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19

## THE HIGH PRESSURE FIRE SYSTEM.

### THE STATEMENT OF ENGINEER O'ROURKE IN REPLY TO NATIONAL BOARD OF FIRE UNDERWRITERS.

NATIONAL BOARD OF FIRE UNDERWRITERS, 76 WILLIAMS STREET, NEW YORK, December 26, 1917.

To Members of the National Board of Fire Underwriters:

Pursuant to requests for a report of progress upon the Boston High Pressure Fire Service System during the past year, with recommendations deemed most urgent in order to obtain the best possible measure of additional protection in the near future, an investigation was made by Engineer J. H. Howland, December 10 and 11, 1917.

After a further delay of a year, the City of Boston is now no nearer obtaining the needed protection contemplated in the High Pressure Fire Service System than as reported in December, 1916; even plans for the location of the pumping station, on which the entire value of the system depends, have been changed recently, and no contract or agreement has yet been made in regard to the equipment now planned.

The distribution system is only about half complete; many lines necessary to reliability and adequacy, as originally planned, have not been installed, and the number of hydrants is insufficient; conditions have been slightly improved in these respects by laying a 16-inch main on Bromfield street and a 20-inch in South Market, and the two lines to the distribution system from the pumping station have been laid in part. The city has also tested many sections for leakage and corrected conditions in several places. A pipe line along Harrison avenue, Bedford and Quincy streets is contracted for.

Of the \$1,000,000 authorized under chapter 312 of the Acts of 1911, there remained December 1, 1917, a book balance of \$294,396. After estimated allowances for payments on existing contracts, unsettled claims, maintenance charges and cost of finishing suction and discharge lines, in connection with the proposed pumping station, there appears to be approximately only \$170,000 available for building and equipping the High Pressure Pumping Station and completing the distribution system.

The Fire Department reports that the high pressure hydrants, with supply from the domestic high service at about 90 pounds pressure, are now used for direct streams in nearly every instance where the fire can be reached with hose lines not exceeding 200 feet in length, and occasionally for engine suction at somewhat greater distances from the fire. Because of the low pressures maintained, these direct hydrant streams are principally used for wetting down or as standby streams in the lower 3 or 4 stories. With the wide spacing of hydrants due to the incompleteness of the distribution system, together with the failure to provide the pumping station for maintaining suitable pressures, the system as at present installed cannot be used to material advantage in a large percentage of the fires occurring in the congested value district.

It is very generally recognized that the city is in sore need of the additional protection afforded by an adequate and thoroughly reliable High Pressure Fire System. With a seriously undermanned fire department, due principally to a large number of unfilled vacancies occasioned

by the National Army draft, and with no provisions made for offsetting a still greater depletion of the fire-fighting force by the granting of increased time off after February 1, 1918, the urgency of an adequate High Pressure Fire System becomes more strikingly apparent.

As it is obviously impossible with the present high prices to provide for the construction of the pumping station building and complete equipment with the small balance of funds available, it is recommended that an additional bond issue be authorized, sufficient to provide for the following:

1. The immediate construction of the station at or near the present proposed site, and the initial installation of a pumping capacity of 18,000 gallons per minute with provisions in the design of piping and building for an ultimate capacity of 24,000 gallons per minute.

2. The completion of the distribution as a duplex system to entirely cover the congested value district and adjacent territory as originally planned, with provision for future extension to cover the entire North End.

3. The making of systematic tests of the system by maintaining 300 pounds pressure for 24-hour periods at least monthly, and studying the resultant leakage in order to develop and correct any weak joints.

Respectfully submitted,  
COMMITTEE ON FIRE PREVENTION,  
R. D. HARVEY, Chairman.

BOSTON, January 9, 1918.

To His Honor the Mayor:

The following reply to the communication of the National Board of Fire Underwriters relative to the High Pressure Fire Service is respectfully submitted at your request:

The recent report of the National Board of Fire Underwriters continues its criticism of our methods in the prosecution of High Pressure Fire Service work, stating that the entire value of the system depends upon the pumping station; that we have not added sufficient piping to the distribution system; that the capacity of our proposed station is too small, and that its installation has been delayed; and that the present undermanning of the Fire Department should hasten the completion of the system.

