38

TAMPA,
FLORIDA

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April, 1960

File No. 38

REPORT

ON

TAMPA, FLORIDA

(Superseding previous reports)

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The survey of conditions in Tampa, Florida was made during November, 1959, through January, 1960, by Engineers William C. Peck, Carl L. Frick, Jr., and Leslie A. Scher in cooperation with the South-Eastern Underwriters Association and the Florida State Inspection and Rating Bureau.

SUMMARY OF REPORT
TAMPA, FLORIDA

Summary of Fire-Fighting Facilities.—Supply works barely adequate, and with some unreliable features; quantities available generally good in the principal business district and good to poor elsewhere; however, very little protection is provided in some areas due to the very wide hydrant spacing. Fire department a generally effective force but additional engine and ladder companies required and training program incomplete. Fire alarm system inadequate in extent and with some unreliable features; being rehabilitated.

Conflagration Hazard.—In the principal business district, the moderately large amount of fire-resistively weak construction, excessive fire areas and mutual exposures makes severe group fires likely in many blocks; however, such fires should not spread beyond the block of origin because of the fair amount of automatic sprinklers and fire-resistive construction, the fair width of streets, and the generally effective fire department. The hazard of sweeping fires of group or block proportion is pronounced in several congested minor business, industrial, and residential areas.

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General.—Mayor-council form of government. Population about 280,000. Seat of Hillsborough County; important port and commercial and distribution center. Surface level; streets mainly of fair width and paved. Extended periods of hot dry weather; area subject to tornadoes and hurricanes.

Water Supply.—Municipal system under capable supervision. Records mainly satisfactory. Emergency service fair. Supply adequate; filter plant barely adequate; insufficient reserve pumping capacity. Piping has some unreliable features. Distribution in one service. Pressures fairly good; generally well maintained. Arterial mains fairly well arranged. Considerable 2- and 3-inch pipe used for minor distributors providing no fire protection. Valve spacing generally wide; condition fair to good. Hydrant spacing fair in principal business district but very wide elsewhere; condition fairly good.

Fire Department.—Full paid; under competent supervision. Three districts, each serving an excessive area. Chief appointed by mayor; other appointments and promotions under civil service regulations. No compulsory retirement age. Manning of existing companies fair to good. Additional engine and ladder companies required for proper coverage and protection. Apparatus fairly well equipped; much new and well maintained. All apparatus radio equipped. Stations generally in good condition; many recently constructed. Rules and regulations being formulated. New drill facilities used to good advantage; training program in need of expansion. Response to some alarms seriously inadequate. Fire methods generally good. Records fairly good.

Fire Alarm.—Automatic system; under good supervision. Provides protection to central part of the city only. System unreliable due to lack of proper maintenance in recent years. Headquarters equipment old and somewhat incomplete but well housed. Circuits entirely underground; most show heavy grounds. Some stations lack duplicate alarm circuits. Boxes of good type, well installed; many inconspicuous; not properly tested. Many additional boxes required. Sufficient number of well qualified dispatchers. Radio facilities complete and used to good advantage Telephone alarms not confirmed over alarm system. Tests somewhat incomplete; records fair to good but some not up to date.

Fire Department Auxiliaries. — State insurance commissioner, with adequate police powers, serves as state fire marshal; all building fires investigated by local fire prevention bureau. Good police department cooperation. Telephone service well distributed; extensively used for reporting fires. A few central station services. Public utilities emergency crews respond upon request. Fair amount of private fire protection. Some outside aid readily available.

Building Department.—State laws incomplete, municipal ordinances good but inadequately enforced. Fire limits slightly inadequate in extent; restrictions good, but enforcement lax. Recods incomplete.

Electricity.—Good municipal ordinances but inadequate supervision over new inside work. Older installations only fair; few reinspections made. Records incomplete.

Fire Prevention.—Good laws. Well organized fire prevention bureau but insufficient personnel to maintain adequate inspection program. Local conditions fair to poor. Records mainly adequate.

TAMPA, FLORIDA

FILE NO. 38

GENERAL

The city is administered by a mayor-council form of government. The Hon. J. Lane is the Mayor.

The 1950 United States Census showed a population of 124,681; the present population is estimated to be 280,000, an increase of about 125% due in part to a recent annexation. The city, seat of Hillsborough County, is the principal commercial and distributing point for southwestern Florida and is an important deepwater port.

The city has an area of 115.8 square miles including 45.2 square miles covered by water. Of this total area, 50.5 square miles of land and 40.2 square miles of water area were annexed in 1953. Sixty-two percent of the present land area is developed. The Hillsborough River extends through the central part of the city and divides it into 2 unequal areas, the larger portion being on the west bank. The surface is practically level; elevations range from about 3 to approximately 55 feet above mean sea level.

Of the 1217.90 miles of streets in the city, 879.76 miles are paved with durable materials, and 73.87 miles are graded and compactly surfaced with crushed shells; most of the remaining 264.27 miles of streets are graded, but none are paved. Street widths vary from about 25 to 80 feet, except for a few main roads, in outlying areas, which are wider. In the principal business district streets are mainly 80 feet wide. Street grades are slight with but a few short lengths having grades up to 6%.

A commercial airport is located in the northwestern portion of the city and a large air force base adjoins the southern extremity of the city. Many commercial airplanes pass over the city throughout the day at fairly low altitudes on their landing approach. There have been no crashes within the city in recent years.

Records of the U. S. Weather Bureau indicate that wind velocities are normally low, but the area is subject to tornadoes and hurricanes. Extended periods of hot, dry weather are moderately frequent, and winter temperatures seldom fall below freezing. In March, 1960 there was severe flooding in the northern portion of the city. Property damage was extensive and about 2,000 homes were evacuated; damage to business property was mainly along Nebraska Avenue near the river. Fire services were not interrupted.

FIRE-FIGHTING FACILITIES

WATER SUPPLY

ORGANIZATION.—General.—The system is municipally owned and operated and supplies most of the city and provides all fire protection. A private water company within the city supplies approximately 5000 consumers.

General supervision of the system is under the water superintendent who is appointed by the mayor for a 4-year term with the approval of the Board of Representatives; L. J. Cobb, Jr. has held this position since January 19, 1956. There are 246 permanent employees in the department; all are under civil service regulations.

Records.—A set of plats on a 100-foot scale, showing mains, valves and hydrants, are kept up-to-date, as are two sets of plats on a 200-foot scale which show mains and hydrants. A wall map of the distribution system showing mains is up-to-date. Plans of the filter plant, pumping station and storage facilities are complete and up-to-date. Hydrant inspection sheets, used also as the hydrant records are complete but not up-to-date; there are no valve records. Recording gauge charts are kept at the shop and show pressures and height of water in the elevated tanks. Most records are stored in a vault or metal cabinets at the shop.

Emergency Service. — The distribution office, shop, garage and storage yard are at Highland and 7th Avenues. The department has ample equipment; 11 vehicles are provided with mobile-telephone units. A power-driven valve-operating device is available. Alarms of fire are not received and response is not made unless requested by the fire department. A 24-hour watch is kept at the shop and an emergency crew is on duty until 4 A.M. and on call thereafter. Telephones are installed in the homes of the employees and off-duty personnel can be readily assembled.

OUTLINE OF SYSTEM. — Supply taken from the Hillsborough River is pumped to a filtration plant, from which it is pumped into a

single service distribution system with elevated storage. A reservoir and a repumping station are used to maintain pressures during peak consumption. A small supply is taken from a well field in the western part of the city to meet local peak demands.

SUPPLY WORKS.—Source. — The Hillsborough River, with a drainage area above the intake of 602 square miles, has a minimum estimated flow of about 50 mgd. About ½ mile below the intake a concrete dam forms a narrow lake some 12 miles long, impounding about 2490 mg in the upper 4 feet, overflow at elevation 21.

Intakes.—See the map.—A concrete chamber in the center of the river channel, in about 25 feet of water, has 4 openings. From the intake a 36-inch cast-iron pipe extends about 250 feet to a concrete screen and suction well adjacent to the steam pumping station. From a submerged intake a 30-inch cast-iron main extends to a concrete screen well adjoining the electric pumping station at the river edge; the well also obtains supply through open bar screens. From this screen wall a 30-inch cast-iron main extends to the screen and suction well at the steam pumping station.

Pumping Stations and Filtration Plant.—See the map. Raw-water pumps in the steam pumping station consist of 3 steam-driven single-stage centrifugals, one of 21.0-mgd capacity, capable of delivering 25 mgd when operating alone, and two of 12.5-mgd capacity with a head of 17 psi. The pumps take suction, with a slight lift, through independent lines from the suction well and the 2 smaller pumps discharge to a 30-inch and the largest pump to a 24-inch main that extend to a valve chamber outside the station.

At the electric pumping station, raw-water pumps consist of a 4.62- and a 12.0-mgd centrifugal pumps driven by 220-volt motors. These pumps take suction from the well adjacent to the building and discharge to a 24-inch main that extends to the valve chamber. A break in this line or the 24-inch main from the steam pumping station would leave only the two 12.5-mgd pumps in operation. The repair of a valve at the valve chamber could prevent delivery by the raw-water pumps. From the valve chamber a 36- and two 30-inch mains extend to the filtration plant.

There are 2 circular steel pre-sedimentation basins, 4 mixing and coagulating tanks and 4 settling basins; all are of substantial construction. The elevation is 49. The pre-sedimentation basins have a rated capacity of 15 mgd each and the mixing tanks and settling basins have a rated capacity of 5 mgd each. The 36-inch and the two 30-inch mains, which reduce to a single 48-inch main, extend to the mixing tanks; the piping is so arranged that any part or all of the settling facilities may be by-passed. From the settling basins a concrete conduit extends to supply the filters. A break in the filter piping would put the plant out of service. There are sixteen 1.75-mgd rapid sand filters. From the filters a 48-inch concrete conduit extends to a 0.5- and a 2.0-mg covered concrete filtered water reservoirs, elevation 31.5; the conduit also supplies a 36-inch main extending to a 5.0-mg filtered water reservoir.

The filter building is of noncombustible construction. Six extinguishers, 5 gas masks and several hydrants on the grounds are provided. Operation of the plant is in 3 shifts of at least 2 men each.

In addition to the raw-water pumps there are two 23.05-mgd and two 12.5-mgd steam-driven centrifugal high-lift pumps in the steam pumping station. When operating alone, the larger pumps can deliver 25.0 mgd and the smaller pumps 14.0 mgd. When operating together, the pumps will deliver their rated capacities. The 2 smaller and one of the large pumps take suction from a 36-inch, single gated, main, elevation 16, that connects the filtered water reservoirs; the remaining large pump takes suction directly from the 2.0-mg reservoir. Discharge is to a header that supplies a 30- and two 36-inch mains, equipped with venturi meters, which extend to the distribution system.

There is a 5.04-mgd centrifugal high-lift pump driven by a 220-volt motor in the electric pumping station. However, several hours would be needed to place the pump in operation. Suction is obtained through an 18-inch connection to the 36-inch high-lift suction main. The discharge is through an 18-inch main to the 30-inch discharge main.

Normal operation is a large high-lift and raw-water pumps with the other steam pumps operated as needed. Discharge pressures vary between 55 and 65 psi. The electric-driven raw-water pumps are run once a week during the winter for a period of 1 to 4 hours and more frequently during the summer. The electric-driven high-lift pump discharges at a lower pressure than the other high-lift so it is only for emergency use. Operation of the station is in 3 shifts of at least one man each.

A 300-kw steam-driven generator furnishes current for lighting and power. Two water tube boilers, rated at 35,000 pounds of steam an hour, supply steam at 350 pounds pressure. One boiler is sufficient to operate the station. Steam piping is in a loop, with branches to each unit well installed and gated, except that the repair of a single valve could necessitate the shutting down of all steam units. Duplicate boiler feed and fuel pumps and piping is provided. There are two 25,000-gallon and one 840,000-gallon oil tanks which are well installed. However, the repair of

a valve in the fuel piping could necessitate the shutting down of the boilers. A 2300-volt overhead circuit from the Tampa Electric Company supplies a bank of transformers adjacent to the electric pumping station. A 2300-volt circuit also extends to a bank of transformers outside the steam pumping station.

The steam pumping station is a large-area building of ordinary construction with a tile covered wooden roof on steel trusses, the floors are of concrete in two levels. The pump room has the pipe gallery under the high-lift pump floor. There are no exposures. Each pump has its own enclosed lubrication system. Wiring is in conduit. Two extinguishers are provided and hydrants are on the grounds. The nearest fire station is more than 1 mile distant.

The boiler house is of noncombustible construction with a precast concrete slab roof on exposed steel trusses; floor is concrete.

The electric pumping station is a small area building of ordinary construction, with a concrete floor and tile covered wooden roof on wood and steel beams.

Drew Field Supply.—See the map.—A pumping station, at Ohio and Manhattan Avenues, operates during week days from 8 A.M. to 7 P.M. to maintain pressures in the vicinity. Six wells, equipped with electric-driven deep-well pumps with 2 wells also having stand-by gasoline engines, supply aerators over a 0.42-mg reservoir at the pumping station. Equipment in the station includes 3 electric-driven centrifugal pumps and one gasoline-driven pump. One electric-driven pump also has a gasoline engine. The maximum capacity of the station is about 1.5 mgd with about 0.5 mgd normally being delivered.

A similar pumping station, at Osborne and Hesperides Avenues is supplied by seven wells. The stations alternate, operating for a weekly period.

DISTRIBUTION STORAGE.—See the map.

