

ACTUARIAL REPORT

CITY EMPLOYEES' RETIREMENT SYSTEM AND FUND
CONTEMPLATED BY ORDINANCE No. 75200
CITY OF LOS ANGELES

AUGUST—1935

COATES and HERFURTH
Consulting Actuaries
437 South Hill Street
Los Angeles

August 30, 1935.

Board of Pension Commissioners
of the City of Los Angeles,
Los Angeles, California.

Gentlemen:

We hand you herewith our actuarial report upon the city employees' retirement system and fund as contemplated by the provisions of Ordinance No. 75200, approved June 28, 1935, Ordinances of the City of Los Angeles.

This report has been prepared in accordance with our agreement of July 1, 1935, and is based upon the census of employees furnished us by the City. Separate figures covering the Harbor Department will be found in the concluding pages of the report. A summary of the figures affecting City finances, excluding the Harbor Department, was forwarded to you under date of August 24th.

We desire to express our appreciation of the cooperation extended to us by the Secretary of your Board in all matters connected with our undertaking.

Very truly yours,

COATES and HERFURTH
Consulting Actuaries

(Signed) By Barrett N. Coates.

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A C T U A R I A L R E P O R T

City Employees' Retirement System and Fund
Contemplated by Provision of Ordinance No. 75200

City of Los Angeles

Section 5 of the Ordinance requires the Board of Pension Commissioners to secure an actuarial report "showing the cost of establishing and maintaining said City Employees' Retirement System on a reserve basis." In arranging for this report, the Board asked the actuaries for the following specific information:

1. A computation of the rates of contribution required by the individual members of the City Employees' Retirement System as defined in the ordinance.
2. A computation of the rates of contribution required to be made by the City under the terms of the ordinance on account of subsequent service as defined therein.
3. A computation of the liability assumed by the City under the terms of the ordinance on account of the prior service of the individual members of the System.

These three subjects will be discussed in order, and will be followed by such further collateral information as is within the scope of this report.

RATES OF CONTRIBUTION REQUIRED BY INDIVIDUAL MEMBERS

The requirement of the ordinance with respect to contributions by individual members is as follows:

"The rates of contribution and deduction from the compensation of members shall be expressed as a percentage of their compensation earnable and shall be based on age at the time of entrance into the system and shall be such as will provide on the average on a reserve basis for one-half of the cost of that part of the retirement allowance provided in this ordinance for subsequent service."

Subsequent service is defined as the actual service of a member after the effective date of the ordinance. The retirement allowance to which he is entitled on account of subsequent service is fixed at one-seventieth ($1/70$) of his average salary for each year of such service up to the time he retires, and the "average" is to be fixed on the basis of the ten years immediately preceding retirement. The member's contribution rate is to be calculated so that it will be adequate to pay for one-half of this allowance (or $1/140$ th of average salary per year served) "on the average."

Member contributions are to be treated as savings deposits to the extent that interest is to be credited to each member's account at a rate to be fixed periodically by the Board, and the full accumulated amount of the account is to be paid to the member or his beneficiary if his service terminates for any reason before he is entitled to a retirement allowance. At the death of a member after retiring on an allowance, his beneficiary or estate is to receive the "unused" portion of his savings account (accumulated contributions). The unused portion is determined by deducting from his account as it stood when he retired, one-half of the total amount paid to him for subsequent service. In actuarial terms, therefore, the employee is to contribute such an amount, expressed as a percentage of

salary, which will provide a savings account at retirement equivalent to the cost of a "cash refund annuity" to yield him an income equal to 1/140th of his average salary during the last ten years of service multiplied by the number of years' service rendered since he became a member of the System. By "cash refund annuity" is meant a series of equal payments continuing throughout life, with a cash refund at death equal to the excess, if any, of the original purchase price over the total of all payments made.

In order to calculate the rates of contribution by members, it is necessary to make definite assumptions covering the following factors:

a. Net rate of interest which will be earned by the Fund.

Present savings are to be the source of old-age income and the size of the current deposit required will be largely affected by the interest which can be earned over a long period of years.

b. Rate of salary change.

Contributions are to be a percentage of salary throughout the period of service under the System, but the retirement allowance will be fixed according to the salary received during the last ten years of service.

c. Rate of mortality after retirement.

The savings account is to be adequate to furnish a definite payment throughout life after retirement, and the necessary deposit obviously cannot be determined without a study of the probable death rate to be experienced.

d. Time when the member will retire.

Normal retirement ages are from 60 to 70, after ten years of service, but the member receives the same fraction of salary for each year served, regardless of age at which he retires.

Allowance for subsequent service not dependent upon amount of savings accumulation

These four factors can be forecast with varying degrees of probable accuracy, but all are admittedly uncertain. Attention is particularly

directed to the fact that the retirement allowance for subsequent service is fixed solely by the number of years served and the average salary during the final ten years. The actual savings accumulation credited to a member determines nothing but the amount of money which will be payable by the System upon his withdrawal from the service before retirement, or upon his death. This condition of a guaranteed benefit not dependent upon the contribution rate accentuates the necessity for close study of the experience which develops under the System, and subsequent changes in contribution rates if the facts warrant. The ordinance vests in the Board the right to make such changes in contribution rates as may in its judgment be necessary, and provides for periodical actuarial valuations to determine the degree of variance between actual experience and advance assumptions.

Rate of interest

The Board has exclusive control of the investment of funds accumulated in the System, but its discretion is limited to bonds or other securities authorized by the laws of the State of California as legal investments for savings banks. The interest assumption entering into former actuarial calculations on public retirement systems has ordinarily been set at 4%, and this has usually been justified by actual returns under judicious investment in securities suitable for public trust funds. In view of the very low return which can be secured on high-grade securities at the present time, an assumption of 4% per annum for the purposes of this report would seem less than conservative. Actual current interest levels need not necessarily be adopted, since the calculations embrace a long period of years, and the desired rate should be such as is a reasonable estimate of earnings for the "long pull." This matter was discussed with the Board, and the actuaries were advised that in the opinion of the Board an interest rate of $3\frac{1}{2}\%$ per annum should be assumed.