#### PRESENT VALUE OF SYSTEM.

The existing piping system comprises about  $7\frac{1}{4}$  miles of mains and 209 hydrants, and is supplied with domestic high service, of about 95 pounds pressure, from a 16-inch connection in Tremont street very close to the 42-inch main. This has been in service since November, 1916, and a demonstration in Haymarket square on December 3, 1916, showed representatives of both the Boston and National Boards that it could be utilized very efficiently for wagon gun and street streams directly connected with the hydrants.

Its value in actual service was emphatically shown at the Sears street fire of December 27 last, when of the two best located domestic hydrants one was found with a cracked barrel and the other frozen. Four high pressure hydrants were put immediately in use with four direct hose lines (one of which was a 3-inch line about

500 feet long, which, however, was afterwards shortened), two engine-connected streams, and a third engine standing by connected up, ready for service.

The utilization of these hydrants may have prevented a conflagration on this very cold morning, and refutes the discouraging comments of the National Board in regard to the present value of the system.

Unquestionably it would be of greater value if direct hose streams were more frequently taken by the Fire Department directly from these hydrants for fighting fires at their early stages.

#### DISTRIBUTION SYSTEM.

Until the pumping station was finally settled, both in size and location and following out our policy of providing a pumping station and feeders to the existing piping system within the million dollars appropriated, it was decided not to follow the feverishly hurried pipe laying of 1914 and 1915 which has been so much criticised both as regards excessive leakage conditions in the joints and going ahead without any definite location of station.

It had been intended by the preceding engineer in charge to lay  $3\frac{1}{4}$  miles of piping in 1916, but we devoted our efforts to getting the existing lines in suitable condition to put all of the 176 hydrants in service either with fire boat delivery or domestic high service, the latter of which was finally adopted on advice from the National Board. About 2,500 feet of mains were laid, however, principally in streets which were to be repaved, to furnish greater protection to Faneuil Hall and to close in bad dead ends.

In 1917 a contract was let for about 7,100 feet of mains, comprising a line in Bromfield street to protect the neighboring bad alleys, one in Merchants row and South Market street to close in bad dead ends, and the feeder lines from the system to the proposed North End location of pumping station. One of the feeder lines is completed and about 2,700 feet of the second one remains to be laid. Good labor was scarce the past season, the men finally refused to work nights, our method of testing the lines before backfilling makes the work slower than in 1914 and 1915, and the contractor was late in starting, otherwise both feeder lines would have been completed.

The fact remains, however, that the lines laid in 1916 and 1917 are not defective in joints or leakage under the 400 pounds test as all joints were exposed under the test for each section, and new hydrants in these lines were immediately put in service. We had one experience with 720 lineal feet of 20-inch main included in one test where there was no measurable leakage for the entire section.

#### BOSTON PUMPING STATION—SIZE AND LOCATION.

We quote as follows from the 1916 report of the Public Works Department, City of Boston:

"A legislative act, approved March 14, 1916, authorized the city to construct a pumping station in the Charles River Basin, on the Boston side, between the Cambridge Bridge and the Charles River dam, and authority was granted on June 8, 1916, by the War Department to construct the station in a location requested by the city, about opposite Fruit street.

"For the size of station proposed at that time to erect this appeared to be the only available satisfactory location, but if a suitable area were reclaimed in the



basin a building attractive enough in appearance to suit the location erected, and an equipment the same as that proposed for the original Charles street station installed, there would have been practically nothing left of the \$1,000,000 appropriated by the Legislature to construct the system, and for which the city would have a very large pumping station and only 6½ miles of piping system, with no connection between the two.

"Action by the Legislature in 1911 was urged by the Chamber of Commerce and the Finance Commission, and the latter body recommended on May 12, 1911, that after inspection and careful consideration of the plans prepared by City Engineer Jackson and the less expensive plan suggested by Fire Commissioner Wells, the City Council pass a vote accepting the act, provided it feels assured that the executive department will adopt a plan which will secure an adequate high pressure service for not more than the sum appropriated.

"The Jackson plan proposed about 13½ miles of pipe mains with 319 hydrants, and the scheme proposed in connection with the large station comprised about 15 miles of pipe mains and 410 hydrants.

"After a thorough investigation of the high pressure fire service in other cities, and the relationship of its service here to the city's general fire protection, the department reached a conclusion that a smaller station would fulfill any reasonable demand for the very restricted neighborhood it was proposed to protect at the expense of the entire city, and that it should be located to better advantage for power, hydraulic conditions and future proposed extension of the piping system close by the North End Park on Commercial street.