Tank No. 1, Tank No. 2 and Tank No. 3.—These elevated tanks are identical; their capacity is 0.5 mg each, are 54 feet high, on a steel tower, top 123 feet from the ground; overflow is prevented by a regulating valve on each. Tank No. 1, elevation 168, floats on the distribution system. Tank No. 2, elevtation 169, is shut off due to the pressure in the distribution system being higher than the overflow of the tank. Tank No. 3, elevation 148, normally floats on the distribution system during part of each day with considerable fluctuations during days of high consumption and occasionally becomes empty.

Tank No. 4.—This tank is welded steel with a capacity of 1.5 mg at elevation 155. The height of the overflow is 135 feet and the range in water level is 35 feet. The tank is equipped with an electrically operated valve that is controlled by a time clock and an altitude valve. The time clock controls the tank during the day; the valve will also open if the pressure in the vicinity is less than 30 pounds.

Tank No. 5.—This tank is welded steel with a capacity of 1.5 mg at elevation 155. The height of the overflow is 116 feet from the ground and the range in water level is 35 feet. The tank is equipped with an electrically operated altitude valve. It floats on the system through an 8-inch bypass until the system pressure drops below that of the tank, at which the valve opens. Tanks Nos. 4 and 5 are provided with cathodic protection.

Drew Field Tank.—This tank has a capacity of 0.1 mg, has a depth of 25 feet, on a steel tower, top 123.5 feet from the ground. The overflow is at elevation 135. The tank is maintained full but is shut off due to the system pressure being higher than the tank pressure.

Port Tampa Tank.—This tank has a capacity of 0.1 mg, has a depth of 39 feet, on a steel tower, top 139 feet from the ground. The overflow is at elevation 144. The tank is maintained full but is shut off due to the system pressure being higher than that of the tank.

Reservoir and Booster Station.—The reservoir has a diameter of 163 feet, depth of 32 feet and a capacity of 5.0 mg at elevation 48.25. It is filled by system pressure through an electrically operated butterfly valve during the night.

The booster station is of fire-resistive construction and houses three 3.96-mgd centrifugal pumps, driven by 440-volt motors, which pump the contents of the reservoir back into the system. The pumps are operated by time and pressure switches to furnish supply during the day. One pump will also operate if the system pressure drops below 40 pounds. At the time of the survey, the booster station and reservoir were not in operation due to mechanical difficulties.

CONSUMPTION. — Figures are based upon readings of meters on the discharge mains at the pumping stations. The average consumption for the year ending September 30, 1959 was 23.71 mgd, of which an average of 0.6 mgd was delivered from the Drew Field supply. The maximum day for the past three years was 41.56 mg, of which 0.6 mg came from the Drew Field supply, occurring on May 8, 1959. The maximum day from Drew Field was 1.2 mg. All services are metered.

PRESSURES. — Recording gauges are maintained on the distribution system and charts are

on file at the shop. At the city hall in the principal business district the pressure is 60 to 65 psi with occasionally rises to 70 psi. At the distribution shop the pressure is 60 to 65 psi with an occasional rise to 68 psi. At Tank No. 1 the pressure during the day is 50 to 55 psi and at night is 50 psi. At Tank No. 3 the pressure is 55 to 60 psi during the day and around 65 psi at night. At Tank No. 4 the pressure is 50 to 60 psi during the day and 65 psi at night. At Tank No. 5 the pressure is maintained between 50 and 55 psi. At the Drew Field Tank the pressure varies from 50 to 60 psi during the day and steadies at 55 psi at night. At the Port Tampa Tank the pressure varies from 50 to 65 psi during the day and steadies at 60 psi at night. At fire department headquarters the pressure is maintained at 50 to 54 psi. At Engine 4 the pressure is maintained between 60 and 65 psi. At Engine 5 the pressure is 40 to 45 psi with occasional rises to 50 psi. At Engine 6 the pressure is maintained at 65 to 70 psi. At Engine 7 the pressure is maintained at 50 to 55 psi. At Engine 8 the pressure is maintained at 45 to 47 psi. At Engine 9 the pressures vary from 40 to 45 psi during the day and steadies at 42 psi at night. At Engine 14 pressures vary from 45 to 55 psi; at night pressures are 60 to 65 psi. At fire alarm headquarters pressures are maintained from 45 to 50 psi.

Pressures taken during fire flow tests are shown in Table A on the map and averaged 60 psi.

DISTRIBUTION SYSTEM.—General.— See the map and Table 1. In the distribution system east of the river, the primary arterial mains form generally large loops in the central portion. The outlying areas are supplied by long single lines. Secondary arterial mains are lacking in many areas, particularly along the river and in the northern part of the system. West of the river, the primary arteries furnish supply through long single lines which with some secondary arteries form several large loops to supply the area. Here again, the secondary arterial system is weak, particularly in the northern portion.

Minor distributors are mainly 6-inch with a good portion of 8-inch and a small amount of 4-inch. There are also 449.3 miles of 2- and 3-inch pipe used for local distribution. The gridiron of 4- and 6-inch pipe is very wide and irregular averaging 1430 feet between intersecting mains. Approximately 13.4 miles or 3 percent of the mains are in 4- and 6-inch dead ends serving hydrants.

Pipe.—Pipe in the system is nearly all cast-iron. The older pipe is class B, tar-coated, and pipe installed after 1940 is class 150 lined with a thin cement and bituminous coating. There is a small amount of asbestos cement pipe. The oldest pipe in the system was laid in 1889.

Mains are laid with a minimum cover of 2½ feet; recent installations under the railroads are laid with a 5½-foot cover and are placed in a concrete conduit. Frost penetration is negligible. The 16- and 24-inch mains crossing the river are in trenches and covered. The 16-inch to Davis Island is on a bridge and the 20-inch to the island is laid beneath the channel bed.

TABLE 1.—PIPE IN THE DISTRIBUTION SYSTEM, SEPTEMBER 30, 1959.

Diameter, Inches	Length, Miles	Per Cent of Total
4	13.07	2.5
6	202.69	38.4
8	139.28	26.4
10	24.20	4.6
12	89.44	16.8
14	0.64	0.1
16	15.62	3.0
20	9.95	1.9
24	25.77	4.9
30	3.35	0.6
36	4.01	0.8
Totals	528.02	100.0

* Does not include 449.3 miles of 2- and 3-inch pipe.

The older pipe in the system is subject to tuberculation and incrustation. There has been no trouble from electrolysis. The 30-inch discharge from the pumping station has been cleaned and relined as far as 13th Street and 7th Avenue.

Valves.—Most 16- and 20-inch, and all larger valves are geared, bypassed and set in vaults. All other valves are direct-acting and are set in cast-iron extension boxes. There are 30 cone valves on supply mains. Those in the 24-inch mains are 18-inch valves and those in the 30- and 36-inch mains are 24-inch valves. Most valves open clockwise. A few in the city and those at Drew Field open opposite. Those in the city are noted on the sectional plats.

Valves are usually located at street intersections on the property lines. No record of valve locations suitable for field use is available. The average length of main that would be shut off in the event of a break on arterial mains is 6800 feet. In the principal business district this average is 690 feet and the maximum is 1800 feet. In representative residential districts the average shut-off length is 1450 feet.

Valves 16-inch and larger are generally inspected yearly; no regular inspection of smaller valves is made. Valve inspection records are not

available. During this survey an inspection of 61 valves from 6 to 24 inches in diameter was observed. The inspection showed that 15 valves needed packing, one was stiff in operation, one had a broken stem, 4 boxes contained dirt, 6 boxes were full of ground water, 7 boxes were paved over, one box was too close to the valve stem and one cover was wedged in tight.

Hydrants. — As of November 30, 1959 there were 3048 hydrants in service of which 2096 have one 4½-inch and two 2½-inch outlets and of these 46 have only a 4-inch branch. The remainder have two 2½-inch outlets of which 161 have a 4-inch branch. Approximately 35 percent of the hydrants are gated. All hydrants have automatic drain valves and the sandy soil provides quick drainage. However, due to the high water table in the area, many hydrants would not drain or drained very slowly.

In the older section of the city, hydrants are generally located at street intersections. In the principal business district several intersections have two hydrants. In the newer annexed portions of the city the spacing is much wider, with some built-up areas without any hydrant protection. In the principal business district the average area served by each hydrant is 65,500 square feet, and in representative residential districts is 442,900 square feet ranging from a minimum of 130,500 square feet to a maximum of 1,905,000 square feet.

Of the 34 hydrants in and 32 hydrants adjacent to the principal business district, all have one 4½- and two 2½-inch outlets and a 6-inch branch; 31 are gated.

The last complete inspection occurred in 1957; in 1958 approximately 50 percent were inspected and in 1959 about 35 percent were inspected. During fire flow tests 313 hydrants were operated and various defects were noted, including 11 hydrants with drain valves that would not close, 3 that were stiff in operation, 3 that could not be shut down, one had no operating nut, 2 had broken frost jackets, one hydrant was set too low, one had a defective outlet, one had a loose foot-valve that chattered, 3 could not be operated, one could not be operated because of a car that was legally parked in front of it and one was fenced in.

FIRE FLOW TESTS.—See Table A on the map. Tests were conducted on Wednesday, December 9, 1959 between 7:30 A.M. and 5:00 P.M., on Thursday, December 10, 1959 between 8:00 A.M. and 5:00 P.M. and on Friday, January 8, 1960 between 8:45 A.M. and 12:30 P.M. under normal operating conditions. During the tests in the principal business district, the consumption was at a 16.3-mgd rate and the 24-hour consumption was 24.09 mg.

Of the tests conducted in 1952 and repeated during this survey, 21 tests indicated increases of 6 to 610 percent while 4 tests showed a decrease of 13 to 29 percent. The increased quantities available were due to the numerous large mains installed since 1952. It was not possible to make tests at numerous locations due to the lack of mains in the area or of sufficient hydrants to make a test.

CHANGES.—Since the 1952 report of the National Board of Fire Underwriters, a 36-inch raw-water main has been installed from the raw-water pumps to the settling basins; four 1.75-mgd rapid-sand filters and a 5.0-mg filtered water reservoir and the necessary piping have been installed. At the steam pumping station, a 23.05-mgd high-lift pump with a separate suction from the 2.0-mg clear well has been put in operation. A 36-inch main has been installed to the distribution system. The distribution system has been strengthened by the addition of 145.13 miles of mains, of which 33.42 miles is 12- and 16-inch pipe and 19.85 miles is 20-inch and larger. In addition, a 1.5-mg elevated tank and a 5.0-mg ground storage reservoir with an 11.88-mgd repumping station have been placed in operation. Two 0.1-mg and a 0.5-mg elevated tanks have been taken out of service. The average daily consumption has increased 32 percent and the maximum daily consumption has increased 52 percent.

Plans for the immediate future include increasing the filter capacity to 48 mgd, constructing a 7.5-mg filtered water reservoir, installing a second 21.0-raw-water pump, and laying additional arterial mains in the distribution system. When the consumption reaches 50 mgd, it is planned to construct a third intake, increase the plant capacity and develop a well field to the east of the city.

CONCLUSIONS.—The system is operated by capable and experienced personnel. Records are mainly complete and generally up-to-date. Emergency service is only fair due to the lack of response to fires.

An adequate supply for present needs is available from the Hillsborough River. Reserve pumping capacity in both raw-water and high-lift units is inadequate. Reserve raw-water pumping capacity will be adequate with the installation of the proposed unit. Filter capacity is barely adequate to meet maximum consumption demands. There are several unreliable features in the piping at the filter plant and pumping stations. Boiler capacity is adequate. Distribution storage is fair.

The arterial system generally has good capacity although it is wide and is incomplete in outlying areas, especially north of the river. The gridiron of smaller mains, except in the central portion of the system, is very wide, irregular and incomplete. This is largely due to the extensive

use of small mains for domestic service; in some areas, little or no fire protection is provided. The system is moderately affected by tuberculation and incrustation.

Pressures are fairly good and generally well maintained, except during brief periods of peak consumption.

The quantities available for fire protection are generally adequate in the principal business district and in other high value areas, except for the areas adjacent to the district and in the north-central and southern section of the system west of the river where they are fair to poor. Available quantities are generally adequate in residential districts. In some areas the lack of sufficient hydrants prevents effective delivery of the indicated quantities.

Valve spacing is generally wide. Valves are in fair to good condition. The majority of hydrants are of good size, but many lack a pumper outlet and a few still have small branch connections. Hydrant spacing is fair in the principal business district and very wide elsewhere, partly due to the lack of minor distributors. Hydrants are in fairly good condition.

FIRE DEPARTMENT

ORGANIZATION. — General. — The fire department is full paid under the general supervision of the mayor. The chief is the executive head of the department.

Districts. — For fire department purposes the city is divided into 3 districts, each excessive in area. District 1 has 9 engine, 3 ladder, one rescue and 2 foam companies and Districts 2 and 3 each have a rescue and 4 and 5 engine and 1 and 0 ladder companies, respectively. The offices of the chief, deputy chief and a district chief are at headquarters and district chiefs also work out of Engine 14 and 18 quarters.

Chief Officers.—Chief E. E. Leavine, age 50, has been a member of the department since 1936 and was promoted to his present position in October, 1959. Deputy Chief R. A. Starling, age 59, entered the department in 1927 and attained his present rank in 1955. They are assisted by 9 district chiefs whose ages range from 41 to 57 years and length of service from 13 to 34 years. The deputy chief is in charge of the department in the absence of the chief.