All of the calculations in this report which involve interest have therefore been made on the basis of $3\frac{1}{2}\%$ per annum. The Board's expression of opinion in favor of $3\frac{1}{2}\%$ as the assumed "long-term" rate does not in any way commit the System as to the rate of interest which will currently be credited to members' accounts after the System takes effect.

Rate of Salary Change

In most lines of work, an employee's salary tends to increase with length of service, and therefore with age. The problem with respect to the contributions of members is to find a percentage rate, to be applied to each member's varying compensation during his future service, which will produce a retirement allowance to be measured by his compensation during the ten years immediately preceding his retirement. If the average salary on which the allowance is to be based turns out to be twice as large as the average salary when the member starts to contribute, his required percentage contribution rate will obviously be larger than if the average salary turns out to be level at all ages.

The census cards furnished by the City showed each employee's rate of pay on July 1st of each year from 1926 to 1935 inclusive. Average salaries for each attained age were determined separately for the years 1929, 1932 and 1935, selected as three typical years; there was a considerable variance in the salary level between these years, but only a slight variation in the rate of change according to attained age. For the final calculations the figures for the three selected years were merged, with equal weight given to each.

Marked differences in the rate of salary change by age were found as between male employees in clerical or administrative positions, other male employees (chiefly manual labor), and female employees. This grouping was therefore necessary for various purposes in this report, and the groups

mentioned will be referred to respectively as

Male - Class 1
Male - Class 2
Female.

Salary scales finally adopted for the three groups are shown in Schedule 5 of the statistical section of this report.

If the average increase in salary between entry and retirement age is actually greater than the calculated salary scales contemplate, the calculated contribution rates for members will actually produce less than one-half of the retirement allowance for subsequent service. Conversely, if the salaries by age stay more nearly level than the scales indicate, the calculated contribution rates will produce more than one-half of the allowance.

Contribution Rates Graded only according to age

The language of the ordinance as to member contributions has already been quoted. It states, in part, that these rates "shall be based on age at the time of entrance into the system." The actuaries were advised by the Board that in its opinion the definite intent of the ordinance is to fix only one rate of contribution for each age at entry into the system. The actual cost of the benefit provided by the ordinance, expressed as a percentage of salary, will unquestionably vary according to sex and occupation. The method by which varying salary scales, mortality rates, etc., were finally merged into a single schedule of contribution rates will be described in a later paragraph.

Rate of Mortality after Retirement

Included in the census material furnished by the City were cards representing all employees who had left the service for any cause, including death, between 1926 and 1935. From these cards the indicated annual death rate by ages over the entire period was calculated. General considerations would argue that these death rates would not be a reliable guide for the future,

because it is almost certain that some employees whose service was terminated by "resignation" died soon afterwards, so that their cards would have been marked "death" if the information had been available. Comparisons of the calculated death rates showed them to be so much lower than well-authenticated experience has established as normal that the figures were discarded. There was the further difficulty that the percentage of employees in service above retirement age was not large enough to give any reliable indication of future death rates after retirement. For the purpose of member contributions, the mortality rate before retirement makes no difference, since the full savings account is paid to the beneficiary in the event of death while in active service.

The mortality standard adopted for use in this report is the "Combined Annuity Table." This was first published by the Actuarial Society of America in 1928, and was based on the actual modern experience of the largest insurance companies, primarily under policies of group insurance. Of the many mortality tables available to the actuaries for the purpose of this report the Combined Annuity Table is believed to be the most suitable. Like other modern tables, it shows a death rate for women lower than for men, indicating that retirement allowances for women cost more than for men. Death rates at all ages according to this table are shown in Schedules 10 and 14.

Time when the Member will retire

The ordinance makes retirement voluntary at any age after 60, with at least ten years of service, and compulsory at age 70 (beginning July 1, 1937), with a possibility of service being extended beyond age 70 upon request of the Department Head, approved by the Civil Service and Pension Boards. Even though there is an increase in the total allowance for each year served, the contribution rate will be much higher if retirement is contemplated at age 60 than if contemplated at age 70. The effect of a change in the retirement age is illustrated by the following table, which shows the

required contribution rates for entry ages 25, 35 and 45, corresponding to retirement ages 60, 65 and 70:

Required Member Contribution Rate to produce
one-half Retirement Allowance

(Male - Class 1)

Entry Age	Retirement Age		
	60	65	70
25	5.43	4.34	3.41
35	6.24	5.03	3.98
45	7.46	6.05	4.81

It will be noted that the calculated rate to cover one-half the retirement allowance commencing at age 70 is about one-third less than the corresponding rate if retirement takes place at age 60. The probability that a member eligible to retire will actually retire will be influenced by such widely different factors as general economic conditions, number of dependents, independent resources, amount of salary, length of service, and state of health. Experience in other systems shows that while retirement as early as age 60 seems very attractive to the member under 40, the average member who reaches the minimum age finds that he needs just about 100% of his salary to maintain his living standard, and is unwilling to quit on a retirement allowance. It would be manifestly unsafe to go to the extreme of assuming that no members will retire before age 70, because ill-health and personal reasons will undoubtedly bring some earlier retirements. Similarly it would be imposing an unnecessary current burden upon the members and the City if rates were based upon retirement at age 60.

Experience in another well-established municipal retirement system in California is to the effect that about five per cent of members will retire when they are first eligible, and that there will be a slight increase in the percentage of retirements each year after eligibility.

Retirement rates have been published for a number of eastern systems, but none of them have benefits exactly like those provided by the Los Angeles ordinance. Based upon such experience as was available, as well as on judgment, the actuaries adopted the retirement rates for ages from 60 to 70 shown in Schedule 7. The assumed rate at age 60 is 4% of those eligible, and this increases gradually to 7.5% at age 69, jumping to 100% at age 70, when retirement is compulsory. It is not practical to make any allowance for possible extensions of service beyond age 70. In order to allow for greater physical demands of their occupation, retirement rates on Male - Class 2 members were increased 50%. The actual effect of the retirement rates selected is tantamount to figuring that clerical employees will retire shortly before age 68, and other employees about a year earlier.