"The department had in mind a smaller station than the one now contemplated (12,000 gallons per minute), but by co-operation with the Chamber of Commerce this size was agreed upon by both as suitable to erect at once, and in the location mentioned, and approval obtained from his Honor the Mayor.

"It is thought that with the money available this station can be built and connected with the existing system with suitable feeders having necessary hydrants, and faith kept with the Legislature, the Mayor and City Council that a complete high pressure fire system be installed for the money now available.

"To complete the piping system as intended, additional money could reasonably be requested from the next Legislature."

A report was submitted to Your Honor on November 18, 1916, discussing different types of stations with estimates of costs and yearly fixed charges which was published in the *City Record* of November 25, 1916, and was the result of studies and negotiations during the year.

At the close of the year 1916 we had decided upon a 12,000 gallon station with 6 units of 2,000 gallons each, operated by Elevated railway current exclusively, and had made tentative arrangements with the officials of that company for a stand-by charge of \$12,000 per year and a sliding scale of prices for current used. A change in management of the company in 1917 required that an auxiliary service be provided with another source of power in the station, and the present equipment is the result.

This comprises four units of 2,000 gallons each operated by Elevated current direct from the Lincoln Wharf generating station, and two units of 2,500 gallons each, operated by Edison current from

the Salem street substation of the Edison Company, together with oil switches and transformers to change 13,200 volts into 440 volts A. C.

This change increased the size of the station and the expense of the equipment materially over the exclusive Elevated current station, but through the generous coöperation of these two public service corporations, and in accordance with a contract for current submitted by the Elevated Company and a tentative agreement with the Edison Company for cable lines and auxiliary power, it is expected that the total yearly cost of current for the main pumps, including stand-by charges, will not much exceed \$10,000 per year, which comparatively low cost (less than \$5 per kilowatt of capacity per year) well repaid the city for our extensive investigations and at times discouraging negotiations for power. This yearly cost for power current is less than one third that which was estimated for the large station previously proposed to build in the Charles River Basin.

Early in 1917 we started designs for this type of station in the North End Paving Yard, but through the solicitation of the late Mr. Peabody, of the Park and Recreation Commission, and the City Planning Board the location was shifted across Commercial street under the Copp's Hill terrace, the roof of our station to be an extension of the existing elevated playground. We had every reason to suppose that these public bodies had knowledge that there were no legal complications to prevent its being carried out, and particularly as it was part of a comprehensive scheme for a greater area for park purposes proposed for this congested neighborhood.

At the end of February we submitted to the Westinghouse Company a rough draft of the specifications for station electrical equipment in this location, and intended to hasten the completion by letting out for bids the traveling crane, piping, valves and other equipment separately. It was felt by that company finally that divided responsibility for the equipment might not be so satisfactory to them, so complete equipment plans and specifications were prepared.

The service has at all times been considerably embarrassed by the existing contract with the Westinghouse Company which was approved January 30, 1914, for equipment in a station under Charles street, comprising six 3,000 gallon pumps (with provision for eight), each operated with two motors, respectively Elevated and Edison current machines. After plans had been prepared for this underground station building with impossible location, it was abandoned, and the Westinghouse Company notified on June 24, 1914, to stop work on the contract. We must conclude that approving a contract for equipment in this impossible location must have been intended to fasten upon the city an unreasonably large capacity, regardless of its location.

We were just about to send along these plans and specifications for the 13,000 gallon combined electric service equipment, when the commissioner was informed by the Law Department that it might be unwise to proceed with the location under Copp's Hill terrace, because of possible objections from abutting owners, or some other complications, which was most discouraging and sensibly lessened our courage for awhile, because it seemed so unreasonable for anyone with an ounce of public spirit to oppose an increase of park and playground area in this neighborhood of about 27,000

square feet, as an ultimate result, even if it could be done successfully. We then returned to the paving yard, where we had to design an entirely different layout of the same equipment than that proposed under the terrace. We postponed asking for bids after our entry into the war, on account of high prices, and the general stress of necessary war preparation business in the industrial plants until a general peace might look promising. As this did not materialize by Christmas time we finally decided that conditions might not improve, and we gave the Westinghouse Company plans and specifications for the complete equipment on December 24, and expect a tender on January 24 for the completion and test of the station not later than November 1, 1918, which will not be much later than the completion of the feeder lines, depending upon the availability of labor next season.