Membership. — Total membership in the department is 425, including 11 chief officers, 43 captains, 20 lieutenants, 10 chief officers' aides and 309 firemen comprising the fire force; other members consist of 8 in the fire prevention bureau, a supply officer and a drillmaster, both with the rank of district chief, 8 in the repair shop, 12 assigned to fire alarm, and 2 in the chief's office.

Appointments and Promotions. — All appointments and promotions, except to that of chief, are under civil service regulations with tenure of office provisions. The local civil service board consists of 3 members, one each appointed for 3-year terms.

Men seeking appointment must pass medical and written competitive examinations but no physical agility test is given. Age limits are 21 to 31 years, with suitable weight, height and vision requirements prescribed. Appointees must serve a 6 months probationary period.

There are 4 competitive promotional steps in the department. A member is eligible to take the examination for driver-engineer after 3 years of service, for captain after 6 years of service and at least 2 years in the previous grade, and for district chief after 10 years of service and at least 4 years as a company officer. District chiefs with at least 3 years in grade and 12 years experience are eligible to take the promotional examination for deputy chief. The chief is appointed by the mayor, seniority being the usual guide, and serves at the pleasure of the mayor. Fifteen years of active experience, at least 3 of which have been spent in a position of major command, or equivalent, are required.

Retirement and Pension.—A city administered pension plan, in which membership is optional, is financed by a 4% assessment on a member's salary, 1% of all fire and liability insurance written within the city, and appropriations, when necessary, by the city. Retirement is optional after 20 years of service at age 46 or after 25 years of service regardless of age. Service connected and ordinary disability provisions are prescribed and benefits for widows and dependent children are provided. There is no compulsory retirement age. The Firemen's Benevolent Association, in which membership is optional, is supported by dues of members and provides death and disability benefits.

There is no compulsory annual medical examination for company members, 7 of whom are over 55 years of age, 2 being 62.

Companies.—See Table 2.—There are 18 engine, 4 ladder, 3 rescue and 2 foam companies in service in 17 stations. A rescue, a ladder and 2 engine companies each have 2 officers assigned, and other engine and ladder companies have 3 officers; none are assigned to the other rescue or foam companies. In companies without an officer and during vacation periods and in case of sickness or days off in other companies a driver-engineer is in command.

The chief and deputy chief are on duty 5 days a week and on call at all other times. A district chief is on duty in each district at all times except during vacation periods or in case of sickness when the drillmaster, supply officer or a cap-

tain are used to fill the assignment. District chiefs, their aides and company members work a 24-hour tour followed by 48 hours off for an average of 56 hours a week. All members receive 14 days vacation annually; periods during 1959 were spread throughout the year with a maximum of 6 members per shift permitted off at any one time. Records indicate that an average of one man a day was lost due to sickness or injury during the past year. Off-duty members are recalled upon orders of the chief in charge who usually designates the number of men to be called. Members are permittted to work on their days off but are required to notify their respective officers before leaving the city. Twenty-five off-duty members reported when called to assist at a major fire in August, 1959.

Two engine, one ladder and one foam companies are at headquarters at the edge of the principal business district. Two additional engine companies are approximately one mile from the center of the principal business district and 3 others are about 2 miles distant. Another ladder company is about one mile from the center of the district, one is approximately 2 miles and the remaining one is about 3½ miles distant. Most high value areas in the central portion of the city are within one mile of an engine and a ladder company, but high value areas in many other parts of the city are from one to 2½ miles of an engine company and from one to 8 miles from the nearest ladder company. Residential areas in some outlying parts of the city are up to 3 miles from an engine company and 8 miles from a ladder company.

APPARATUS AND EQUIPMENT. — See Tables 2 and 3.—Pumpers.—Twenty pumpers, all with centrifugal pumps, are in service. Each is provided with hard suctions and 11 carry soft suctions. All are generally well equipped; 18 are in good condition and 2 are in fair to good condition. In addition one foam truck and the tank truck are each equipped with centrifugal pumps. Seven pumpers, 3 with rotary gear and the remainder with centrifugal pumps, are in reserve. Two carry a fair amount of minor equipment while the remainder have only a limited amount; one pumper is kept at the drill school for training purposes. Two are in fair to good condition, 2 are in fair and 3 are in fair to poor condition.

Tests at draft of 11 pumpers in service and one in reserve were witnessed during the survey. Ten in service and one in reserve delivered their rated capacities at the required pressures. Pumper 11 was unable to deliver water from draft and after being repaired was still unable to perform; plans call for a complete overhaul of the apparatus. One throttle required a slight adjustment. Most operators performed their duties well; however, several showed the need for additional training and experience in the operation of pumpers from draft.

Ladder Trucks. — Four tillered aerial ladder trucks are in service; all aerials are of metal and hydraulically raised. Included in the ground ladders carried are 50-, 45- and 35-foot extensions. Three are in good condition and one is in fair to good condition; all are generally well equipped. There is no reserve ladder truck.

Booster Trucks. — Five booster trucks are in service and one is in reserve. Each carries a limited amount of minor equipment. All in service are in fair to good condition; the one in reserve was being built in the repair shop at the time of the survey.

Tank Truck.—A tank truck, with a 500-gpm centrifugal pumping unit, is in service. It carries a small amount of minor equipment and is in generally good condition.

Foam Trucks.—Two foam trucks, one with a 500-gpm centrifugal pump, are in service. One has a mounted turret and carries a variety of equipment including a portable electric generator, smoke ejector, protective breathing apparatus, and foam equipment; the other carries a limited amount of minor equipment but a good supply of foam equipment and supplies. Both trucks are in fair condition.

Turret Truck. — A truck, with a large capacity mounted turret and 2 combination mounted-portable turrets, is in reserve at Engine 17 quarters. The truck is in good condition.

Rescue Vehicles.—Three station wagons, each with a variety of emergency and first aid equipment, are in service. As the result of accidents prior to and during the survey a station wagon assigned to the repair shop and a reserve chief officer automobile were being temporarily used as rescue vehicles pending the delivery of 3 new station wagons.

Chief's Cars. — Miscellaneous Vehicles. — Ten 1954 to 1959 sedans are provided for chief officers and fire prevention personnel. A 1955 sedan is in reserve. Two 1955 and 1956 station wagons, and a 1949 pick-up truck are assigned to the repair shop. A 1958 pick-up truck was being used as a supply truck at the time of the survey.

Two 16-foot aluminum boats are mounted on trailers and kept at Engine 11 and 14 quarters; both have outboard motors and a small amount of emergency equipment.

Hose.—Most 1½-, 2½- and 3-inch hose in service and reserve is double jacketed, cotton, rubber lined, purchased under the usual trade guarantees; new hose has a jacket with a synthetic fibre filler. The 2½-inch hose is tested

TABLE 2.—FIRE COMPANIES AND APPARATUS.

Company	Location	Members Normally on Duty	Apparatus		Hose			Ladders Carried	Water Tank, Gallons
			Make and Type	Date Built	Size, Inches	Carried, Feet	Spare, Feet		
Eng. 1A*hv*	Headquarters: Zack & Jefferson Sts.	4 - 5	Seagrave 1000-gpm Pumper	1958	2½ 1½ 1	1500 400 400	1500 400	1—30′ 1—14′ 1—10′	300
Eng. 1B*hv*	With Engine 1A	4 - 5	Seagrave 1250-gpm Pumper	1957	2½ 1½ 1	1400 300 300	1400 300	1—24′ 1—14′ 1—10′	300
Eng. 2	12th St. & Columbus Dr.	4 - 5	Am. LaFrance 1000-gpm Pumper	1955	2½ 1½ 1	1250 300 200	1250 100	1—28′ 1—14′	200
Eng. 3*hv*	Magnolia Ave. & Platt St.	4 - 5	Seagrave 1000-gpm Pumper	1957	2½ 1½ 1	1400 400 400	1400 400	1—30′ 1—14′ 1—10′	300
Eng. 4*hv*	9th Ave. & 18th St.	4 - 5	Seagrave 1000-gpm Pumper	1958	2½ 1½ 1	1400 300 400	1400 250	1—30′ 1—14′ 1—10′	300
Eng. 5*hv*	Florida & Ross Aves.	4 - 5	Howe 1000-gpm Pumper	1954	2½ 1½ 1	1300 300 200	1200 300	1—30′ 1—14′ 1—10′	250
Eng. 6*hv*	22nd & Linsey Sts.	4 - 5	Seagrave 750-gpm Pumper	1942	2½ 1½ 1	1250 300 250	1250 100	1—28′ 1—14′	90
Eng. 7*hv*	Taliaferro Ave., bet. Hillsborough & Giddens Aves.	4 - 5	Seagrave 1000-gpm Pumper	1958	2½ 1½ 1	1400 300 400	1400 300	1—30′ 1—14′ 1—10′	300
Eng. 8	Albany Ave. & Azeele St.	4 - 5	Am. LaFrance 1000-gpm Pumper	1955	2½ 1½ 1	1250 300 200	1250 100	1—28′ 1—14′ 1—10′	200
Eng. 9	Chestnut St. & Tampania Ave.	5 - 6	Am. LaFrance 1000-gpm Pumper	1955	2½ 1½ 1	1250 200 200	1200 200	1—30′ 1—14′	200
			Chevrolet Booster Truck	1936	1½ ¾	300 250	300	1—12′	420
Eng. 10	34th St. & 23rd Ave.	4 - 5	Seagrave-Ford 600-gpm Pumper	1951	2½ 1½ ¾	1450 300 200	1150 100	1—24′ 1—14′	350
Eng. 11*hv*	Fairbanks St. & Huntley Ave.	6 - 7	Seagrave 1000-gpm Pumper	1950	2½ 1½ ¾	1550 300 200	1550 300	1—35′ 1—14′ 1—10′	150
			Dodge Booster Truck	1940	¾	200	.....	.....	500
			Mack Tank Truck	1946	1½	300	300	.....	1900
Eng. 12	Lois Ave., bet. Buffalo Ave. & Alva St.	5 - 6	Seagrave 1000-gpm Pumper	1952	2½ 1½ 1	1250 350 200	1250 350	1—35′ 1—14′	250
			Chevrolet* Booster Truck	1942	1½ ¾	300 200	300	1—10′	235
Eng. 14*hv*	Neptune St. & Church Ave.	6 - 7	Seagrave 1000-gpm Pumper	1958	2½ 1½ 1	1200 300 400	....	1—30′ 1—14′ 1—10′	300
			Oren-Ford 500-gpm Pumper	1952	2½ 1½ 1 ¾	1000 400 150 200	....	1—20′ 1—12′ 1—10′	300
Eng. 15	Himes & Marlin Aves.	5 - 6	Seagrave-Ford 500-gpm Pumper	1956	2½ 1½ 1	1250 300 200	1250 100	1—28′ 1—14′	300
			Chevrolet Booster Truck	1947	1½ 1	300 300	....	1—24′ 1—14′ 1— 9′	600

TABLE 2.—FIRE COMPANIES AND APPARATUS.—Continued.

Company	Location	Members Normally on Duty	Apparatus: Make and Type	Apparatus: Date Built	Hose: Size, Inches	Hose: Carried, Feet	Hose: Spare, Feet	Ladders Carried	Water Tank, Gallons
Eng. 16	10th Ave. & 52nd St.....	5 - 6	Mack 1000-gpm Pumper	1947	2½ 1½ ¾	1450 200 200	1450 200	1—30′ 1—14′ 1—12′	200
			Chevrolet 500-gpm Pumper	1953	2½ 1½ ¾	500 300 200	500 300	1—28′ 1—12′	375
Eng. 17	East Davis Blvd. & Cayuga Ave.	5	Seagrave 1000-gpm Pumper	1958	2½ 1½ 1	1400 300 400	1400 300	1—30′ 1—14′ 1—10′	300
Eng. 18	30th St., opp. Deleuil Ave.	5 - 6	Seagrave 1000-gpm Pumper	1958	2½ 1½ 1	1400 300 400	1400 300	1—30′ 1—14′ 1—10′	300
			Chevrolet Booster Truck	1946	1½ ¾	300 200	350	.....	460
Lad. 1*hv*	With Engine 1A	5 - 6	Seagrave*† 100-ft. Aer. Lad. Tk.	1958	.....	.....	.....	10; Total Length, 336′	.....
Lad. 3*hv*	With Engine 3	5 - 6	Seagrave*† 100-ft. Aer. Lad. Tk.	1956	.....	.....	.....	10; Total Length, 336′	.....
Lad. 4	With Engine 4	5 - 6	Am. LaFrance*† 100-ft. Aer. Lad. Tk.	1952	.....	.....	.....	11; Total Length, 325′	.....
Lad. 14	With Engine 14	5 - 6	Am. LaFrance† 100-ft. Aer. Lad. Tk.	1941	.....	.....	.....	9; Total Length, 304′	.....
Rescue 1	With Engine 5	3	Pontiac Station Wagon	1955	.....	.....	.....	.....	.....
Rescue 2	With Engine 14	2	Ford Station Wagon	1957	.....	.....	.....	.....	.....
Rescue 3	With Engine 11	2	Ford 4-door Sedan	1955	.....	.....	.....	.....	.....
Foam 1	With Engine 1A	1	International* Foam Truck	1947	2½ 1½	50 200	50 200	.....	.....
Foam 4	With Engine 4	1	International 500-gpm Pumper	1943	¾	150	.....	1—24′ 1—14′	.....
			APPARATUS IN RESERVE						
	With Engine 16		Am. LaFrance 750-gpm Pumper	1925	2½ 1½ ¾	1050 300 200	....	1—35′ 1—14′	90
	With Engine 11		Am. LaFrance 1000-gpm Pumper	1925	2½ 1½ ¾	1050 200 200	....	1—28′ 1—30′	500
	Drill Grounds		Am. LaFrance 750-gpm Pumper	1925	2½ 1½ ¾	1000 200 150	....	1—35′ 1—12′	90
	Repair Shop		Mack 750-gpm Pumper	1949	2½ 1½ ¾	1050 200 200	....	1—30′ 1—14′	92
	Repair Shop		Oren-Ford 500-gpm Pumper	1948	2½ 1½ ¾	1000 200 300	....	1—32′ 1—14′	400
	Repair Shop		Chevrolet 500-gpm Pumper	1939	2½ ¾	1000 200	....	1—24′ 1—12′	215
	Repair Shop		International 500-gpm Pumper	1943	2½	1000	.....	.....	175
	Repair Shop		Dept. Built-Ford Booster Truck	1958	.....	.....	.....	.....	592
	With Engine 17		Dept. Built-Ford* Turret Truck	1958	3	1200	.....	.....	.....