Preliminary Contribution Rates by Classes

Having determined upon rates to be used in projecting the effect of interest, salary change, mortality and voluntary retirement, the next step was to compute preliminary contribution rates by age for each of the three groups previously mentioned. The ordinance provides that the rate for age 59 shall apply to all members entering the system at higher ages, so that no member contribution rates were computed above age 59.

Samples of these preliminary contribution rates are as follows:

Preliminary Contribution Rates by Classes
to produce one-half Retirement Allowance

<u>Age</u>	<u>Male Class 1</u>	<u>Male Class 2</u>	<u>Female</u>
25	3.83	3.76	4.37
35	4.44	4.56	5.01
45	5.31	5.51	5.91
55	6.28	6.50	6.95
59	6.62	6.80	7.34

The higher cost for female members arises from the lighter mortality rate anticipated after retirement. It will be noticed the difference between the

two male groups is very slight; the effect of the greater expected salary change by age in Class 1, calling for higher contribution rates, is more than offset at most ages by the anticipated earlier retirements in Class 2.

Complete tables of these preliminary "class" contribution rates are shown in Schedule 8.

Final Required Contribution Rates by Members: Average 5.58%

As has already been stated, it was necessary to transform the member contribution rates into a single table, with age the sole variant. For this purpose the calculated "class" rates were weighted in proportion to the present salaries being paid at each age. Salaries for each age and class are tabulated in Schedule 3; in order to minimize irregular grading the "weights" were applied by five-year groups centering at ages 25, 30, 35, 40, etc. It is obvious that male members will pay slightly more than one-half, and female members slightly less than one-half, of the cost of their retirement allowances, in order to comply with the "average" requirement of the ordinance. Since salary payments to women are only about 18% of the total salary payments, the final "average" contribution rates are not greatly above those calculated for men.

One further point should be mentioned regarding contribution rates for members entering the system above age 50. Nearly all the members more than 50 years of age who enter the system at its inception have considerable prior service to their credit; nearly all will be eligible to retire at age 60, and the contribution rate calculations assume that a definite percentage of them will retire each year after age 60. However, a new employee who enters the system at age 55, for example, cannot possibly retire until 65, so that the calculated contribution rate for age 55 when applied to him upon his employment will produce slightly more than one-half his ultimate allowance. This situation cannot be avoided under the ordinance, and in any event is of very minor importance.

Contribution rates required of members range from 3.96% at entry age 18 to 6.78% at entry ages 59 and over. Ages are to be determined as of nearest birthday when the member enters the system. Based on the census cards furnished, the average rate of contribution by members at the inception of the system will be 5.58%. On salaries over \$250.00 per month, that portion over \$250.00 is to be disregarded.

RATE OF CONTRIBUTION BY CITY FOR SUBSEQUENT SERVICE

The rate of contribution required of the City for subsequent service of a member is less than the member's rate for two reasons:

(a) The City obligates itself under the ordinance to provide one-half of the allowance for subsequent service (Section 5); any payment to a beneficiary upon the death of a member after retirement is covered by the calculated contribution rate of the member. In actuarial terms, the City provides a "life annuity" upon retirement; the member provides himself, on the average, with a "cash refund annuity" having the same monthly yield.

(b) No obligation is assumed by the City for any payment to members who die, resign, or are dismissed before they are eligible for retirement. The City's contribution rate can therefore be discounted to allow for the proportion of members who may be expected to die or otherwise leave the service before reaching age 60 with ten years of service.

Rates of future interest, salary change, mortality and retirement selected for the purposes of this report have already been discussed in relation to member contributions, and apply with equal force to City contributions for subsequent service. The one additional factor necessary to determine the City's "subsequent service" contribution is the expected rate of resignation or dismissal before retirement age; this factor is referred to herein as the "withdrawal rate."

Determination of Withdrawal Rate

A careful statistical analysis was made of all "terminated" census cards which were furnished by the City in connection with other data covering the period from July 1, 1926, to July 1, 1935. All terminations which showed a service period of less than two years were eliminated; there is always a definitely higher withdrawal rate in the first few years of employment, and a reflection of such higher "select" rates into the calculations affecting the whole group of present members would not be defensible. No attempt was made to calculate "select" rates to apply to present employees in their first two years of service, because the number of such employees was so few as to make negligible the effect of any such calculations. A considerable number of census cards indicated that termination occurred because of "lack of work" or "lack of funds"; in the analysis to determine the best possible estimate of future experience this type of termination was eliminated, as being a non-recurrent item. No mathematical analysis of a retirement system can measure possible dislocations of service by wholesale curtailment of the present staff.

Further study of the withdrawal cards after eliminations already mentioned showed that the number of withdrawals in 1932 was wholly disproportionate as compared with other years in the ten-year period; the experience of the year 1932 was therefore omitted in setting up the "exposure" and withdrawal figures.

Withdrawal rates were then calculated by five-year attained age groups, and showed a constant decrease as the age increased, which is in accord with the usual experience among employed groups. Complete schedule of withdrawal rates assumed for the purposes of this report is shown in Schedule 10. If these rates are compared with any other published experience, it should be remembered that the system contains no disability benefit, so that the "withdrawals" may be regarded as including cases which would fall under the head of "total disability" in other systems.

"Subsequent service" contribution of City
by classes and ages

Using rates of withdrawal and mortality already discussed, service tables for male and female members were constructed, and appear in Schedules 11 and 12. Based on these service tables, and the same assumptions as to other necessary factors as were used in calculating the members' contribution rates, a separate contribution rate required from the City to cover subsequent service was computed for each age and each of the three "classes" of members. A brief illustration of the method can be given by using the figures for male members, Class 1, age 45.