We have requested of the War Industries Board in Washington a priority certificate and have received an encouraging letter from Mr. Everett Morss, a Boston member of the Priority Committee.

Without a final granting of priority for our equipment it would be very foolish for the city to agree to pay the prevailing high price with uncertainty of getting the equipment within any specified time. Again, if the price submitted seems unreasonably high even for these times we would not be justified in entering into a contract even with priority. It should be borne in mind that for every \$25,000 saved in pumping station we can now lay about 3,000 feet of piping mains with hydrants.

#### EXISTING AND PROPOSED HIGH PRESSURE PUMPING STATIONS.

##### *Philadelphia.*

For six years the high value district was protected by only the Race Street Station on the waterfront close by with a capacity of 9,100 gallons per minute. The Lehigh Avenue Station of about 12,000 gallons per minute was built in 1910 to protect principally the Kensington district, an area of large manufacturing plants. It is connected with the high value district piping system with two 20-inch mains, each about two miles in length, either of which if out of service when needed to reinforce the Race Street Station would result in only a small quantity of water from this station being available at high pressure, because of large frictional loss in the long single line.

The Lehigh Avenue Station to protect the high value district may then be said to be not safely reliable for its capacity at high pressures. Type of pump is such that increased quantities at lower pressures are not available. Units are small and one out of service does not materially reduce capacity.

##### *Baltimore.*

Succeeding a disastrous conflagration a high pressure system was put into service in 1912. The pumping station has three pumps, 4,500 gallons each, making a total capacity of 13,500 gallons per minute. A foundation for a fourth pump was provided, but is now occupied with electric lighting generators to furnish current for municipal purposes. The National Board has repeatedly urged that the fourth pump be installed, but without effect.

The type of pump is such that increased quantities at lower pressures are not available, and one pump out of commission reduces the capacity to 9,000 gallons, which is a serious handicap.

It would seem that the actual distressing experience of a recent conflagration would



provide a larger pumping capacity if it were really necessary, but this city refuses to date to be cajoled by the National Board for an increase.

Cleveland.

Station in service for over four years, with four pumps, each of 2,500 gallons, with space for two additional. Total present capacity 10,000 gallons per minute with larger quantities at reduced pressures. No intention at present to increase capacity although recommended by National Board. No standby charge, as current is furnished by municipal plant.

Toledo.

Station in service for a year, with four pumps, 2,000 gallons each, and space for two additional, making present capacity 8,000 and total intended 12,000 gallons.

Manhattan.

Two stations put in service in 1908 connected with about 55 miles of piping mains. Each station five 3,000 gallons pumps, with space for three more, and one additional pump was installed in each station in 1909. Present capacity of each station six pumps, about 18,000 gallons per minute, and the mileage of pipe mains has increased from 55 to about 127, and no intention of adding any more pumps to either station. Greatest quantity of water registered at one time and for five simultaneous fires, three of which were of more than usual extent and one particularly so, was 32,700 gallons per minute, which, with a reduction for leakage, would make 30,000 gallons available for the fires and at only 225 pounds pressure. At these fires there were forty fire engines standing idly by, and if two thirds of the latter were put into service the necessary pumping station capacity could be reduced to 16,200 gallons which was the maximum in use at any other time during nine years. Again if two fire boats were coupled into the system for this nine-year period emergency a similar result of reducing expensive pumping station capacity and yearly costs would be brought about.

Manhattan is now connecting up the Catskill aqueduct supply directly with the high pressure piping system, giving a plentiful supply at about 112 pounds pressure, and the intention is to couple direct hose streams to the high pressure hydrants and not to call upon the pumping stations until it is thought the fire is beyond the capacity of 112 pounds pressure to successfully fight, and it is expected that 90 per cent of the fires will be put out with this service. This in a modified way corresponds to the present use of our system with its 95 pounds pressure.

Detroit.

There is considerable high pressure piping and hydrants in service with fire boat supply, and the system is being extended. A pumping station is contemplated with a total capacity of 10,000 gallons per minute, and two pumps of 2,500-gallon capacity will be installed at the start. There are no signs of a feverish rush to completion as work was entirely suspended one season recently due to the scarcity of labor.

Cincinnati.