* Equipped with Turret. † Equipped with Ladder Pipe. *hv* Company located in or near High Value District.

upon receipt to 400 psi and all hose is tested annually thereafter to 300 psi using a pumper to build up the pressure. All hose is shifted monthly on apparatus if not used within that period. A hydraulic expander is provided at the department repair shop.

Hose is distributed as shown in Table 2. In addition 1000 feet of 2½-inch hose was on order at the time of the survey. Fifty-nine percent of all 2½- and 3-inch hose is under 5 years of age, and 32% is over 7 years of age. Couplings are stamped with the year of purchase and are color coded to designate the company to which the length is assigned. Drying facilities are provided at each station. Eleven pumpers, 3 booster trucks and the tank truck have pre-connected 1½-inch lines.

The 2½-inch hose couplings are of the usual screw type with National Standard dimensions.

Appliances.—Minor equipment carried on apparatus is generally uniform and mainly complete. Major appliances, shown in Table 3, are mainly well distributed on apparatus but some important items are insufficient in amount.

Radio. — Transmitting and receiving facilities for the fire department radio system are installed at fire alarm headquarters and receivers are provided at each station and the repair shop. Mobile units are installed on all apparatus and vehicles in service and reserve except the deputy chief's car. For details see Fire Alarm, Page 16.

Repairs.—Repairs to apparatus and equipment are under the supervision of the chief mechanic, assigned to the repair shop since 1939 and promoted to his present position in 1944. Other personnel includes an assistant chief mechanic, 2 mechanics, 2 apprentice mechanics, one fireman detailed as a painter and one utility man. They are on duty 5 days a week and subject to call at other times.

The fire department shop, erected in 1959 adjacent to Engine 9 quarters, is a 1-story building and can readily accommodate several pieces of apparatus. In addition to the large maintenance area, the building contains an office for the chief mechanic, store rooms, a carpenter shop, and preparation and paint spraying rooms equipped with exhaust and filter systems. A fair number of power tools and a good variety of hand tools are available. The supply of small parts is generally complete. Local facilities are good and most parts for apparatus can be obtained from the manufacturer within a reasonable length of time. Battery chargers are provided at each station.

Minor repairs are performed at stations but apparatus is brought to the shop for major overhauls. Pumpers are tested annually in accordance with recommended methods and plans are being completed for the adoption of a preventative maintenance program. Several dry chemical hand extinguishers are provided. Housekeeping was good.

Stations.—Fuel.—Seventeen stations, 6 built in 1958 or 1959 and the remainder between 1910 and 1956, are in service; all are 1 or 2 stories in height. Ten are of ordinary and 7 of fire-resistive construction. Doors to the apparatus floor at 8 stations are overhead, being electrically operated at 6, sliding at 8 and folding at one station. All apparatus floors are of concrete. Eleven stations are heated by small space heaters and the 6 newest stations have electrically operated combination air conditioning-heating units. Ten stations have room for additional apparatus; the apparatus floors at 4 stations are small. Stations are mainly well located in relation to traffic. Seven stations are in good condition while the remainder are in fair to good condition. Housekeeping was generally good.

Gasoline of good grade is stored in outside 200- to 575-gallon underground tanks at 15 stations and fire alarm headquarters. Pumpers 10 and 17 go to Engine 2 and 3 quarters, respectively, for refueling. Gasoline is dispensed from an inside pump at fire headquarters, and from outside pumps at other locations; all pumps are electrically operated. Apparatus is refueled both inside and outside of quarters. At fires of extended duration fuel is delivered by a mechanic, either in ordinary 5-gallon cans or in a 55-gallon drum mounted on the shop truck.

OPERATIONS. — Discipline. — The department is presently operating under general orders pertaining to policy, special orders pertaining to promotions, and memorandums of general departmental information; these are issued from time to time in mimeographed form to all members. In November, 1959, a board composed of 3 chief and 3 company officers was appointed by the chief to compile a set of rules and regulations for submission to the chief for approval and adoption.

Charges are preferred through normal channels to the chief who holds a hearing and renders a decision, subject to the approval of the mayor. The chief has authority to suspend, dismiss or reprimand. The accused has the right of counsel and can appeal any decision to the civil service board and the local courts. Since this survey one chief officer has been dismissed from the department for insubordination and conduct unbecoming an officer. Discipline is good.

Training and Instruction. — Training and instruction are under the direction of the drillmaster, assigned to this position since 1944 and promoted to district chief rank in 1954. A train-

ing area has been established at the foot of 20th Street and State Road. A 3-story reinforced concrete frame drill tower, with open sides, has been erected in the center of a large hard-surfaced area. Fires can be built in a 1-story fire-resistive building about 450 square feet in area and 2 steel tanks are used for flammable liquid fires; the fire building is in only fair condition. Another building contains an office for the drillmaster and a garage; 2 hydrants are provided and an old 750-gpm pumper is used for training purposes. Radio and telephone facilities are provided.

New men appointed to the department are given a 4-week course in basic fire fighting at the training area under the supervision of the drillmaster. A drill is held at each station 4 days a week, about an hour being devoted to some phase of training, and from time to time various companies are taken to the drill grounds for training purposes. No training has been given in handling fires involving radioactive materials. Combined engine and ladder company drills were witnessed at the drill grounds during this survey; members performed most evolutions in a satisfactory manner. Company members do not make building inspections.

Response.—Fire alarm headquarters maintains a list of all boxes and a detailed street index which includes the response to first alarms. Printed cards showing box locations only are available at each station and the boxes to which a particular company responds on a first alarm are listed at the respective stations. No multiple alarm response is designated and additional companies are requested by the chief officer in charge as required. Dispatchers relocate companies as necessary to strengthen weakened areas.

The district chiefs on duty respond to all box alarm and telephone alarms for building fires in their respective districts. First alarm response to box alarms and reported building fires in the principal business district is 4 engine, one rescue and 2 ladder companies. The response to box alarms and telephone alarms for building fires elsewhere ranges from one ladder and 4 engine companies to one engine company, with a rescue company responding in all cases. At least one ladder responds to first alarms from schools, hospitals, university buildings and similar occupancies with a high life hazard but no ladder company answers first alarms in many areas.

The nearest engine company is dispatched to fires of a minor nature such as grass or automobile fires, and in some cases to investigate an unusual condition. The nearest rescue company is dispatched to an appeal for a resuscitator and the foam companies to telephone alarms from areas where gasoline and oils are stored and on special call.

Numerous railroad grade crossings and several drawbridges offer the possibility of delay to apparatus. Wire obstruction in the principal business district is slight to moderate. Considerable difficulty might be experienced in fighting fires along the waterfront because of inaccessibility to the water side of the buildings. Grades are slight; there are some unimproved streets.

During 1959 there were 3983 alarms received including 996 for fires in buildings, 1302 for grass, brush and other minor fires, 529 smoke scares, honest mistakes and service rendered calls, 806 first aid and emergency calls, 326 recorded as maliciously false, and 24 alarms from outside the city.

Fire Methods.—Records show that the majority of building fires occurring during 1959 were extinguished by 1½-inch or booster lines. Good use is made of pre-connected 1½-inch lines on pumpers and booster trucks so equipped, being supplied by a 2½-inch line. Other companies lay hydrant supply lines and supply 1½-inch lines by a gated wye. Large lines are used directly as the occasion demands. The tank truck is used to good advantage in some areas where hydrant spacing is poor or hydrants are lacking.

Hydrant lines are used extensively, pumpers being connected on orders or in areas where the pressures are known to be low. The department has no standing rules concerning sprinkler or standpipe connections. Fires are fought from the inside whenever possible and heavy and special stream appliances are placed into operation as conditions warrant. Forcible entry, laddering and ventilation operations must frequently be carried out by engine company members as no ladder truck responds to many areas of the city. Only fair use is made of protective breathing apparatus. Salvage work is performed as men are available and includes the spreading of waterproof covers and the removal of water and debris from the premises.

Reports and Records.—Reports and records include good personnel files and general office and departmental information. A journal is kept at each station and shows company activities and pertinent departmental data. Each company submits a brief fire report for each alarm answered, information from these reports being consolidated into a master fire record book by the fire prevention bureau. Equipment inventories are kept at each station and headquarters and apparatus records, including those of pumper tests, are kept at the repair shop. Hose records are maintained. Monthly and annual reports outlining alarms answered are submitted by the fire marshal.

CHANGES AND IMPROVEMENTS.—Since the 1952 report by the National Board of Fire Underwriters the rank of assistant chief has been abolished and positions for one deputy, 11 district

TABLE 3.—SUMMARY OF APPARATUS.

	In Service	In Reserve
Pumpers:		
1250-gpm	1	0
1000-gpm	14	1
750-gpm	1	3
600-gpm	1	0
500-gpm	3	3
Ladder Trucks:		
Aerial	4	0
Booster Trucks	5	1
Foam Trucks	2	0
Tank Truck with 500-gpm Pump	1	0
Turret Truck	0	1
Repair Shop Vehicles	3	0
Rescue Vehicles	3	0
Supply Truck	1	0
Chief Officer Automobiles—Fire Prev. Vehicles	10	1
Hose, 1- and ¾-inch Booster	7,300′	950′
Hose, 1½-inch	13,800′	1,000′
Hose, 2½-inch	50,150′	6,150′
Hose, 3-inch	0	1,200′
Ladders, Total Length	2,394′	264′
Ladders, Short, on Pumpers, Etc.	60	12
Portable Extinguishers	62	18
Large Water Tanks	26	8
Gas Masks, Filter Type	52	0
Breathing Apparatus, Self-contained	16	0
Resuscitators	3	0
Comb. Mounted-Portable Turrets	0	2
Portable Turrets	3	0
Mounted Turrets	2	1
Ladder Pipes	4	0
Cellar Pipe	1	0
Distributing Nozzle	1	0
Siamese Connections, 2½-inch	2	0
Foam Generator	1	0
Foam Aspirating Nozzles	5	0
Foam Powder	500 lbs.	250 lbs.
Foam Liquid	215 gals.	315 gals.
Waterproof Covers	80	0
Smoke Ejectors	5	0
Portable Lighting Units	6	0

chiefs and 39 additional company officers have been created. The fire force has been increased by 253 men and the total department membership by 268. More men are on duty but, considering the 8 additional engine, 3 ladder, one foam and 2 rescue companies that have been established, individual company manning remains about the same. Fourteen pumpers, 3 ladder trucks and numerous miscellaneous vehicles have been purchased. Additional minor equipment and heavy and special stream appliances have been added. A new repair shop has been constructed and additional shop personnel assigned. Seven new stations have been constructed and one was obtained through annexation. Training facilities have been provided.

Since this survey, 21 new men have been added to the department, and the rank of lieutenant abolished, all officers of this rank having been promoted to captain; 6 additional captains have been appointed. Annual medical examinations of members over 55 years of age are now being conducted. The district chief assigned as drillmaster has been dismissed from the department and a new training officer appointed. It is proposed to relocate Engine Company 12 to a site near the Tampa International Airport.

CONCLUSIONS.—The fire department is well organized and under competent and experienced supervision. Subsequent to the rapid growth of the city in area and population, due to extensive annexation, many substantial improvements have been made; however, there are still a number of areas, including some of high value, which are excessive distances from both engine and ladder company protection. Ladder service is particularly weak in many areas. Manning is fair to good, but becomes only fair at times through absences due to vacation, sickness or injury.

Apparatus is fairly well equipped although some important items have not been provided in adequate amounts. Good repair facilities are provided and most apparatus is maintained in good condition; much apparatus is new. The present rules and regulations are inadequate but this condition is to be remedied. New drill facilities have been provided, and while some benefit is being derived from the present training program it is in need of considerable expansion.

Response to some alarms is seriously inadequate. Efficient use is being made of pre-connected 1½-inch lines; operations at times would be improved by the more frequent use of masks. Under normal conditions, the department should be able to confine a fire to the floor or building of origin; however, the inadequate response and excessive running distances to some areas greatly increases the possibility of fires spreading beyond control of the first arriving company or companies. The lack of a fireboat could adversely affect operations at fires on the waterfront.

FIRE ALARM

ORGANIZATION.—General.—The fire alarm system is a part of the fire department and under the same supervision. It is maintained by the Superintendent of Fire Alarm F. Boyer, assigned to fire alarm in 1944 and promoted to his present position in 1959. Other personnel includes an acting assistant superintendent, 2 linemen and 8 dispatchers.

Headquarters.—Fire alarm headquarters is in a high 1-story and basement building of noncombustible construction in a block bounded by St.