As will be noted from Schedule 6, already described, the preliminary rate calculated as required from male members in Class 1, at age 45, is 5.31% of salary. This rate provides an annuity of 1/140th of salary for each year of service, on a "cash refund" basis; the other one-half of the retirement allowance is on a "straight life" annuity basis, without refund at death after retirement, and if this second half were purchased by the member, his additional rate would be 4.12%. The total cost of the full retirement allowance if paid by the member would therefore be 5.31% + 4.12%, or 9.43%. The actual "weighted" contribution assessed against all members age 45 is 5.50% (see Schedule 9). The difference between 9.43% and 5.50%, or 3.93%, is the "subsequent service" requirement falling upon the City, but it can be discounted because of deaths and withdrawals anticipated before retirement age. Applying this discount by standard actuarial methods, through the service tables already mentioned, the contribution rate required of the City for this particular age and class is 2.56%.

City rate for Subsequent Service 3.12%

The results of similar calculations for each age and class appear in Schedule 13; applying each percentage to the actual present salaries shown by the census cards, the aggregate rate of contribution required to be

made by the City on account of subsequent service was found to be 3.12% of the entire salary roll. On salaries over \$250.00 per month, that portion over \$250.00 is to be disregarded.

LIABILITY ASSUMED BY CITY ON ACCOUNT OF PRIOR SERVICE

The length of the prior service of each member was shown on the census cards furnished by the City. The ordinance states that the amount of money to be provided by the City shall include provision for all of the retirement allowance provided for all prior service of members. If a member has rendered 25 years of service before the effective date of the system, the City's obligation as to "prior service" is to pay to the member upon retirement a monthly allowance equal to twenty-five seventieths (25/70) of the average monthly salary which he received during the last ten years of his service.

The ordinance also provides that if a member with any credit for prior service is compulsorily retired, he shall receive a guaranteed minimum allowance of 30% of his average pay earned during the last ten years of service. This provision is equivalent to an additional benefit to all members with any prior service credit who ultimately become subject to compulsory retirement when they have had less than 21 years of total service.

Prior service liability \$5,263,886.00

Based upon the fundamental assumptions as to future experience already fully discussed, the present liability assumed by the City of Los Angeles under the terms of the ordinance on account of the prior service of the individual members of the system is \$5,263,886.00. This figure covers prior service of 58,755 years in the aggregate, rendered by 5,516 members; the average period of prior service is 10.65 years. This total is made up of the following items:

P r e s e n t L i a b i l i t y

	<u>Account "regular" prior service allowances of 1/70 per year served</u>	<u>Account extra allowances to make up 30% minimum</u>	<u>Total</u>
Male - Class 1	\$1,782,816	\$ 53,841	\$1,836,657
Male - Class 2	2,510,429	294,577	2,805,006
Female	<u>619,678</u>	<u>2,545</u>	<u>622,223</u>
TOTALS -	\$4,912,923	\$350,963	\$5,263,886

The apparently disproportionate liability in the above Male - Class 2 figures arises because of the high entry ages prevalent in that group.

As a basis of comparison, the following summary of the present annual salaries shown by the census cards for all members will be of interest.

	<u>Number of Members</u>	<u>Annual Salary</u>	<u>Average Annual Salary</u>
Male - Class 1	1,537	\$3,294,072	\$ 2,143
Male - Class 2	2,910	4,043,760	1,390
Female	<u>1,069</u>	<u>1,599,072</u>	<u>1,496</u>
TOTALS -	5,516	\$8,936,904	\$ 1,620

If a former employee of the City, not in the service when the system takes effect, is later re-employed, he will receive credit for all service rendered prior to the System's effective date. It is therefore possible that additional prior service liability will later develop from this source, but there is no practical way in which such possibility can be measured; any such re-employments can readily be tabulated in future actuarial valuations.

The ordinance provides that a member between 60 and 70 years of age may be forced to retire "for the good of the service." The member would then receive the regular retirement allowance of 1/70th of "final average" salary for each year served, and if any part of his allowance resulted from prior service the minimum allowance payable would be 30%. Retirement rates used in this report for ages below 70 were selected with possible "good of service" retirements in mind, but no calculation seemed practicable as regards the minimum allowance provision just mentioned. It seems a reasonable supposition that compulsory retirement below age 70 will only be effective in very extreme cases, in which there will be a distinct net gain to the City by termination of employment, even though there may be a small additional cost to the Retirement Fund.

Liquidation of Prior Service Liability

The City is required to provide annually a sum sufficient to liquidate over a period of years, to be determined by the Board, the deficit accrued because of prior service. Schedule 16 shows annual factors necessary for such liquidation in any number of years from twenty to fifty, assuming interest at $3\frac{1}{2}\%$ per annum. The following summary illustrates the application of these factors to liquidate the calculated prior service liability of \$5,263,886.00.

<u>Number of Years</u>	<u>Annual Factor</u>	<u>Annual Payment</u>
20	7.036%	\$370,367.00
30	5.437	286,197.00
40	4.683	246,508.00
50	4.263	224,399.00

Retirement Allowances to Members now Eligible

The question naturally arises as to what amount of retirement allowances will become payable because of immediate retirement of eligible

members when the system is effective. In general, all members who have passed age 70 will be forced to retire on July 1, 1937, subject only to special extensions in individual cases; but any member who is 60 years of age, and has had ten years of service, may retire on an allowance if he so desires. The number of members above age 60 is as follows:

	Number	Present Monthly Salaries
Ages 60-69	748	\$ 92,246
70-79	192	22,159
80 or over	<u>39</u>	<u>4,986</u>
Total age 60 or over	979	\$119,391

If all these members should retire immediately, the total monthly prior service payments, if based on their 1935 salary, would be as follows:

	<u>1/70 per year served</u>	<u>Additional to make 30% minimum</u>	<u>Total Monthly allowance</u>
Ages 60-69	\$20,376	\$ 9,156	\$29,532
70-79	6,107	1,380	7,487
80 or over	<u>1,765</u>	<u>118</u>	<u>1,883</u>
Totals -	\$28,248	\$10,654	\$38,902

The above figures have been assembled from detailed calculations for each attained age commencing at 60, which will be found in Schedule 15.