A piping system has been completed and the city officials are having a controversy with the National Board and have decided to get along without a station and use a gravity system (Plan C) at a pressure of 170 pounds at the hydrants and capacity of about 12,000 gallons.

We quote the following from an article published December 29, 1917, by J. A. Hiller, Superintendent of the Cincinnati Water Works:

"After a study had been made of the systems used in other cities and noting their methods of operation and especially noting the average and extreme pressures used at times of fires, it did not appear necessary to expend a large sum for installation and encumber the city with a large annual cost for operation. It was therefore recommended that Plan 'G' was sufficient for all purposes within the district to be protected.

"This brought forth a storm of protest from the insurance interest, which claimed that the available pressure was not adequate for furnishing the largest and most powerful streams which may be reasonably expected, and that the plan did not offer a maximum degree of reliability. It was admitted that this plan would be sufficient for 99 per cent or more of all fires likely to occur, but to take care of a possible fractional percentage of fires a separate pumping station should be built in addition. That is to say, that the city should expend a large sum for a pumping station and assume a large annual operating expense to provide against this chance. This appears to be carrying insurance to an absurd limit, as the premium demanded is not justified by the additional protection."

Chicago.

Advices from Chicago less than one year ago state that the installation of a piping system with three stations of a capacity of 10,000 gallons each which had been proposed had been abandoned by the city.

Washington.

There are 296 high pressure hydrants of the same design as those in use in Manhattan on a system proposed at one time to utilize high pressure, but after later careful consideration of fire risks in the city and the investigation into the probable effect upon insurance rates it was finally decided that such a system would be inadvisable and the project has not been revived.

FIRE DEPARTMENT.

The city now spends over \$2,000,000 a year maintenance for its Fire Department and has a large investment and maintenance expense in its Water Department for general fire protection. In the maintenance cost per capita of its Fire Department, Boston exceeds at present that of any of the 10 largest cities in the United States, as shown below, and which is greater by from 44 per cent to 165 per cent of the four cities in this group having high pressure systems with pumping stations; the height of buildings in other cities is much greater than in Boston.

City.	Population.	Year.	Expense Per Capita.
Cincinnati.....	400,000	1914	\$1 91
Buffalo.....	400,000	1914-15	2 25
Detroit.....	500,000	1907-11	1 65
Pittsburgh.....	551,000	1912	2 08
Baltimore.....	585,000	1915	1 62
Cleveland.....	658,000	1915	1 30
Boston.....	722,000	1912-16	2 39
Philadelphia.....	1,574,100	1906-10	0 90
Chicago.....	2,270,000	1911	1 29
New York.....	5,032,800	1912	1 66

Detroit and Cleveland are both at present probably larger than Boston in population.

The maintenance of the High Pressure Service will increase the per capita expense, and if conditions are as represented in the report of the National Board it will be further increased after February 1, and it would seem that the time had arrived for the city to consider measures to reduce the per capita expense, which, as large as it is at present, has not served to prevent a recent increase in insurance rates.

INFLUENCE OF HIGH PRESSURE FIRE SERVICES ON INSURANCE RATES.

Unfortunately it is difficult to get accurate information as to what reduction in insurance rates the installation of these systems have brought about in different cities, but submit the following:

Manhattan.

The real estate interests have within a year protested that there had not been a sufficient reduction in rates due to the \$7,000,000 spent on its High Pressure Service.

Toledo.

An excellent system has been in operation for a year, but a reduction in rates as promised awaits further requirements of the National Board.

Cleveland.

The following is quoted from the Cleveland Inspection Bureau, which corresponds, we believe, with our local Board of Underwriters which shows that psychology has an effect upon protecting the city from fires. Incidentally, it took some time to complete the system.

"In anticipation that this system would be fully completed and in active operation within a few months after the underground mains were laid, this bureau, in September, 1907, in recognition of the additional fire protection thus afforded, bulletined a reduction in fire insurance estimates.

"This reduction amounted to about 8 per cent in the then prevailing insurance estimates in force, and principally affected wholesale and retail mercantile and light manufacturing risks. Roughly estimated, this reduction in the cost of insurance probably netted the insuring public a yearly saving of at least \$50,000 and placed the city of Cleveland in a minimum class of its own with respect to the future basic cost of insurance.