Clair Street, Mitchell Avenue, Robles Street and Taliaferro Avenue. Exposures are mild. Heat is from an oil-fired boiler in the basement with fuel supply from an underground tank. A small repair shop is in the basement. Two carbon dioxide hand extinguishers are provided. A 1-story garage of concrete block construction, at the rear of the building is used for the storage of the fire alarm truck and line materials.

EQUIPMENT. — Apparatus at Headquarters. —Equipment, of Gamewell make, automatic type, originally installed in 1926 and moved to its present location in June, 1953, consists of a modified battery charging and operating board with a capacity of 16 box, 6 alarm and 2 local circuits; two 8-circuit repeaters with contacts for 6 alarm circuits; a 4-figure manual transmitter; a punch register on a box circuit, responsive to all box circuits through the repeaters; an inoperative print-type recorder with time and date stamp; radio and telephone facilities, with 3 dual voice recorders; an electrically lighted in and out of service board; a central station company supervisory panel and punch register; and a rotary-type file showing box numbers, street locations and apparatus scheduled to respond.

Circuits extend in conduit from headquarters equipment in two 40-conductor cables to a metal terminal cabinet in the basement and then in underground ducts to the street.

Current Supply.—Current for normal operation of the system is furnished by individual circuit rectifiers with batteries floating. There are 85 6-volt and 58 2-volt cells in service, with 18 6-volt cells in reserve. Batteries are well mounted on racks in the battery room and a motor-generator set for charging purposes is installed in an adjoining room. There are 2 independent commercial power circuits from separate banks of power company transformers extending overhead to fire alarm headquarters, and then in conduit to a power panel in the basement. In an emergency current can be obtained from a 5-kw gasoline-engine driven electric generator installed in the basement; it can be started manually from the operating room or at the generator.

Apparatus at Fire Stations.—Each fire station has one or more receivers on the fire department radio system. Two stations have gongs connected to box circuits and a punch register connected to an alarm circuit; one station has a gong connected to a box circuit and gongs and a punch register connected to an alarm circuit; 5 stations have gongs and a punch register connected to box circuits only; one station has a punch register connected to a box circuit and a gong to an alarm circuit; one station has gongs and a punch register connected to an alarm circuit only; and 7 stations have no alarm instruments other than radio.

Boxes.—There are 219 boxes, all of Gamewell make and succession type, in service, all but one being accessible to the public; boxes have either key guard or quick-opening door actions. Twenty-four are master boxes connected to sprinkler systems or manual pull stations. One box is mounted inside a building and the remainder are on pedestals. Conspicuousness of boxes is only fair; there are no indicating lights over boxes in high-value areas and many boxes and pedestals are in need of painting.

Tests of 20 boxes, 2 on each circuit, were witnessed during the survey. Boxes were noted to be generally well mounted and most interiors were clean. Signals from 2 boxes on Circuit 14 and from one on Circuit 3 were not received at any location, and from one box on Circuit 2 was received only at Engine 8 quarters; a jumbled signal was received from a box on Circuit 3. The trouble was traced to excessive grounds on the 3 circuits involved; part of the underground cable on Circuit 14 was replaced during the survey and all boxes on that circuit returned to working condition. Most of the grounds on Circuit 3 were eliminated by shunting out 4 boxes, thereby placing the other boxes on that circuit back in operation. At the time of the survey no work had been done on Circuit 2, but members at Engine 8 quarters had been instructed to notify fire alarm headquarters of any alarms received pending the return of the circuit to proper working condition. The common punch register in fire alarm headquarters developed a malfunction during the tests and had to be replaced. Boxes are timed to transmit blows at approximately 1-second intervals.

Box distribution in the principal business district is good, only one additional box being needed to give complete coverage. Distribution in some high-value areas is good to fair but a number of these areas, particularly in the more recently annexed sections, lack fire alarm boxes. Distribution in residential areas ranges from fair to poor with no boxes provided in many of these areas.

Circuits.—Ten box, 4 alarm and one local, all-metallic, normally-closed circuits are in use. Each box circuit connects to 11 to 33 boxes and 5 serve excess areas. Seven box circuits extend to instruments in some fire station, and one to a punch register in fire alarm headquarters, and 2 have no instruments. The local circuit serves instruments in alarm headquarters. Alarm circuits extend to instruments in 5 stations.

All box and alarm circuits are entirely underground. Circuits are of No. 14 hard-drawn copper wire with rubber or thermoplastic insulation, mostly in parkway cable, but some in lead sheath

and polychloroprene covering in both telephone company and city owned ducts, and a small amount in submarine cable. Some of the cable is in poor condition and all box and 2 alarm circuits show slight to serious grounds. At the time of the survey one alarm circuit was out of service due to a break at an undetermined point. As a result of trouble experienced during box tests, 1826 feet of box circuit No. 14 was replaced during the survey, using 7-conductor cable having No. 14 copper wire with thermoplastic insulation and sheath; grounds on this circuit were considerably reduced. Plans call for the gradual replacement of all cable in poor condition. Wiring in fire alarm headquarters is in conduit and in good condition; wiring at some fire stations is in fair condition.

Circuit protection, all at fire alarm headquarters, consists of mechanical circuit breakers, ½- or 3-ampere fuses, choke coil lightning arresters and ½- or 3-ampere fuses on each side of each circuit, 3-ampere fuses on the rectifiers, and 5- and 6-ampere fuses on the battery leads.

Radio.—The fire department 3-way radio system is used as one of the alarm circuits. A 60-watt transmitter-receiver is installed at fire alarm headquarters, with an antenna on top of a 150-foot steel tower at the rear of the building; an auxiliary 25-watt transmitter, with an antenna on an 80-foot tower, is also provided at alarm headquarters. Power supply for both transmitters is from the same commercial power circuit serving the building; the generator provides emergency power.

An emergency 60-watt transmitter is installed on the roof of a 17-story hotel in the principal business district, being connected to a remote control unit in alarm headquarters by leased telephone lines; current for operation is obtained from a branch circuit off the hotel power panel. An emergency 30-watt transmitter-receiver is installed in the watch room at Engine 14 quarters; current for normal operation is from the same commercial power circuit serving the station. Receivers on the civil defense radio frequency are installed in fire alarm headquarters and at Engine 14 quarters.

A receiver is installed at each station with one or more speakers distributed throughout the building; power supply is from the nearest ac outlet, 7 stations including Engine 14 quarters also having an electric generator for use in an emergency. A 50-watt transmitter-receiver is installed in the chief's car and 10- or 25-watt units on all apparatus and department vehicles in service and reserve, except the deputy chief's car. Portable radio units are carried on 2 ladder trucks, and each rescue and district chief's cars. All radio equipment is maintained by police department radio technicians.

Commercial Telephone Service. — A private telephone switchboard, owned and maintained by the telephone company, is installed in the operating room. It has provisions for 10 trunk lines and 40 individual lines, 7 trunk and 36 individual lines being in use. Four trunk lines, arranged for progressive operation, are reserved for emergency calls and 3 trunk lines are used for business. Individual lines extend to each station, various offices in fire headquarters, training school, Tampa General Hospital, Tampa Electric Company, police headquarters, fire department repair shop, residence of the fire chief and to 9 instruments at various locations in fire alarm headquarters. Provisions are made for simultaneous communication. Separate telephones are installed on circuits from the Tampa Signal Company, and civil defense headquarters; a private telephone is also provided in alarm headquarters and at each fire station. Listings in the directory are somewhat incomplete and include the number of the private telephone in each station.

OPERATIONS.—There are 2 qualified dispatchers on duty at all times in the operating room; during vacation periods and in case of sickness the assignment is filled by one of the linemen or an off-duty dispatcher. The fire alarm superintendent and his assistants work 5 days a week and are subject to call at all other times. Vehicles include three 1952 to 1956 station wagons and a 1939 1½-ton truck equipped with a winch; all are radio equipped. Spare parts and equipment are stored in the basement of fire alarm headquarters and line materials and supplies are kept in the garage.

Current, voltage and ground readings are taken, 2 blows transmitted over the alarm system, and telephones to stations and all radio units tested 2 times a day. Battery voltage and electrolyte are checked every 3 months, at which time the system is operated on battery for approximately 1½ hours. The telephone circuit to the Tampa Signal Company is tested 2 times a day. Records indicate that boxes were tested during 1953 and 1955 and once in 1958. However, all boxes are given a visual check and a silent test at least annually.

The fire alarm dispatchers maintain a journal of all departmental activities and compile a brief report of each alarm handled. All radio and telephone conversations are recorded. A good form is provided for recording tests to the system. Good box record cards, showing tests made and other data, are on file. Maps showing box locations and circuit routes and other pertinent circuit information are on hand but have not been kept up to date.

Four rounds of box alarms are automatically transmitted over the system, being received on instruments in the operating room and at 10 sta-

tions; companies in the other 7 stations have no alarm instruments and must be notified to respond by telephone. Upon receipt of a telephone alarm for a fire in a building 3 blows are transmitted over the alarm system and companies to respond are dispatched by telephone. Other telephone alarms are handled in the same manner except that no signal is transmitted. After companies have been dispatched a tone signal is given over the radio system and the location and type of alarm announced. Two blows are transmitted over the alarm system whenever the officer in charge of the fire notifies alarm headquarters by radio that the fire is under control.

During 1958 there were 3983 alarms received; of these 313 were by box, 3660 by telephone and 10 from the A.D.T. Company. Ninety-one of the telephone and 230 of the box alarms were recorded as maliciously false.

CHANGES AND IMPROVEMENTS.—Since the 1952 Report by the National Board of Fire Underwriters a new superintendent has taken charge of the fire alarm system and additional dispatchers have been provided. Fire alarm headquarters has been relocated; additional equipment provided at the new location includes a transmitter and recording facilities. Three boxes of a poor type have been replaced with those of succession type and 58 additional boxes have been installed. One alarm circuit has been taken out of service and 2 additional box circuits added. Some underground cable has been replaced. All fire stations are now equipped with radio receivers and one or more speakers. An additional telephone trunk line has been reserved for emergency calls.

CONCLUSIONS. — The fire alarm system, although lacking some essential equipment, is basically a good installation; however, it covers only a portion of the city and has been permitted to become unreliable due to the lack of routine maintenance and tests. The decision, since the survey, to begin rehabilitating the system is commendable and is an indication that the importance of this protection is recognized. The complete rehabilitation of the existing system, taking full advantage of the investment it represents, and its gradual expansion to provide adequate and reliable fire alarm service, first to all high value areas and eventually to all closely built-up sections of the city, is essential for proper protection to the city.

FIRE DEPARTMENT AUXILIARIES

FIRE MARSHAL.—A state act of 1941 designated the state insurance commissioner as state fire marshal and provided for appointment of a deputy from each congressional district with a chief deputy from the state at large. Responsibilities include the investigation of all fires in which property is damaged or destroyed under circumstances suggesting malicious intent or design or willful carelessness. The fire marshal and his deputies have ample authority to investigate suspected arson or incendiarism and to prosecute. All building fires and any other fire of a suspicious nature are investigated by the local fire prevention bureau. Local agencies cooperate in such investigations. During 1958 there were 13 fires of incendiary origin and 3 of a suspicious nature. As a result of investigations 7 persons were placed on probation for 2- to 5-year periods and 2 were given prison sentences. Several cases are pending.

POLICE DEPARTMENT.—The department is under the supervision of Chief N. G. Brown and has a total force of 391, including 67 civilians and 14 recruits. Headquarters is at Jackson Street and Florida Avenue in the principal business district.

Vehicles include 75 cruisers and chief officer automobiles, 3 patrol wagons, 34 motorcycles, 3 trucks and a boat.

There are 13 call boxes in service, maintained by the telephone company, on circuits terminating at a telephone switchboard in police headquarters. The 60-watt main transmitting facilities for the police department radio system are installed on the roof of a 17-story hotel in the principal business district and a similar unit is installed at the radio repair shop at Lake Avenue and 12th Street. Both are connected to remote control units in the communications room at headquarters by leased telephone lines. An additional 25-watt unit is installed in police headquarters. Current for operation is from commercial power sources. Transmitter-receivers of 10- or 25-watts capacity are installed on all department vehicles except the 3 trucks. All radio equipment is maintained by the department radio technicians. A well equipped shop and a good supply of spare parts, supplies and equipment are on hand. Transportation is provided.

Foot patrolmen report to headquarters hourly and cruisers are in constant communication. All alarms of fire are received over a direct telephone line from fire alarm headquarters. Response is at least one cruiser and the patrolman on the beat if in an area so covered, with additional assistance sent if required. Barricades are available from the traffic division. Cooperation with the fire department is good.

PUBLIC UTILITIES.—The Tampa Electric Company and the People's Gas System, Inc., both have emergency crews with radio equipped trucks

available at all times. Response to alarms is normally upon request. Cooperation is good.

PUBLIC TELEPHONE COMPANY. — The General Telephone Company of Florida serves approximately 67,300 subscribers in the city, over 1-, 2 and 4-party lines and a few 8-party lines through 7 dial central office buildings; approximately 25% of the subscribers are on 1-party lines. There are 371 outdoor pay telephones distributed throughout the city. The main central office building, 5 and 12 stories, is at the edge of the principal business district. The other buildings, attended only during normal working hours, are 1-story and basement; all central office buildings are of fire-resistive construction and the usual fire protection facilities are provided. Emergency power at the main central office building is provided by a 250-kw diesel engine driven electric generator in the basement. Some trouble has been recently experienced with electrolysis. All circuits are underground in the principal business district. Emergency calls, when received by the telephone company operators, are supervised and logged.