BALANCE SHEET OF SYSTEM

The ordinance requires that every actuarial report on the system shall include an actuarial valuation of the assets and liabilities of the Fund at the time the report is made. A "balance sheet" of assets and liabilities will become of increasing interest each year after the system is established, but as of the present time it is merely a re-statement of the

facts already set forth herein.

City and member contributions for subsequent service have been so computed that, taken together, they are adequate to provide the promised benefits for such service, assuming that the various assumptions as to interest earned, salary change, withdrawal rate, etc., are realized. The balance sheet as of the present date, therefore, automatically shows the "liability" for subsequent service allowances exactly balanced by the "asset" of future contributions from the City and the members. The remaining liability is the prior service obligation, and since this is to be liquidated by the City over a period of years, it must be regarded as "balanced" by prospective contributions to come from City funds. Subsequent balance sheets will reflect the extent to which actual experience corresponds with the fundamental assumptions outlined in this report.

INITIAL BALANCE SHEET OF FUND (HARBOR DEPARTMENT EXCLUDED)

VALUATION AS OF SEPTEMBER 1, 1935.

ASSETS	Present Value of Payments to be Received by Fund	LIABILITIES	Present Value of Payments to be Made by Fund
Contributions from Members towards Retirement Benefits Male - Class 1 \$1,296,568 Male - Class 2 1,436,911 Female 740,551	\$3,474,030.00	Retirement allowances to present members for subsequent service Male - Class 1 \$2,245,720 Male - Class 2 2,561,957 Female 1,435,733	\$6,243,410.00
Contributions from City for subsequent service (covered by aggregate rate of 3.12% of salaries) Male - Class 1 \$ 949,152 Male - Class 2 1,125,046 Female 695,182		2,769,380.00	
Additional contributions to come from City to liquidate prior service obligation	5,263,886.00	Total Liabilities	<u>\$11,507,296.00</u>
Total Assets	<u>\$11,507,296.00</u>	Total Liabilities	<u>\$11,507,296.00</u>

CALCULATION OF OPTIONAL RETIREMENT ALLOWANCES

A retiring member may elect to receive the actuarial equivalent of his regular allowance in the form of a lesser allowance, with the provision that the lesser monthly payment will continue throughout the life-time of his wife, should she survive him. He may make a similar arrangement for a dependent parent, or for a child. The obvious purpose of this optional provision is to enable the member to fit his allowance to his family circumstances at the time of retirement, without placing any additional financial burden upon the Fund.

As actual cases arise under this Option, it will be necessary to figure the capital value, at the time of retirement, of the "regular" allowances, by using the annuity tables shown in Schedule 6. This capital value must then be converted into a "joint and survivorship" annuity, by the use of standard actuarial methods. Necessary basic tables for this purpose are shown in Schedule 21. Since the option involves a distinct selection on the part of the member, the actuaries have chosen the American Annuitants' Select Table, with $3\frac{1}{2}\%$ interest, as a proper standard by which to determine the lesser retirement allowance. To the extent that a member has accumulated contributions to his credit when he retires, special calculations must be made in each case because of the provision in the ordinance that there must be a "refund" of any unused contributions at the death of the survivor of the two lives.

The ordinance is not clear (Section 12) as to how the calculations are to be made when the option is selected for the benefit of the children of the member. The Section states initially that upon his death the lesser allowance shall continue throughout the life of the surviving children, etc. In the succeeding paragraph it is stated that if the

selected beneficiary is a minor, payments shall cease on the day following the eighteenth birthday. Legal interpretation of the Section may be necessary to determine the right of a member to have a lesser allowance continued throughout the life of a son or daughter who is past the age of minority.

ACTUARIAL REPORT FOR HARBOR DEPARTMENT

Census cards were furnished for the members of the Harbor Department, and were tabulated and analyzed in order to determine the cost of establishing and maintaining that part of the system and Fund applicable to Harbor employees.

Contribution Rates for Harbor Members

Harbor members' contribution rates were calculated by exactly the same methods as already described in the discussion of City members' rates; the same fundamental assumptions were made as to rate of salary change, mortality, etc., since no evidence was found that these were unsuitable for use for Harbor Department purposes. Some very slight differences were found in the distribution of members between the three statistical groups (Male - Class 1, Male - Class 2, and Female), and the effect of these differences upon the final member contribution rate was studied. When the exact distribution between statistical classes in the Harbor was carried through into a schedule of member contribution rates, the aggregate contributions from present Harbor members were found to be 99.5% of the contributions which would result from the use of exactly the same contribution table as previously shown for City members. In view of this negligible difference, and the obvious advantages of having "City" and "Harbor" members contribute at equal rates, decision was reached to recommend for Harbor members the same contribution rates as shown in schedule 9. When applied to the present Harbor Department salaries and ages, these rates produce an average member contribution rate of 5.66%.

Contribution for "subsequent service" required from
Board of Harbor Commissioners 3.12%

The method of calculating the City's contribution for subsequent service has already been described in detail. Exactly the same process was followed to determine the Harbor Board contribution. Although the members in the City and the Harbor pay the same contribution rate by ages, it does not necessarily follow that the Harbor Board contribution for subsequent service will be at the same aggregate rate as the City contribution. In each instance the contribution from public funds is a total reached by allowing for the amount of salaries being paid at each attained age, so that any considerable difference in age distribution would have a distinct effect.

Complete calculations show that the required rate of contribution from the Harbor Board on account of subsequent service is 3.14%. This compares very closely with the corresponding rate of 3.12% previously shown for the City.