"Inasmuch as six years elapsed before this system was finally completed, it will be observed that the reduction in cost of insurance extending over this six-year period amounts to a large contribution towards paying for the cost of this installation, and may be considered as a future annual contribution.

"Under these conditions, no additional reduction in fire insurance estimated is contemplated at the present time for this specific improvement."

Cincinnati.

From Hiller's Article—"It was finally admitted that Plan G would greatly improve the fire-fighting facilities of the city and be of great value, if properly handled, but this not being what is termed standard high pressure equipment, no credit in insurance rates would be given."

This statement is, however, not less frank than Mr. Cabot's letter on Boston.



### Boston.

A letter of Mr. Cabot's, secretary of the local Board of Underwriters, to the Commissioner of Public Works, dated June 20, 1916, states that it will be impossible for him to give any more definite statement of the matter than the following: "We have agreed to remove the 15 per cent which was put on a number of buildings and their contents at the time of the San Francisco conflagration, whenever the high pressure pumping station is completed and approved by the National Board of Fire Underwriters. Owing to various other changes in rates, this reduction has already been made as far as buildings are concerned and therefore it would appear that only an allowance on contents has been provided. This charge has not been made on buildings of fire-proof construction or buildings protected with sprinklers throughout, or the contents of these buildings."

From this it will be seen that there is very little reduction in rates coming to the city, and that the attitude of Mr. Cabot has changed somewhat since 1911, when the system as proposed by Engineer Jackson would be acceptable and insisting now upon one approved by the National Board. A peculiar feature of the situation is that the National Board, who attempt to dictate conditions for the local situation, naively say they have nothing to do with rates, and at various hearings before your Honor, representatives of the local Board, who have entire jurisdiction over rates, when questioned as to what reduction might be expected due to the high pressure system, refuse to go on record even to the extent of an approximate figure or percentage.

One of the reasons advanced by the Chamber of Commerce for the Act of 1911 was that for the first time the companies were willing to promise a reduction in rates.

We have strengthened the Water Service in the high value district by 209 high pressure hydrants which are on our piping system lines with no other connection except at Tremont street, near West, close to a large high service domestic supply main, with 95 pounds pressure. These hydrants, at 200 feet each side of the line, serve an area of more than 250 acres within the high value district and undoubtedly there is at present a reduction in rates due on a great many risks in this neighborhood. The laxity of the insurance interests in protecting this district against the probability hazard by an insistence upon sprinklers in the bad risks can be seen from the accompanying chart. The number of buildings sprinklered in two years, 1912-13, was 13. The State Fire Prevention Commissioner's office was established in August, 1914, with legislative powers in regard to sprinklers and other conditions, since which time, in three years, about 174 buildings have been sprinklered, and other conditions vastly improved in the high value district. It can be readily seen that this progress in sprinkler equipment, if continued, will result within a very short time in having this and other areas secure against large fires or conflagrations.

On petition of Fred J. Burrell, backed by the Massachusetts Real Estate Exchange, House Bill No. 1335 was before the last Legislature for a curtailment of the powers of the Fire Prevention Commissioner, which revoked entirely his authority to order sprinkler equipments, and reduced from 5 to 1 per cent of assessed value, the expenditure to carry out any of his rules or orders. This bill

was opposed by Mr. C. H. Blackall of the Chamber of Commerce, Mr. O'Keefe, the Fire Prevention Commissioner, and Mr. Devlin of the City Law Department, and we have no knowledge that any representative of the New England Insurance Exchange, or the Boston or National Board of Fire Underwriters appeared to oppose it.

If this bill became a law a most serious blow would be dealt community fire protection in this city and elsewhere, and it is strange that it was not opposed by the insurance interests, or the Boston newspaper which comments so frequently on the high pressure situation. Happily the bill was defeated. Considering the array of high salaried and retained talent who appeared last year at the hearing before his Honor the Mayor in favor of the large station, the suspicion is confirmed that the insurance interests are more concerned in maintaining high premiums, and being protected against a conflagration in the high value area by high pressure service at the community's expense, than in the compulsory prosecution of sprinkler equipments at the owner's expense for these high values which has been increasing at a very rapid rate under the law of 1914.