CENTRAL STATION SERVICE. — The Tampa Signal Company provides sprinkler supervisory and other emergency central station service to 4 subscribers in Tampa. Service to each subscriber includes water flow, gate valve supervision and manual fire alarm. The central station is on the third floor of a 6-story building of fire-resistive construction at Twiggs and Marion Streets adjacent to the principal business district. No protection to windows is provided; carbon-dioxide hand extinguishers are mounted on the wall and a standpipe with 100 feet of 1½-inch hose is in the hallway.

Current for operating the system is obtained from a building branch circuit through rectifiers with batteries floating; the batteries are mounted on racks in the operating room. There are 3 McCullough circuits in use with spare facilities for 2 additional circuits. Circuits, all-metallic and normally-closed, are in telephone company cables. Signals are received on registers and sounding devices. Alarms are transmitted to fire alarm headquarters over a direct telephone line.

At least one operator is on duty and one guard-runner is available at all times; the latter is dispatched to each alarm received.

PRIVATE FIRE PROTECTION. — A fair amount of private fire protection, including private fire brigades, fire apparatus and private hydrants and supplies of hose, is available at 2 railroad maintenance shops. Foam equipment and supplies are available at some of the bulk oil storage plants. Two vehicles carrying a limited amount of fire fighting equipment are provided at the Tampa International Airport. At the time of the survey plans were being completed for expanding protection at the airport.

Several of the larger industrial and manufacturing plants have fire protection facilities including employees trained in the use of fire equipment, private hydrants with supplies of hose, and hand extinguishers of various types. A number of buildings are protected by standpipe and automatic sprinkler systems, some of which are connected to the municipal fire alarm system through master boxes and some of which are supervised by a central station. Hand extinguishers were noted to be only fairly well distributed throughout the city.

OUTSIDE AID.—A small amount of outside aid is available from several nearby volunteer and part paid departments, McDill Air Force Base, and the Florida Forest Service.

STRUCTURAL CONDITIONS AND HAZARDS

BUILDING DEPARTMENT

ORGANIZATION.—General. — The building bureau is part of the department of public works. Direct supervision of the bureau is by the building inspector. All members of the bureau are appointed by the mayor to serve at his pleasure. There are no qualifications prescribed and unqualified inspection personnel are occasionally appointed. Duties and functions of the building bureau include the checking of plans and specifications for conformity with building and zoning regulations, the issuing of building and other permits, the inspection of buildings and structures under construction, and the enforcement of state and local laws.

Supervision and control over the installation and maintenance of stacks, chimneys, or other machines or contrivances from which smoke, fly ash, fumes, or cinders are emitted, boilers and all unfired pressure vessels over 18 cubic feet, and all class 2 and class 3 refrigerant systems, is placed with the boiler inspector and his assistant. Both are appointed by the mayor to serve at his pleasure.

Personnel.—E. M. Miller, who has been with the building bureau since 1953, was made Building Inspector in February, 1959. He has been preceded by 7 inspectors within the last 14 years. He is presently assisted by a radio dispatcher, 3 commercial inspectors, 7 residential inspectors

and 7 clerks, 2 of whom devote time to the plumbing, gas and boiler bureau. D. C. McClelland, an experienced engineer, has been the Boiler Inspector since February, 1959; he has one assistant.

CONTROL.—State Laws.—Rules and regulations promulgated by the state hotel and restaurant commission embody good provisions for wall thicknesses, protection of openings in fire and exterior walls, firestopping, chimney and flue construction, installation of heating equipments, and enclosure of vertical openings. Regulations covering the installation of gas appliances are comprehensive and generally in line with standards of the National Board of Fire Underwriters. Only approved gas-burning appliances may be installed. All hotel buildings over 3 stories in height must be of fire-resistive construction. Good requirements for emergency exits and internal fire protection are provided.

Under the Florida School Code, each county school board undertaking the construction, alteration of, or addition to, any school building costing more than $500 must submit plans and specifications to the state superintendent for review and recommendation and secure his approval before proceeding with the work. The code provides that no school building of wood frame construction, or which has masonry walls but is otherwise of ordinary or wood-joisted construction and wood finish, shall be more than 1-story in height; and, further, that no school building having masonry walls and otherwise of ordinary construction with fire-resistive corridors and stairways shall be more than 2 stories. Provisions with respect to exits, heating plants, electric wiring, fire escapes, private fire protection, and motion picture booths are generally good.

Municipal Ordinances. — The 1949 edition of the National Building Code with the 1952 amendments was adopted in March, 1953, with several deletions and modifications. The 1954 amendments to the National Building Code were adopted March 22, 1955. All sections relating to the appointment and qualifications of the building inspector have been deleted. The use of wood shingles for roof covering is prohibited. The fire limits include those areas zoned for commercial and industrial use. The use of wood frame and unprotected noncombustible construction is properly restricted within these areas. In addition, no exterior wall facing of any building on Davis Islands shall be constructed of wood, except small areas for architectural purposes.

The municipal boiler code of 1950, with amendments through April, 1953, contains good requirements pertaining to the regulation of the operation, installation, repair, and inspection of boilers and other pressure vessels, stationary engines, and other machinery.

Procedures. — A permit is required from the local supervising architect of the Florida hotel and restaurant commission before the city can issue a permit to erect, enlarge or remodel any building for use as a public lodging or public food service establishment. Applications for such a permit must be accompanied by 3 sets of plans and specifications prepared by a registered architect when new construction or remodeling exceeds $10,000 in cost. Scaled drawings only need to be submitted for construction costing $10,000 or less. Plans for schools must be approved by the state superintendent so as to conform to minimum standards prescribed by law and by regulations of the state board of education.

An application must be prepared and submitted and a permit obtained before the construction, alteration, repair, demolition, or removal of any building or structure may be begun where the cost of the work is $50 or more. A building plan is required for new residential construction costing $10,000 or more, but is not always enforced. Two sets of plans, stamped and approved by a registered architect or engineer, must be submitted for approval of commercial construction costing $10,000 or more. Only one set of plans is required for new commercial construction costing less than $10,000. A set of plans, if required, and a posted permit card must be kept at the construction site. Police do not report unauthorized construction.

An inspection must be called for before the foundation or footing is poured and thereafter before each pour and when complete for a final inspection. Inspection dates for new construction are usually recorded on the application form. Approval or disapproval tags are left at the job site after each inspection. Violations must be corrected and the work reinspected and approved before continuing with the job. A few inspectors carry official violation notices but these are seldom used. A certificate of occupancy is supposed to be issued upon approval of the final inspection, but is generally only done upon request.

Structurally deficient buildings, deteriorated 51% or more of its value, may be condemned. Such buildings are tagged, and a written report is sent to the owner allowing him 30 days to raze the structure. If satisfaction is not received, the building bureau must request the board of councilmen to offer competitive bids to raze the building. Appeals can be made to a condemnation board of review. The entire procedure is usually long and drawn out with the results often being unrewarding. Decisions of the building inspector can be appealed to the board of adjustments, consisting of 6 members appointed by the mayor, including an attorney. Decisions of the board of adjustments may be brought before the civil court.

There are no regular inspection records. Existing records consist of application copies and permit receipts, certificates of occupancy, and plans and specifications of major construction which are filed in wooden bins.

BUILDING CONSTRUCTION AND PROTECTION.—New building construction in progress about the city is fairly extensive and consists principally of 1-story, concrete-block, single-family dwellings. Buildings are generally well separated. New and recent mercantile construction of importance includes several large shopping centers, a number of individual small groupings of stores, a bank building and several motels. Buildings have low heights, small to excessive fire areas, and generally have reinforced concrete slab floors, concrete block walls with reinforced perimeter beams, steel joists and lally columns, metal roof decks or other roof planking materials with built-up roof coverings, and suspended ceilings.

Recent construction within the principal business district includes a 3-story, noncombustible, sprinklered addition to a newspaper building and an 8-story, noncombustible, office building.

Enforcement of existing regulations appears to be lax and somewhat inconsistent. Architects, builders, and building inspectors are often confused as to what regulations govern construction, and as to the interpretation of these regulations. Violations of code requirements revealed through inspections of recently constructed buildings and of those buildings under construction included the use of unprotected metal construction within the fire limits, the low height or lack of parapets when required, the general lack of proper protection to communicating and exterior wall openings, and the many too thin fire walls.

CONCLUSIONS.—Laws are adequate and include provisions for enforcement. However, the laxity of enforcement of existing regulations materially reduces their value. The extent of the fire limits are mainly adequate, and restrictions therein are good, but are not strictly enforced. The method of appointments and requirements for the position of inspector is poor. Inspection procedures are fairly good. Inspections of a number of buildings under construction and other buildings recently constructed disclosed several violations of the building code. There are no regular inspection records; other records are mainly adequate, but some are not safely filed.

ELECTRICITY

ORGANIZATION.—General. — Jurisdiction and control over all electrical work in the city, except the police signal and fire alarm systems, is vested in the electrical bureau which is part of the department of public works. Direct supervision of the bureau is by the chief electrical inspector. All personnel of the bureau are appointed by the mayor to serve at his pleasure; no qualifications are prescribed and some unqualified personnel have been appointed. Duties of the chief inspector and his assistants include the issuance of permits, the inspection of all electrical work, and the enforcement of the electrical codes and ordinances.

Personnel.—R. A. Miller, an experienced electrical contractor, has been with the electrical bureau since 1940, and was made Chief Electrical Inspector in 1946. He is presently assisted by 5 inspectors and 2 clerks. One of the inspectors was a former electrical supply dealer who was originally hired as a clerk.

CONTROL.—Laws and Ordinances. — The municipal electrical ordinance adopts the 1956 edition of the National Electrical Code as the standard of all electrical work together with a number of supplementary local regulations. The State Hotel and Restaurant Commission also requires conformity with the National Electrical Code in buildings and occupancies under its control. Regulations require that services be in galvanized or weather resistant conduit except in single family residence installations not exceeding 100 amperes; rigid conduit, surface metal raceway, or electrical metallic tubing is required for wiring in all buildings, except residences of 1 or 2 living units; the use of armored cable is prohibited.

Procedures.—A permit is required before starting any electrical work. Applications for permits are made on suitable forms. Plans are required for practically all commercial work. Permit cards must be posted at all construction sites. Electrical work must be started within 60 days after issuance of a permit. An application and permit are also required for a temporary pole connection which the power company will not make until they receive approval from the electrical bureau. Electricians are required to call for inspections. Two inspections, the rough and the final, are made on all ordinary installations; commercial and other jobs are generally inspected more often. Approval or disapproval tags are applied to the work after each inspection. Violations must be corrected and the work reinspected and approved before continuing with the job. The power company will not supply electricity to the consumer until they have inspected and approved the meter installation and have received a final approval from the electrical bureau.

Inspections of old work are not usually made except upon complaint and when additions or alterations are made. Inspection records are not maintained; other office records are only fair and

generally consist of application copies, kept for only one year, permit receipts, a ledger book, and contractor's licenses and certificate numbers.

LOCAL CONDITIONS. — Inspection of a number of electrical installations did not reveal any violations. Old work was generally fair but with several poor installations. Adverse conditions include substandard wiring and equipment at some hazardous locations, misuse of extension cords, and other defects.

CONCLUSIONS. — Laws are complete with adequate provisions for enforcement. Appointments and requirements for the position of inspector are poor. The condition of new work was good, but there is little reinspection of old work which is generally in only fair condition. Records are incomplete.

FIRE PREVENTION

ORGANIZATION.—General. — Direct supervision and control over hazardous conditions is exercised by the local fire marshal and his assistants. All are under civil service rules and regulations with removal only for cause; good qualifications are prescribed. Duties include the enforcement of all laws and ordinances pertaining to the prevention of fires, the storage and use of explosives and flammables, the installation and maintenance of automatic and other private fire alarm systems, and fire extinguishing equipment, the maintenance and regulation of exits and fire escapes, and the investigation of the cause, origin, and circumstances of fires.

Supervision and control over installations and equipment using natural gas is placed with the plumbing inspector and his assistants, all of whom are appointed by the mayor to serve at his pleasure. Good qualifications are prescribed. Supervision and control over Class 2 and 3 refrigeration installations and equipment is by the boiler inspector and his assistant.

Personnel.—J. Gomez, who has been with the fire prevention bureau for 13 years, was made Fire Marshal March 1, 1956. He is presently assisted by 5 inspectors and 2 office clerks. W. T. Collopy has been with the plumbing and gas bureau for 14 years and was made Plumbing Inspector January 1959. There are 4 assistant plumbing inspectors.

CONTROL.—State Laws.—The Florida Fire Prevention Code was adopted on October 1, 1958, and made a part of the regulations of the state fire marshal. This code, which is practically a verbatim copy of the 1956 edition of the Fire Prevention Code recommended by the National Board of Fire Underwriters, also adopts the standards of the National Board of Fire Underwriters and other approved nationally recognized safety standards.

Regulations of the state hotel and restaurant commission include a number of good requirements relative to internal fire protection, heating apparatus, and means of exit. An approved flame-out device is required on all space heaters and automatic water heaters, including those using liquefied petroleum gas; space heaters installed in sleeping rooms of hotels, motor courts, apartment houses, and similar occupancies must be equipped with an approved vent to the outside air. Regulations of the Florida School Code in regard to heating plants, fire exits, private fire protection, and motion picture booths are generally in line with standards of the National Board of Fire Underwriters.