Harbor Prior Service Liability \$286,436.00

Based on the census cards furnished, and the various mathematical assumptions described earlier in this report, the system's liability on account of prior service of Harbor Department members is \$286,436.00. This total can be analyzed as follows:

	Present Liability		
	Account "regular" prior service allowances of <u>1/70 per year served</u>	Account extra allowances to make <u>up 30% minimum</u>	<u>Total</u>
Male - Class 1	\$ 78,635	\$ 5,228	\$ 83,863
Male - Class 2	150,067	31,818	181,885
Female	<u>20,688</u>	<u> </u>	<u>20,688</u>
TOTALS -	\$249,390	\$37,046	\$286,436

Prior Service in the Harbor Department covers a total of 2,781 years in the aggregate, an average of 8.06 years per member.

Annual payment to liquidate the prior service liability of \$286,436.00 in various periods of years is as follows:

<u>Years</u>	<u>Amortization Factor</u>	<u>Annual Payment</u>
20	7.036%	\$20,154.00
30	5.437	15,574.00
40	4.685	13,414.00
50	4.263	12,211.00

If all Harbor members age 60 or over were to retire immediately, the total monthly prior service allowance to them, if based on 1935 salaries, would be \$1,873.00. This figure is divided as follows:

	<u>1/70 per year served</u>	<u>Additional to make 30% minimum</u>	<u>Total Monthly Allowance</u>
Ages 60-69	\$958	\$675	\$1,633
70 or over	<u>109</u>	<u>131</u>	<u>240</u>
Totals -	\$1,067	\$806	\$1,873

Present members and salaries in the Harbor Department can be summarized as follows:

	<u>Number of members</u>	<u>Annual salary</u>	<u>Average Annual salary</u>
Male - Class 1	71	\$151,884	\$2,139
Male - Class 2	241	332,606	1,588
Female	<u>52</u>	<u>47,952</u>	<u>1,498</u>
Totals -	344	\$532,444	1,693

Detailed statistical information covering the Harbor Department will be found in Schedules 17 to 20 inclusive.

Initial balance sheet of that part of the System pertaining to the Harbor Department is shown on the next page.

INITIAL BALANCE SHEET OF FUND (HARBOR DEPARTMENT SECTION)

VALUATION AS OF NOVEMBER 1, 1935

ASSETS	Present Value of Payments to be Received by Fund	LIABILITIES	Present Value of Payments to be Made by Fund
Contributions from Members towards Retirement Benefits Male - Class 1 \$ 63,410 Male - Class 2 145,240 Female <u>22,438</u>	\$231,088.00	Retirement allowances to present members for subsequent service Male - Class 1 \$108,952 Male - Class 2 259,505 Female <u>43,097</u>	\$411,654.00
Contributions from City for subsequent service (covered by aggregate rate of 3.14% of salaries) Male - Class 1 \$ 45,542 Male - Class 2 114,365 Female <u>20,659</u>	180,566.00	Retirement allowances to present members for prior service Male - Class 1 \$ 83,863 Male - Class 2 161,885 Female <u>20,688</u>	286,436.00
Additional contributions to come from City to liquidate prior service obligation.....	286,436.00	Total Liabilities	\$698,090.00
Total Assets.....	\$698,090.00	Total Liabilities	\$698,090.00

STATISTICAL SECTIONList of Schedules

	Pages
Statistical Note - - - - -	28
<u>Schedule No.</u>	
1 Number of members and monthly salaries by departments - - - -	29
2 Number of members and monthly salaries by age - - - - -	30
3 Number of members and salaries by age and class - - - - -	31-32
4 Number of members and salaries by years of prior service - -	33
5 Salary scales - - - - -	34
6 Life annuity and cash refund annuity values - - - - -	35
7 Rates of retirement - - - - -	36
8 Preliminary contribution rates of members by classes - - - -	37
9 Rates of contribution required from individual members - - - -	38
10 Rates of withdrawal and mortality among active members - - - -	39
11 Active service table - male - - - - -	40-41
12 Active service table - female - - - - -	42-43
13 City's rates of contribution by age and class (subsequent service) - - - - -	44-45
14 Rates of mortality ages 60 and over - - - - -	46
15 Monthly retirement allowances of all members age 60 or over retired immediately - - - - -	47
16 Percentage annual payment required to amortize obligation - -	48
17 <u>Harbor:</u> Members and salaries by age - - - - -	49
18 <u>Harbor:</u> Members and salaries by age and class - - - - -	50-51
19 <u>Harbor:</u> Members and salaries by years of prior service - - - -	52
20 <u>Harbor:</u> Monthly retirement allowances if all members age 60 or over retired immediately - - - - -	53
21 Basic actuarial tables for optional allowances - - - - -	54

STATISTICAL NOTE

All statistical information upon which this report is based was derived from census cards furnished by the City and Harbor Department. The following information as to each employee was then transferred to Hollerith cards:

Identification number
 Department
 Occupational class
 Sex
 Date of birth
 Attained age
 Date of employment
 Length of prior service
 Monthly salary 1929, 1932 and 1935
 Date and reason of discontinuance
 (if not now in service).

For per diem employees, 26 days was assumed as equal to one month.

Information on the census cards was as of July 1, 1935. The report is based on the assumption that the System goes into effect on September 1, 1935, for the City, and on November 1, 1935, for the Harbor. Ages of members and length of prior service were figured accordingly.

Due to some uncertainty as to exemptions, the exact payroll to be covered will not be known until actual operation commences. Schedule 1 shows the number of members and salaries by departments which have been used as the basis for determining prior service liability, etc. Any errors or duplications in the census cards will be reflected in the prior service deficit as computed, but can have only an insignificant effect upon the calculated rates of contribution by members and by the City to cover subsequent service.