At the 20th annual meeting of the National Fire Protection Association in Chicago, in 1916, in the discussion of the subject "Protection of High Value Districts," high pressure fire service is alluded to but once in the opening address, but great stress is laid upon legislation and sprinklers and the latter may be summed up in the statement of Mr. H. W. Foster, Chief Engineer of the Independence Inspection Bureau: "Sprinklers are the only effective general medium for securing practical immunity from conflagration hazard in our high value district,—and finally the money return of the sprinkler investment through insured property, and noninterruption of business, make such community action advisable from an economic standpoint."

The Factory Mutual Companies, engaged principally in protecting factory and storehouse establishments, foundries and so forth, specifically require that they will take no risk where combustible material is carried without being 100 per cent sprinklered, and where possible, require two independent sources of supply for the sprinkler equipment. While they do not take risks in the commercial buildings in the high value districts of cities they have one risk, to our knowledge, in Boston, namely, Schraff's Chocolate Factory in the North End.

The general policies of these Mutual Companies, since they started in 1835, has been to prevent fires rather than to pay losses due to fires, and if the stock companies had adopted the same policy within ten or fifteen years, of not insuring high value risks unless they were properly protected from within, a very different story could now be told in regard to the increasing amount of money necessary for cities to spend in Fire Department maintenance, and the demand on this city for an excessively large pumping station.

It is decidedly unfair and unjust to require the community at large to share the expense of unreasonable protection of this area, where the values are so large that they should be protected at the owner's expense. If money is available from City funds it should be spent in additional equipment and men for fire protection in all parts of the city rather than in the excessive fixed charges and yearly maintenance of an excessively large high pressure pumping station.

### BOSTON PUMPING STATION.

We have asked for bids on a station with total capacity of 13,000 gallons per minute at 240 pounds delivery pressure and 15 feet suction lift. The total capacity at 240 pounds pressure and normal suction conditions will be at least 16,000 gallons per minute with corresponding increase at lower delivery pressure.

This quantity will be greater than has ever been required from any similar station in the country excepting only in one instance in Manhattan for the five simultaneous fires already referred to and occurring on a gridiron piping system of 127 miles of mains, while ours at present intended will have not exceeding 15 miles of mains.

Should the occasion arise here once in nine years in accordance with the precedent established in Manhattan, with its 127 miles of mains, when greater capacity would be required, the station supply can be augmented by fire boats and by fire engines taking water from the domestic system hydrants and delivering into the high pressure hydrants and thence to the piping system. They could safely set up at any favorable location near or far from the scene of the fire, and each horseless would be good for over 1,000 gallons per minute which would be available at the fire hydrants with negligible frictional loss. Yet the National Board recommends a pumping station capacity for 15 miles of mains equal to two-thirds that of Manhattan with 127 miles.

The station adjoins the fireboat berth and crew quarters of Engine 31 and the immediate response of this boat in an emergency can be counted upon and a second boat put into the system in less than ten minutes through wharf connections. The location is first class from hydraulic and power current standpoints.

We will have four distinct sources of water supply: Southern low service, southern high service, northern low service, and for an emergency harbor water.

We are but about 1,500 feet distant from a generating station furnishing the primary supply and an equal distance from a substation furnishing the auxiliary supply, and the underground cables for power will be in streets with little present cable congestion, and fairly safe from conflagration damage, and we will be able, without much additional expense, to protect these two power current stations with adjoining high pressure hydrants. The fire hazard of the neighborhood is not bad.

### CONCLUSION.

We have always claimed that the National Board representatives sent to this city to report on conditions should be considered as inspectors and not engineers, and this claim is borne out by their successive reports on our high pressure service.

In 1911 their reports say that it is possible to dispense with fire engines in the area covered; that the piping system should have no dead ends and be connected at all intersections.

In 1916 their report has a map of the proposed and recommended piping system showing 26 dead ends and a duplex system of mains.

In 1917 the recent report calls for a station to be located at or near the proposed present site with ultimate capacity of 24,000 gallons per minute. This is emphatically not advisable from a power standpoint even if such capacity should be considered necessary.

Were the system completed in accord-



ance with all their recommendations not a single fire engine in or close by this district could be dispensed with, due to the necessity of having them mobilized in their present locations for service just outside the district or in the immediate adjoining suburbs such as East Boston, Charlestown, South Boston and Roxbury.

The high pressure fire service in this city has been from the start an economic and engineering problem, and beyond the capacity of those previously in charge to solve properly as the following instances clearly show:

(a) The awarding of a contract for equipment in a station ridiculously and dangerously located, and the necessary result of stopping work on it.