Municipal Ordinances. — The 1943 edition of the Fire Prevention Code of the National Board of Fire Underwriters was adopted in 1946. An ordinance of 1949, specifies that no gasoline or other motor fuel shall be dispensed or delivered into the fuel tank of any motor vehicle or other container by any person other than the owner, lessee, proprietor, or duly authorized attendant of a service station. It also specifies that no hose, nozzle, or other device may be used which is designed to automatically cause the flow or continue the flow of gasoline or other motor fuel into the tank of any motor vehicle, or other container without the manual intervention of the persons listed above. Another ordinance of 1949, specifies that all tanks having a capacity of 100 gallons or more in which gasoline or other motor fuel is contained shall be inspected annually, and makes it unlawful for any one to deliver fuel to said tank if this certification has not been made.

The municipal gas code of 1929 prescribes many good requirements for the regulation, installation, maintenance, and repair of gas piping and appliances, but is incomplete. An ordinance of 1954, with amendments through 1957, provides good regulations for the sale, storage, handling, distribution, and use of compressed and liquefied petroleum gases other than acetylene, and adopts standards of the National Board of Fire Underwriters for the Storage and Handling of Liquefied Petroleum Gases, for Liquefied Petroleum Gases at Utility Gas Plants, and for Liquefied Petroleum Gas Piping and Appliance Installations in Buildings.

Procedures.—Permits are issued to manufacture, use, store, or sell explosives or flammable materials, to transport explosives; to sell, store, transport or handle liquefied petroleum gases; to install liquefied petroleum gas appliances and/or equipment; to install tanks or vessels containing more than 100 gallons of flammable liquids; and to burn trash.

A set of plans must be submitted to the fire marshal's office for approval and the location must be inspected before a permit can be issued to install any flammable liquid tank or vessel having a capacity over 100 gallons, and must again be inspected before the installation is buried. Gasoline or other fuel oil tank installations used for the operation of motor vehicles are inspected annually for a certificate of inspection. An application must be filed with the fire marshal's office for each liquefied petroleum gas installation. An application for an installation having an aggregate water capacity of 150 pounds or less need not be submitted until 5 days after such an installation has been made. Applications for systems having a greater aggregate water capacity must be submitted prior to installation and must be accompanied by a set of plans and drawings.

A brief application must be filed with the plumbing and gas bureau and a permit obtained for the installation of gas piping systems using natural gas. Installations must be inspected and approved by the bureau before the gas company will set a meter. Inspections are recorded on the application cards which are kept permanently.

An inspector from the state fire marshal's office inspects liquefied petroleum gas storage plants about once a month. The fire prevention bureau inspects hospitals annually prior to issuance of a state license. Nursing, convalescent, and homes for the aged are inspected at least once a year, in conjunction with a certificate of approval which must be completed and sent to the state, prior to the issuance of state and city licenses. All business establishments are licensed by the city. Skating rinks, kindergartens, day nurseries, and dance halls are inspected and licensed annually. New laundries, launderettes, and dry cleaning plants must be inspected before they can be licensed.

The location of fire escapes for rooming houses, hotels, and apartment houses must be approved by the fire prevention bureau before a building permit can be issued. In like manner, the fire prevention bureau must also approve the location of boilers and lumber, junk, and scrap yards. Tents must be approved before being erected.

Two or three of the inspectors devote much of their time to investigating fires, many of which are outside the city. One of the inspectors spends most of his time inspecting new liquefied petroleum gas installations. One inspector is assigned to the downtown business area which is inspected about twice a year. Commercial and industrial occupancies in other sections of the city are inspected occasionally, as time permits. Violations are handled verbally whenever possible; hazards of a serious nature are brought to the attention of the offender through a written order specifying the violation and the time allotted for its correction. A second notice is issued if the reinspection shows that the necessary corrections have not been made. Legal action is taken if the second notice fails to produce satisfactory results.

Building and occupancy record cards are filed for each building and occupancy that has been inspected. These cards contain a detailed description of the buildings physical structure, including the type and amount of fire protection provided. Inspection dates, conditions found during the inspections, and the inspector's name are recorded on these cards. Other records include, violation notices, applications, and permits. All records are permanently and safely filed. The latest annual report of the fire prevention bureau shows a total of 5109 inspections, investigations, and permits issued in 1958.

LOCAL CONDITIONS. — Explosives and pyrotechnics are neither manufactured or stored within the city. A few sporting goods and hardware stores carry small to moderate amounts of fixed ammunition generally stored under favorable conditions.

Retail paint and hardware stores and building supply dealers carry small to moderate amounts of paints, enamels, varnishes, and other coating materials in the usual sealed containers, and also paint oils, solvents, and thinners mainly in package form but in a few instances also in drums with discharge generally by gravity; storage in glass bottles was noted at several places. Housekeeping and fire hazards were fairly well controlled at all but one place where congested storage was noted. Proper measures were not exercised to control the severe fire and explosion potential present at 2 paint and varnish manufacturing plants.

At 2 grain and feed mills, the air was heavily saturated with combustible dusts which had also accumulated on most surface areas. The indiscriminate use of portable gas welding equipment, grinding wheels, and other flame- and spark-producing devices creates a serious fire and explosion hazard at one of these establishments. Other poor features noted at this location were the extensive use of ordinary electric lights, fixtures, and motors. Similarly poor conditions existed at a fertilizer manufacturing plant which handles huge quantities of powdered chemicals.

Conditions at tire rebuilding and repair plants were generally fair to poor. Buffing operations are generally conducted in enclosed compartments, but at 2 locations the fire doors were blocked open by a number of tires. The buffing machine, at one of these locations, was not connected to the dust collector that had been provided. The dust collector, at another establishment, discharged rubber dust into an outside tank which had overflowed its contents around a weedy area containing a large accumulation of

cardboard cartons and scrap rubber stripping. A huge pile of used tires was stored within close proximity to this area. At most plants, rubber cement is sprayed on tire bodies in buffing or vulcanizing areas without any special protective measures.

Projection booths are generally well constructed, of fair size, and suitably ventilated; the secondary means of egress was rendered ineffective by a latched door at one booth. Projection and observation ports were equipped with suitable shutters, which were fused and rigged for simultaneous closure, and also arranged to permit manual operation. Booths are equipped with metal inspection and rewind benches, and standard film storage cabinets. Covered metal cans for scraps and carbon tips are generally not provided. In most instances, ordinary unprotected lights are located over rewind benches utilizing open or enclosed rewinds. Public areas were found mainly clean and orderly, but backstage areas were cluttered with combustible storage; one stage was not provided with a proscenium drop curtain. Several theaters receive steam heat from detached buildings.

Most dry cleaning plants use solvents having a flashpoint similar to kerosene. Cleaning and drying operations are generally conducted in open areas under hazardous conditions. Ordinary lights, fixtures, and switches were common and poor extension wiring was noted at several locations. Dry cleaning equipment at a few plants was not properly grounded. Dryers at 2 plants were improperly vented through wood roofs. At one of these plants, a 550 gallon fuel oil tank was not securely set, but rested on concrete blocks. At another plant the fill pipe for a fuel oil tank is in a shed with a compressor, oily rags, and cans and bottles of paints, solvents, and motor oils.

At automobile filling and service stations, gasoline is stored in underground tanks and dispensed with pumps of approved types. Garages and service stations are usually located in large one- and two-story buildings of ordinary construction; a few of the larger establishments are sprinklered. Most garages are provided with concrete floors that are equipped with adequate floor drainage systems. Automotive parts are generally cleaned in open buckets of flammable solvents, including, in several instances, gasoline. Practically no protective measures were provided; welding operations were conducted without the necessary precautions taken, and smoking was common.

Inspection of a number of auto paint and body shops, general repair garages, and several other occupancies including cabinet shops and furniture manufacturers disclosed that spray painting with the usual flammable coating materials is usually done without proper protective measures. Separate spray booths or rooms, when provided, are generally substandard in character and afford inadequate separation from other sections. In many instances, spraying is done in open shop areas with other work. Ordinary electric lights, fixtures, and switches were in use in most spray areas; at one location, a wall switch cover was missing. At several locations spraying is done within close proximity to electric or kerosene heaters and in some instances where welding operations are conducted. In some spray areas, adequate means of forced ventilation was lacking and at one location the exhaust fan was inoperative. The storage and handling of flammable mixtures and general housekeeping was usually only fair to poor in most spray areas.

There are a number of bulk oil plants in the city. Most of the larger ones are concentrated in Hooker's Point, along the channel, and receive gasoline and other products by boat and rail. Tanks are mainly vertical resting on concrete foundations. All have adequate dikes and generally do not expose other occupancies but are mutually exposing in a number of instances. Dock facilities were mainly good except that few measures were taken to control the growth of weeds and grass under docks and walks along the waterfront. At one small installation, the static bonding clamp, at the loading dock, was in poor condition and not used; a globe was missing from one of the lights and gasoline was leaking from a valve in an uncapped fill pipe. Loading facilities and maintenance at most other plants were adequate. None of the plants have automatic foam extinguishing systems; most of the larger installations have private fire hydrants, hose, portable foam equipment and supplies, and hand extinguishers of suitable types.

Conditions at various occupancies producing millwork items was generally fair to poor. Exhaust and collector systems are generally not provided and large accumulations of sawdust and shavings were noted around most machines. The mill area, of a concern engaged in the manufacturing of trailers, was heavily congested with benches, tables, and machines. Cardboard cartons and a huge accumulation of paper was piled outside the 1-story, wood frame building of this concern. Paints, lacquers, and thinners, stored in a small wire enclosed area, is applied in the open without proper protective measures. A wood burning stove, located in the mill area of a furniture manufacturing plant, was covered with sawdust. A number of poor conditions noted in the upholstery sections of this plant included the misuse of extension cords, the inadequate storage of foam rubber and various upholstery materials, the lack of proper safeguards in handling rubber adhesives, and poor housekeeping. Lumber storage is small at most plants but little control is exercised over the growth of grass and

weeds around lumber piles. Accumulation of rubbish was noted at 2 yards.

Conditions at one of the bowling alleys inspected were mainly poor. Five-gallon cans of bowling alley finish were stored in the heating and air-conditioning room which communicates directly with the main area. Bowling pins are cleaned with denatured alcohol and hand coated with flammable finishes behind the automatic pin setters without exercising proper protective measures. Numerous boxes of damaged and unused pins were stored in this area.

Poor housekeeping was noted at a mattress factory and an upholstery shop. Propane was leaking from the discharge valve on a 20,000 gallon tank at a small liquefied petroleum bulk plant. At an ice plant, unprotected lights and poor wiring were noted on the loading platform, where kerosene is dispensed.

The disposal of rubbish and trash was generally only fair within the city. Fire extinguishers were poorly distributed in a number of hazardous locations; when provided, they were generally well maintained. Control over smoking in places of public assembly was mainly good, but in many hazardous locations smoking went unchecked.

CONCLUSIONS. — Laws are complete and provide a good basis for control over hazardous conditions and occupancies. The fire prevention bureau is well organized with experienced personnel. Although inspection procedures are generally adequate, the lack of systematic inspections due to the insufficient number of personnel devoted to routine inspection work has resulted in the fair to poor conditions existing at many hazardous locations. Records are mainly complete and safely filed.

CONFLAGRATION HAZARD

PRINCIPAL BUSINESS DISTRICT.—General.—See maps. The district is located a few blocks east of the Hillsborough River in the south-central portion of the city. It is fairly regular in shape and contains 40 blocks, covering 72.9 acres of which 47% is in streets. The district is practically level and has an overall length of 2550 feet and ranges from 1150 to 1400 feet in width. All but a short length of one street are 80 feet in width.

Occupancies consist mainly of grade floor mercantiles with department stores, office buildings, banks, hotels, restaurants, theaters, and other business occupancies interspersed. Floors above grade are commonly used for office or storage purposes and in some cases as hotels or lodging houses. Values vary from low to high, the higher values being found in the form of the principal department stores, banks and office buildings, and hotels. Exposures to the district on the west and south are moderately severe to severe from a wharf and warehouse district and moderate on the other sides from minor business establishments.

Building Construction.—Fire areas and heights of buildings within the principal business district are shown in Table 4. As indicated therein, wood frame and unprotected noncombustible construction accounts for only 2% of the total built-on area and is well scattered so as to create only a slight hazard in the 13 blocks where it is found. Fire-resistive construction, covering 20% of the area built upon, is found in 21 blocks and in some cases forms local fire breaks.

Ordinary construction, which accounts for 78% of the total built-on area, is found in but one of the blocks. Forty-nine percent of this class of construction is in individual or combined fire areas in excess of 10,000 square feet and 28% is in excess of 20,000 square feet. Five buildings are 5 stories or over in height. Buildings of this type of construction are normally weak from the standpoint of restricting the spread of fire. How-

TABLE 4.—FIRE AREAS AND HEIGHTS OF BUILDINGS IN PRINCIPAL BUSINESS DISTRICT.

FIRE AREAS

Square Feet	Per Cent of Built-On Area			
	Fire-Resistive	Ordinary*	Wood Frame†	Total
5,000 and Under	0	16	1	17
5,001 to 10,000	7	24	0	31
10,001 to 20,000	6	16	1	23
20,001 to 40,000	7	19	0	26
Over 40,000	0	3	0	3
Total	20	78	2	100
Per Cent Sprinklered	3	30	0	33

HEIGHTS

Number of Stories	Number of Buildings			
1	0	51	5	56
2	5	95	2	102
3	9	30	0	39
4	1	8	0	9
5	1	3	0	4
6	1	0	0	1
7	2	1	0	3
8	3	1	0	4
9	0	0	0	0
10-17	8	0	0	8
Total	30	189	7	226

* Includes protected noncombustible and heavy timber construction.

