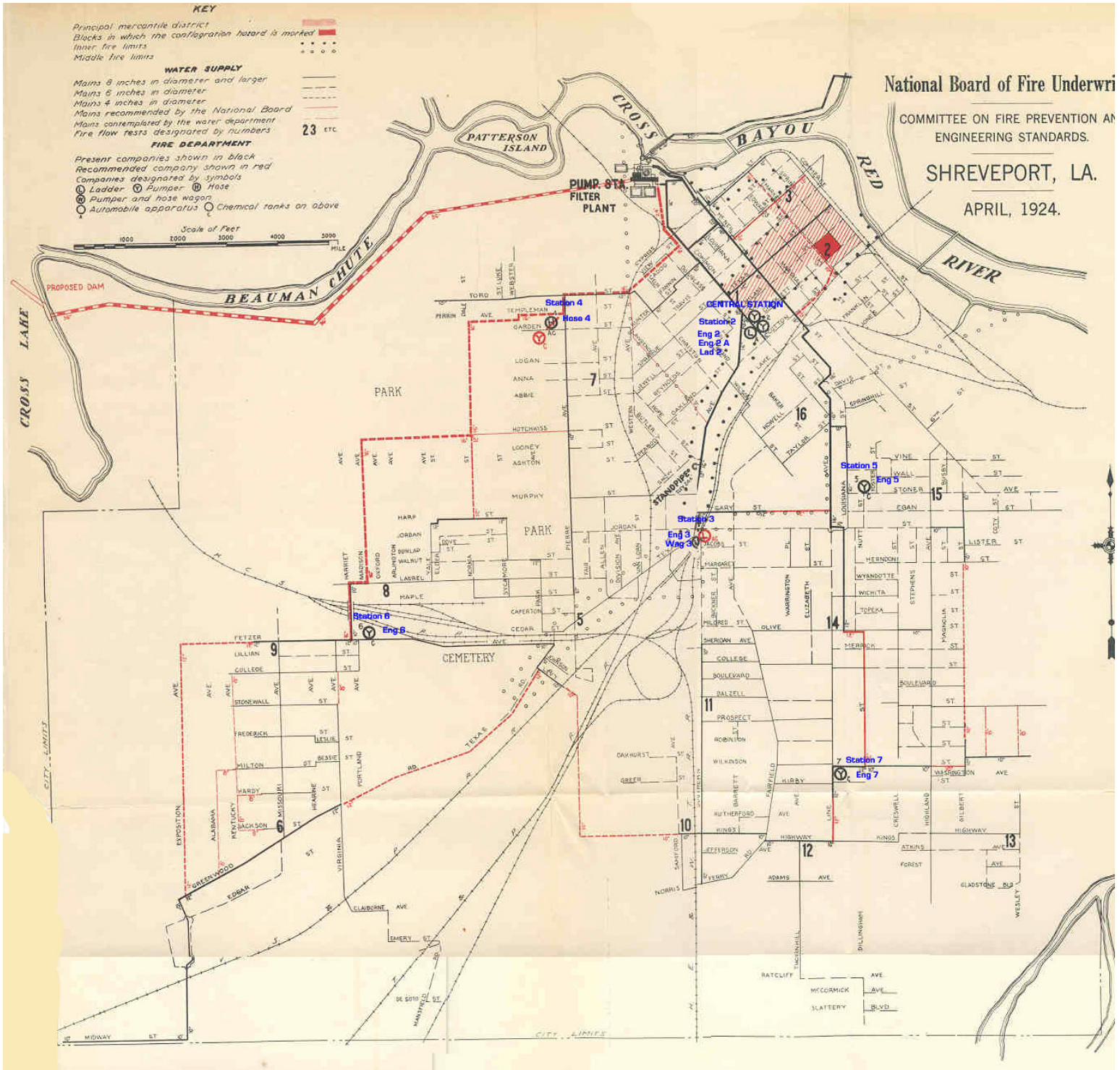
STRUCTURAL CONDITIONS AND HAZARDS.

Building Department.—Good building laws, except that shingled roofs are permitted outside fire limits, which are now inadequate in extent; enforcement good. Department is in charge of experienced inspector.