SCHEDULE 1Number of Members and Total Monthly Salaries by Departments

(Harbor Department excluded)

<u>Department</u>	<u>Number</u>	<u>Salary</u>
Building & Safety	178	\$ 31,301
Engineering	2,328	304,904
Park	495	53,456
Police	351	50,577
Treasurer	88	14,658
City Attorney	104	19,405
Controller	67	11,136
Custodian	223	21,938
Library	512	57,286
Playground	211	29,141
Receiving Hospital	155	25,737
Construction	39	6,700
Public Utility	18	3,348
Civil Service	26	4,001
Humane	23	3,118
Mechanical Engineering	15	2,401
City Clerk	34	6,460
Bureau of Standards	13	2,205
Public Works	69	11,256
Fire	9	1,289
Airports	25	3,800
Purchasing & Supplies	17	2,447
City Planning	16	2,578
Budget & Efficiency	14	2,900
Street Lighting	47	7,263
Assessments	39	6,338
Printing	21	2,812
R/W & Land	21	3,500
Health	277	40,465
Miscellaneous	81	12,323
	<hr/>	<hr/>
TOTALS	5,516	\$744,742

SCHEDULE 2Total Number of Members and Monthly Salaries by Attained Age

(Harbor Department excluded)

<u>Attained Age</u>	<u>No.</u>	<u>Salary</u>	<u>Attained Age</u>	<u>No.</u>	<u>Salary</u>
20	5	\$ 375	55	134	\$ 18,693
21	3	163	56	101	13,772
22	10	713	57	105	14,986
23	23	1,664	58	101	14,273
24	32	2,651	59	133	16,393
25	46	4,051	60	95	12,055
26	59	5,606	61	87	10,886
27	81	9,025	62	85	11,031
28	76	8,517	63	100	12,871
29	106	12,855	64	78	9,655
30	94	11,705	65	78	9,761
31	102	14,231	66	63	7,749
32	96	13,450	67	62	7,613
33	135	19,095	68	59	7,260
34	117	16,526	69	31	3,365
35	171	24,172	70	36	4,258
36	148	21,428	71	23	2,602
37	183	27,021	72	25	2,911
38	161	23,438	73	23	2,647
39	181	25,733	74	15	1,747
40	168	23,706	75	14	1,657
41	187	28,161	76	19	2,227
42	159	23,855	77	16	1,897
43	170	24,293	78	8	903
44	147	20,373	79	13	1,310
45	133	18,930	80	10	1,234
46	144	19,721	81	5	660
47	145	19,659	82	7	956
48	143	20,110	83	3	402
49	125	18,438	84	2	200
50	128	18,366	85	3	450
51	140	19,102	86	2	260
52	117	16,365	87		
53	127	18,256	88	3	424
54	111	15,480	89		
			90		
			91	2	200
			92		
			93	2	200
			TOTALS -	5,516	\$744,742

SCHEDULE 3Number of Members and Total Monthly Salaries by Attained Age

(Harbor Department excluded)

<u>Attained Age</u>	<u>MALE - CLASS 1</u>		<u>MALE - CLASS 2</u>		<u>FEMALE</u>	
	<u>No.</u>	<u>Salary</u>	<u>No.</u>	<u>Salary</u>	<u>No.</u>	<u>Salary</u>
20	3	\$ 193	1	\$ 77	1	\$ 105
21	2	123			1	40
22	1	70	2	175	7	468
23	8	576			15	1,088
24	8	618	1	100	23	1,933
25	14	1,269	4	360	28	2,422
26	8	889	13	1,240	38	3,477
27	20	2,514	5	603	56	5,908
28	19	2,195	16	1,817	41	4,508
29	50	4,011	24	3,012	52	5,832
30	22	3,315	22	2,547	50	5,843
31	34	5,981	32	3,863	36	4,387
32	35	5,937	38	4,667	23	2,846
33	49	8,558	41	5,005	45	5,532
34	37	6,434	45	5,546	35	4,546
35	56	9,990	69	8,255	46	5,927
36	59	10,250	53	6,642	36	4,536
37	64	11,932	81	9,932	38	5,157
38	52	9,767	77	9,234	32	4,437
39	60	10,707	77	9,556	44	5,470
40	50	8,718	77	9,499	41	5,489
41	66	12,514	85	10,689	36	4,958
42	61	11,401	71	8,823	27	3,631
43	56	10,289	83	9,651	31	4,353
44	45	8,434	85	9,657	17	2,282
45	43	8,051	75	8,781	15	2,098
46	34	6,258	86	10,223	24	3,240
47	34	6,076	79	9,163	32	4,420
48	42	7,966	75	8,592	26	3,552
49	42	8,057	62	7,446	21	2,935
50	38	7,064	70	8,369	20	2,933
51	30	5,603	91	10,597	19	2,902
52	31	6,147	71	8,221	15	1,997
53	41	7,887	75	8,543	13	1,826
54	36	6,817	68	7,615	7	1,048

(Continued on next page)

SCHEDULE 3

(Continued from previous page)

Number of Members and Total Monthly Salaries by Attained Age

(Harbor Department excluded)

Attained Age	MALE - CLASS 1		MALE - CLASS 2		FEMALE	
	No.	Salary	No.	Salary	No.	Salary
55	33	\$ 6,335	84	\$10,080	17	\$ 2,278
56	19	3,541	69	8,148	13	2,083
57	30	5,917	69	8,157	6	912
58	29	5,370	63	7,473	9	1,430
59	25	4,224	98	10,846	10	1,323
60	19	3,578	71	7,814	5	663
61	21	3,755	62	6,570	4	561
62	19	3,564	63	6,918	3	549
63	20	4,030	78	8,576	2	265
64	11	2,070	64	7,189	3	396
65	13	2,745	64	6,953	1	63
66	13	2,283	47	5,090	3	376
67	9	1,733	52	5,736	1	144
68	11	1,990	48	5,270		
69	3	485	26	2,880		
70	5	982	31	3,276		
71			22	2,512	1	90
72	3	685	22	2,226		
73	3	540	20	2,107		
74	2	450	13	1,317		
75	2	430	12	1,227		
76	3	601	16	1,626		
77	1	207	15	1,690		
78	1	238	7	665		
79			13	1,310		
80	3	534	7	700		
81	2	360	3	300		
82	3	556	4	400		
83	1	202	2	200		
84			2	200		
85	1	250	2	200		
86	2	260				
87						
88			3	424		
89						
90						
91			2	200		
92						
93			2	200		
TOTALS	1,537	\$274,506	2,910	\$336,980	1,069	\$133,256