† Includes unprotected noncombustible construction.

ever, about 38% of the area covered by this class of construction is protected by automatic sprinkler systems. Unpierced fire and exterior walls occur with moderate frequency and are mainly in fair to good condition, but some lack parapets, which when provided are usually too low. Less than half of all buildings have unprotected floor openings whereas a fairly large proportion of exposed windows and practically all communicating wall openings are either improperly or entirely unprotected.

About a third of the total built-on area is sprinklered and 15 buildings in the district are provided with standpipes and hose.

Probability of General Conflagration.—Blocks are mainly of regular shape with all but 3 being about 210 feet square. The built-on area of the individual blocks mainly range from 50 to 100% and averages 81%. One block, near the center of the district, is occupied by only a small booth, but many other blocks are solidly built upon with 3 being inaccessible. Groupings of buildings having excessive fire areas are found in many of these and other blocks. Most block frontages are compactly built and many buildings have permanent awnings which considerably reduces the effective street widths. These undesirable features are offset in-part by the extensive concentration of automatic sprinklers in most of the congested blocks and elsewhere and also the fairly good distribution of fire-resistive construction. Fires originating in most blocks should be confined to small groupings of buildings; fires of a larger magnitude can be expected in a few blocks, but should not spread beyond the block of origin except for the extra hazard created by the grade level railroad on Polk Street. Several long freight trains run through this district each day, often consisting of tank cars of flammable liquids. A derailment could create a severe hazard by freeing flammable liquid on the streets and/or delay fire department response by blocking many of the street crossings.

OUTSIDE THE PRINCIPAL BUSINESS DISTRICT. — Minor Business Districts. — Extending northward from the principal business district to about Oak Avenue between Ashley and Marion Streets is an important business district consisting principally of grade floor mercantiles, restaurants, filling stations, garages and auto sales agencies, hotels, furniture stores, and other general businesses and service establishments. Buildings are mostly old, of ordinary construction, and lacking in the fire protection features necessary to restrict the spread of fire. Heights are mainly low to moderate but areas range from small to excessive. Blocks are accessible but streets are only of fair width with some being narrow and further decreased by permanent awnings. The water supply in this area is adequate. Severe fires of group proportion are probable and in some instances can be expected to cross the narrow streets to involve several blocks.

Extending along Broadway from about 13th Street to the vicinity of 26th Street, and for one or two blocks along several cross streets on either side of Broadway, is another extensive business district. Construction is about ¼ wood frame; the newer and larger buildings are of ordinary construction. Buildings are mainly 2 and 3 stories and of moderate size; there are good fire walls or open spaces in nearly every block and accessibility is good. Streets are of fair width, but their effective width is decreased by many wooden galleries or permanent awnings. This district is completely surrounded by wood frame dwellings and is also exposed by a sprinklered woodworking plant and lumber yard on the south and a sprinklered cigar factory on the north. The water supply in this area is adequate. The blocks containing principally wood frame buildings create considerable hazard. Fires originating in this district should be confined to one or two blocks.

Extending along Lafayette Street from the Hillsborough River to Grand Central Avenue to Howard Avenue, along Florida Avenue north to the Hillsborough River, along Nebraska Avenue to the Tampa and East Coast Railrod, along Rome and Howard Avenues for about a mile, and along most of Hillsborough Avenue, Dale Mabry Highway, and Henderson Boulevard are important minor business districts. Heights are mainly low and areas small to moderate. Construction is mostly ordinary. Accessibility is good in most instances. Some buildings are severely exposed by surrounding wood frame dwellings. Severe fires are probable in most areas but should not spread beyond the group of origin.

There are several major shopping centers found scattered in the city. Most are fairly new and have the same general characteristics of construction. They are of ordinary or protected noncombustible construction, 1-story in height, and have excessive fire areas which are often subdivided into smaller areas by concrete block fire walls that extend to, or through the roof for about 1 or 2 feet. Some of the larger areas are sprinklered. Accessibility is good. Shopping center fires should be local in nature.

Industrial and Manufacturing Districts.—South and east of the principal business district lies an extensive industrial and warehouse district. Buildings are of low height and mainly of ordinary construction with some wood frame and metal-clad buildings interspersed. Many areas are excessive; however, automatic sprinkler protection is provided in quite a few instances. The hazard of sweeping fires is increased somewhat by the mainly inadequate water supply, but un-

der normal conditions, a fire originating in this district should be confined to the group or block of origin.

At Hooker's Point and north along the western side of the peninsula are a number of large bulk oil storage plants, numerous shipyards and warehouses, a paint and lacquer manufacturer, and various other industries. At Hooker's Point, buildings are mainly of low-height, wood frame construction, and excessive area, but with fairly good separation. The water supply in this area is very inadequate and severe local fires can be expected. Northerly along the peninsula the spacing of plants is fairly wide. Bulk oil plants have adequate dikes and other facilities are properly installed, but many tanks severely expose one another and are not provided with automatic foam extinguishing systems, so that severe fires are probable at most bulk farms in this area.

Located in the area bounded by 27th Street, 6th Avenue, 36th Street, and Adamo Drive are numerous industrial and manufacturing plants, including a steel mill, fertilizer plants, lumber yards, and electronic manufacturers. Buildings are mainly of wood or metal-frame construction; most buildings have excessive areas but practically all are low in height and many are sprinklered. Buildings are well separated and are readily accessible. Most fires originating in this area would be severe but should be local in extent.

Extending along both sides of West Shore Boulevard from North B Avenue to West Crest Avenue, and along the north side of West Crest Avenue to about North Hubert Avenue, is an extensive manufacturing and warehouse district consisting of machine shops, cabinet and furniture manufacturers, mattress factories, upholstery shops, trailer manufacturers, and ceramic tile makers. Most buildings are large 1-story, wood frame, barrack type structures having little resistance to the spread of fire. Buildings are separated and are readily accessible but in many instances they severely expose one another. Also, the water supply is seriously deficient, so that fires originating in this area could possibly get beyond control of the fire department and involve a large portion of this district.

In the northeastern corner of the city is a modern industrial park consisting of several breweries, a manufacturer of storage batteries, a glass container manufacturer, and manufacturers of polishing and dishwashing machines. Buildings are of superior construction, have low heights and excessive fire areas, and are mainly sprinklered. Buildings have good separation and are readily accessible; the water supply is adequate. Fires should be confined to building of origin.

There are numerous other warehouses, and industrial and manufacturing plants scattered throughout the city, but generally located along or near the railroad right-of-ways. In most cases, these establishments do not expose other structures so that it can be expected that fires should only be individual in nature.

Residential Districts.—Dwellings in the older sections of the city consist largely of closely-built, 1- and 2-story, wood frame residences. Severe group fires are probable in these areas where the water supply is inadequate. Most buildings erected in recent years, particularly on Davis Islands and in the western and extreme northern positions of the city, are of concrete block stucco construction with concrete floors and roof coverings generally of tile or other approved roofing materials. Spacing is mainly good and fires should be restricted to the building of origin. Higher individual losses can be expected in many areas because of the very wide spacing or lack of hydrants.

CONCLUSIONS. — Large group fires can be expected within the principal business district, but should not spread beyond the block of origin. Sweeping fires of block proportion, in some cases spreading to involve adjoining blocks, are likely in the older and more congested minor business districts. In shopping centers and newer business districts the hazard is mainly local. Sweeping fires of large magnitude can be expected in an extensive manufacturing and warehouse district in the northwestern portion of the city. Severe group fires are probable in most other industrial areas, except where buildings are well separated. In older residential areas the hazard of sweeping fires is prevalent.

RECOMMENDED IMPROVEMENT PROGRAM

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

WATER SUPPLY

1. That emergency service be improved by receiving fire alarms on a fire alarm circuit at the water department shops and that a responsible employee respond to all second alarms of fire, prepared to operate valves and cooperate with the fire department.

★2. That the capacity of the supply works be increased as proposed and that the piping be arranged so that no case of a break in a pipe or

the maximum day's consumption and the required fire flow in conjunction with the available storage.

3. That an additional high-lift pump of at least 25.0-mgd capacity be installed.

★4. That the distribution system be strengthened by the installation of the mains shown in red on the map, and that the following be adopted as the standard minimum size of mains used for hydrant supply for all future construction:

a. For residential districts 8-inch.

b. For business and industrial districts, 8- and 12-inch; the former to be used where it completes a good gridiron and the latter for lines not interconnected.

5. That general improvement of the distribution system be made by replacing 4-inch mains used for hydrant supply and eliminating 6-inch dead ends supplying hydrants.

6. That additional 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 2 blocks, or a maximum of 800 feet in other districts.

7. That all valves be inspected annually and large valves more frequently and that records be kept of inspection, operation and condition.

8. That all hydrants be inspected twice a year and after use.

★9. That additional hydrants be installed so that:

a. In the principal business district the average area served by each shall not exceed 48,000 square feet.

b. In other high value districts the average area served by each shall not exceed 80,000 to 110,000 square feet depending upon the character of the district.

c. In residential districts there will be one at each street intersection with intermediate hydrants in long blocks so that they will not be over 500 feet apart.

FIRE DEPARTMENT

10. That the position of chief be placed under civil service.

11. That company members be retired at age 62 and that the recently inaugurated annual medical examination of all company personnel over 55 years of age be continued.

12. That new engine companies, provided with pumpers of at least 750-gpm capacity, be established as follows:

a. At Engine 14 quarters.

b. In Engine 12 quarters if Engine 12 is relocated to the Tampa International Airport as proposed.

c. On Hillsborough Avenue in the vicinity of Armenia or Habana Avenue.

d. In the northern part of the city, the exact location to depend upon future growth in this area.

13. That additional ladder companies, preferably provided with aerial ladder trucks, be established as follows:

a. With Engine Company 9.

b. With Engine Company 11.

c. With Engine Company 18.

14. That Pumpers 12 and 15 be provided with sufficient ladder truck equipment, including a 35-foot extension ladder and forcible entry tools, in order to be able to furnish ladder service in their respective areas.

★15. That sufficient men be appointed to the department immediately to provide at least 5 men on duty at all times with each company.

Note: Standard manning requires 7 men on duty at all times with each high-value engine and ladder company and with engine companies furnishing ladder service, 6 men with other ladder companies and 5 men with other engine companies.

16. That a fireboat of at least 5000-gpm capacity be provided and located at the foot of Meridian Avenue.

17. That equipment be provided where not already furnished as follows:

a. To each Pumper: Two bale hooks, a claw tool, door opener, rubber gloves, hydrant hose gate, burst hose jacket, 2 wyes, siamese connection, 2 spray nozzles for 2½-inch hose, a distributing nozzle, hand extinguisher for Class A fires, and 2 electric handlights.

b. To each Ladder Truck: Four bale hooks, a cellar pipe, hand extinguisher for Class A fires, bar cutter, 2 building jacks and power and hand saws.

18. That adequate rules and regulations be adopted as planned, printed and issued to all members.

★19. That the training program be expanded to include frequent company drills at the training grounds and more comprehensive daily company drills and school in quarters.

20. That company members make inspections of important buildings in their respective districts, information obtained to be recorded on suitable forms, augmented by appropriate notes and sketches, and used as material for discussion in the training program.

21. That running cards covering response through a fourth alarm be developed and provided for each fire station and alarm headquarters, and that response to all box alarms and telephone alarms for fires in buildings in high value areas be at least 3 engine and 2 ladder companies, with an additional engine company at night, and in residential areas be at least one ladder and 2 engine companies.

FIRE ALARM

22. That the fire alarm system be rehabilitated, as planned, in accordance with the Standards of the National Board of Fire Underwriters for Municipal Fire Alarm Systems and that the system be gradually extended to all high value areas and eventually to all closely built-up parts of the city.

23. That reliability of the system be improved by:

a. Placing circuits in good condition.

b. Providing proper protection to circuits at fire alarm headquarters.

c. Providing each box circuit with a recording device in alarm headquarters.

d. Providing 2 alarm circuits to each station.

e. Providing additional box circuits so that none will serve an area in excess of that protected by 30 properly spaced boxes.

24. That conspicuousness of boxes be improved by placing indicating lights over boxes in high-value areas and by painting boxes and pedestals more frequently.

25. That the system be operated manually and boxes be retimed to transmit signals at a speed of 2 blows per second.

26. That telephone alarms for building fires be confirmed over the fire alarm system.

27. That complete and frequent tests of the system be made, this to include current, voltage, ground and interline tests at least 3 times a day and after electrical storms; a test of circuits and apparatus by transmission of signals 3 times daily; and bi-monthly test of all boxes, this to include a check of the succession feature.

BUILDING DEPARTMENT

★28. That inspectors be appointed under civil service rules and regulations with suitable qualifications prescribed for the position.

★29. That the building code be rigidly enforced.

30. That complete records of all inspection operations be maintained.

ELECTRICITY

★31. That inspectors be appointed under civil service rules and regulations with suitable qualifications prescribed for the position.

32. That a complete inspection of old wiring be made and defects corrected, and that all wiring be subsequently reinspected at suitable intervals.

33. That complete records of all inspection operations be maintained.

FIRE PREVENTION

★34. That sufficient qualified personnel be assigned to the fire prevention bureau to provide an adequate system of inspections and rigidly enforce fire prevention laws and ordinances.

CONFLAGRATION HAZARD

★35. That owners of existing defectively-constructed buildings which involve serious life hazard or are so located as to form conflagration breeders be required to protect floor, fire wall, and exposed window openings.

★36. That approved automatic sprinkler equipment be required in all basements exceeding 2500 square feet in area used for storage or for mercantile purposes and in all buildings which by reason of their size, construction, or occupancy involve serious life hazard or might act as conflagration breeders.