(b) Plunging ahead and laying pipe lines without a definite location of station, resulting in all kinds of sizes, puzzling posterity a great deal.

(c) Not testing the piping until back filled and repaved.

(d) A total of 176 hydrants only 57 of which could be utilized for fire purposes from the fireboat connection.

(e) The weakest pipe line system of any installed in other cities.

(f) A lawsuit with one of the laying contractors of 1914-15, necessitating much time and expense on the city's part.

During the period when these blunders were being made the service was in charge of an engineering inspector, Mr. Goldsmith of the National Board, who inspected this city in 1911.

Their report for 1911 devoted (1) three lines to stating that Mr. McInnes is an able and competent water works engineer; (2) five lines to a recommendation for automatic sprinkler equipments; and (3) thirty-two lines and a special report of eight pages to a recommendation for a high pressure fire system. It may be in return for (1), and for which Goldsmith probably was responsible, that Mr. McInnes the Division Engineer then and now of the Sewer and Water Division, not to be outdone in exaggeration, recommended Goldsmith to have charge of the high pressure fire service organization. The Chief Engineer of the National Board testified that Goldsmith at this time had no connection with the design or installation of any high pressure systems for fire purposes only, and he had charge of the installation of the water system in North Andover, a town, and that he (the chief engineer) did not recommend him for the Boston position.

Several times during Goldsmith's four and one half years as Engineer in Charge he was certified to the Civil Service Commission by the former Commissioner of Public Works as an expert in this class of work in order to retain him without an examination.

This is the only city in the United States, as far as known, which intrusted his work to an employee of the National Board, and which, considering Boston's vast reputation in the engineering field, is much to be regretted as a severe reflection upon the city's engineering talent available in 1911.

It may be that the primary cause of the delay in the work and its inefficiency was due to the innocent looking three lines (1) appearing in the report of 1911.

Before closing we will refer to the statement in the National Board's Report of December, 1916: "With the low price of labor and materials prevailing between 1911 and 1914 it is believed that the originally planned system could have been completed within the appropriation."

To show how little regard was paid to saving within this estimate Goldsmith

submitted in February, 1913, eighteen months after taking charge, preliminary plans and estimates for a system to cost \$1,000,000 with 15 miles of piping mains and the National Board pumping station. Less than one year after this was submitted designs for a station were adopted and the contract for its equipment was awarded to cost a total of about \$500,000. Pipe line materials had been bought or contracted for to the extent of over \$300,000 which provided the valves and hydrants for the complete system, pipes for 11 miles and specials for less than 11 miles. Over \$50,000 had been spent in engineering and miscellaneous, so that there was available in January, 1914, of the million dollars estimated the previous year to be the entire cost, less than \$150,000 with which to lay 11 miles of pipe, buy more specials, and buy and lay an additional 4 miles.

This meant to complete the system at the very lowest estimate for that time at least \$350,000 in addition to the million. On September 10, 1915, four years from the start of the work, and one year after war was declared, Goldsmith testified at a Finance Commission hearing: "We still believe we shall be very nearly able to construct the system at the engineer's estimate."

#### FINAL.

After the existing contract for feeder lines to the proposed station is completed we shall have stock in pipes, specials, valves and hydrants to the cost value of over \$125,000 on hand and for the laying of which additional money should be provided as well as for taking care of a possible shortage in the present available amount for providing the pumping station and equipment.

For these purposes we think that authority for an additional \$200,000 loan could be reasonably asked of the present Legislature subject to acceptance of the City Council and his Honor the Mayor.

We think that if at any time the present powers of the State Fire Prevention Commissioner, particularly over sprinkler equipments, are revoked or curtailed, further work on the construction and continued maintenance of the High Pressure Service should cease. Sprinkler equipments for fire protection are preëminent in value, and the fairest to the entire community of any form of fire protection, both for life and property.

To reassure those who may think that his district is in great danger from a conflagration, fires generally spread and reach conflagration size through the absence of water to put them out, and inefficiency of the Fire Department. It can be fairly said that the Fire Department has repeatedly proven its efficiency recently, and there is a better supply of water for fire purposes and at better pressures than any large city in the country previous to the installation of a high pressure system.

Respectfully submitted,

JOHN A. ROURKE,  
*Engineer in Charge High  
Pressure Fire Service.*