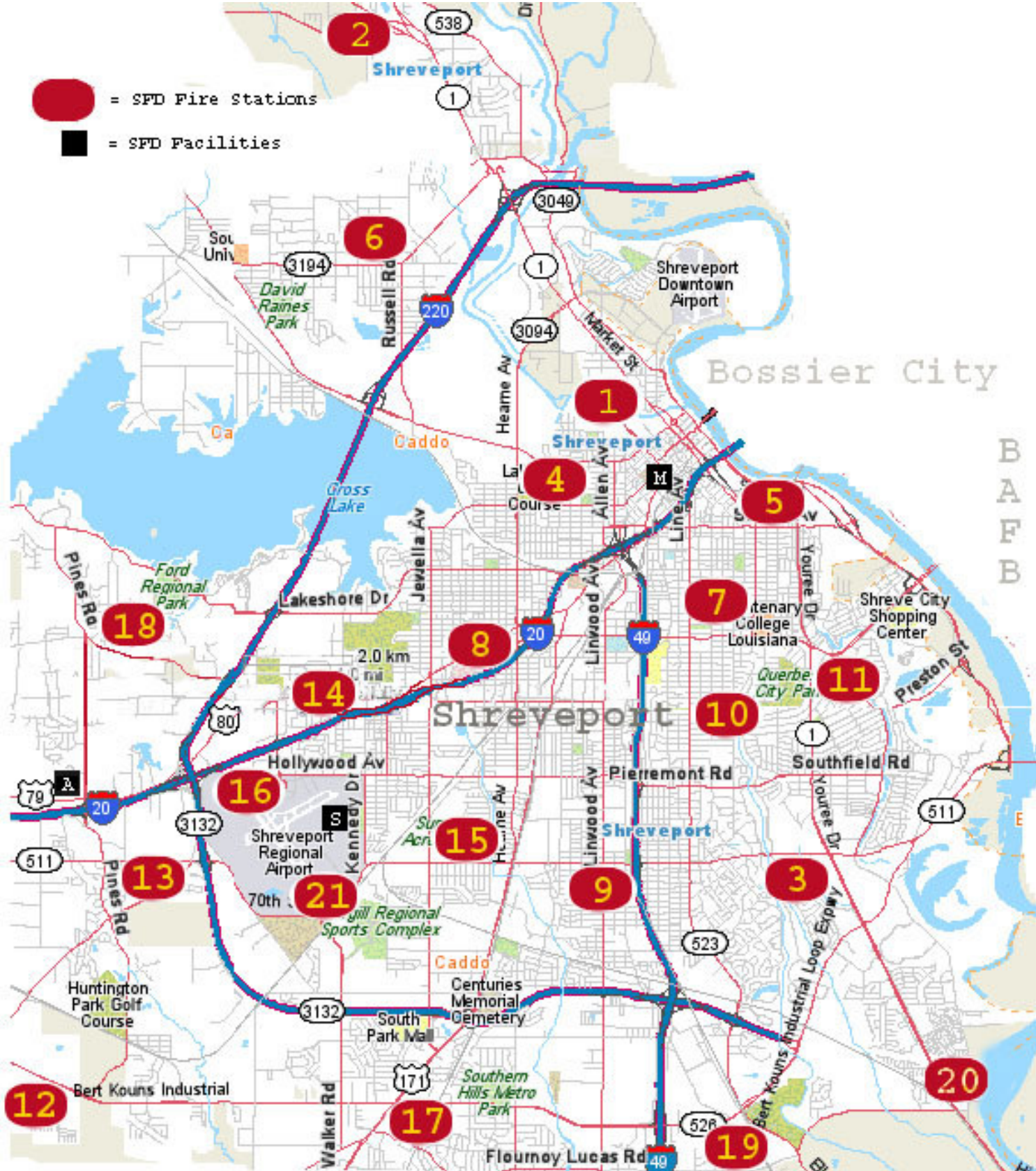
Explosives and Inflammables.—Laws inadequate. Efficient inspections by fire marshal and fire department. Some hazardous conditions found, due mainly to lack of laws.

Electricity.—Municipal control; National Electrical Code adopted by ordinance. New work in good condition; old work in fair condition. Overhead wire obstructions serious. Considerable electrolytic action has been experienced; proper remedial measures adopted.

Conflagration Hazard.—In the principal mercantile district there are several excessive areas, construction is weak, and the water supply is deficient in the northeastern part. However, under normal conditions a general conflagration is improbable, as the fireproof construction forms potential fire breaks, block interior accessibility is good, buildings mainly low, and the fire department efficient. In the manufacturing districts serious individual and small group fires are probable. In the minor mercantile district group fires are likely. Residential districts present the usual flying-brand hazard, increased by a poor water distribution system in some sections.



**Map of Shreveport, Louisiana - 1924
 Showing Fire Stations and
 Type of Apparatus**



Map of Shreveport, Louisiana - 2004
Showing Fire Stations