SCHEDULE 5SALARY SCALESIndicating relative salaries by attained age

<u>Attained Age</u>	<u>MALE - CLASS 1</u>	<u>MALE - CLASS 2</u>	<u>FEMALE</u>
20	1,044	1,248	1,020
21	1,163	1,299	1,066
22	1,279	1,347	1,112
23	1,392	1,391	1,158
24	1,502	1,430	1,203
25	1,608	1,464	1,248
26	1,709	1,493	1,292
27	1,804	1,517	1,336
28	1,891	1,536	1,379
29	1,970	1,550	1,422
30	2,040	1,560	1,464
31	2,098	1,566	1,503
32	2,140	1,569	1,537
33	2,167	1,571	1,566
34	2,187	1,572	1,589
35	2,202	1,572	1,608
36	2,215	1,572	1,625
37	2,227	1,572	1,641
38	2,236	1,572	1,655
39	2,248	1,572	1,668
40	2,256	1,572	1,680
41	2,262	1,572	1,691
42	2,267	1,572	1,701
43	2,272	1,572	1,711
44	2,276	1,572	1,720
45	2,280	1,572	1,728
46	2,285	1,572	1,736
47	2,290	1,572	1,744
48	2,295	1,572	1,751
49	2,300	1,572	1,758
50	2,304	1,572	1,764
51	2,307	1,572	1,770
52	2,309	1,572	1,776
53	2,310	1,572	1,781
54	2,310	1,572	1,785
55 and over	2,310	1,572	1,788

SCHEDULE 6LIFE ANNUITY AND CASH REFUND ANNUITY VALUESCombined Annuity Table with $3\frac{1}{2}\%$ Interest

--

<u>Age</u>	<u>Life Annuity</u>	<u>Cash Refund Annuity</u>
60	11.421	13.611
61	11.070	13.316
62	10.720	13.020
63	10.571	12.719
64	10.024	12.418
65	9.679	12.122
66	9.338	11.824
67	8.999	11.520
68	8.664	11.225
69	8.333	10.930

NOTE: Annuity values shown above cover male lives.
Annuity value on female members is the same
as male value at an age four years younger.

SCHEDULE 7RATES OF RETIREMENT

<u>Age</u>	<u>Male - Class 1 and Female</u>	<u>Male - Class 2</u>
60	.0400	.0600
61	.0425	.0638
62	.0450	.0675
63	.0475	.0712
64	.0500	.0750
65	.0550	.0825
66	.0600	.0900
67	.0650	.0975
68	.0700	.1050
69	.0750	.1125
70	1.0000	1.0000

SCHEDULE 8Preliminary Contribution Rates of Members by Classes

Percentage of Salary based on age nearest birthday at entry into the System

<u>Age</u>	<u>MALE - CLASS 1</u>	<u>MALE - CLASS 2</u>	<u>FEMALE</u>
18	3.74	3.40	4.13
19	3.74	3.44	4.16
20	3.75	3.46	4.19
21	3.75	3.52	4.22
22	3.76	3.58	4.25
23	3.78	3.63	4.29
24	3.80	3.69	4.33
25	3.83	3.76	4.37
26	3.87	3.82	4.42
27	3.91	3.90	4.47
28	3.96	3.97	4.52
29	4.01	4.05	4.58
30	4.07	4.13	4.64
31	4.14	4.21	4.71
32	4.21	4.30	4.78
33	4.28	4.36	4.85
34	4.36	4.47	4.93
35	4.44	4.56	5.01
36	4.52	4.65	5.09
37	4.60	4.74	5.17
38	4.68	4.84	5.26
39	4.77	4.93	5.35
40	4.86	5.02	5.44
41	4.94	5.12	5.53
42	5.04	5.22	5.62
43	5.13	5.31	5.72
44	5.22	5.41	5.81
45	5.31	5.51	5.91
46	5.41	5.61	6.01
47	5.50	5.71	6.11
48	5.60	5.81	6.22
49	5.70	5.91	6.32
50	5.79	6.01	6.42
51	5.89	6.12	6.53
52	5.99	6.21	6.63
53	6.09	6.31	6.74
54	6.19	6.41	6.85
55	6.28	6.50	6.95
56	6.38	6.59	7.06
57	6.46	6.67	7.16
58	6.55	6.74	7.25
59	6.62	6.80	7.34

SCHEDULE 9Rates of Contribution Required from Individual Members

Percentage of Salary Based on Age Nearest Birthday
at Entry into the System

<u>Age</u>	<u>Rate</u>	<u>Age</u>	<u>Rate</u>
18	3.96	40	5.03
19	3.99	41	5.12
		42	5.21
20	4.02	43	5.31
21	4.05	44	5.40
22	4.08		
23	4.11	45	5.50
24	4.14	46	5.59
		47	5.69
25	4.17	48	5.79
26	4.20	49	5.89
27	4.23		
28	4.25	50	5.99
29	4.28	51	6.08
		52	6.18
30	4.31	53	6.27
31	4.37	54	6.37
32	4.43		
33	4.49	55	6.46
34	4.55	56	6.54
		57	6.62
35	4.61	58	6.70
36	4.70	59 or over	6.78
37	4.78		
38	4.86		
39	4.94		

SCHEDULE 10Rates of Withdrawal and Mortality among Active Members

<u>Age</u>	<u>Rate of Withdrawal</u>	<u>Rate of Mortality</u>
20	.0660	.00205
21	.0647	.00211
22	.0631	.00215
23	.0612	.00218
24	.0592	.00220
25	.0571	.00222
26	.0550	.00223
27	.0526	.00224
28	.0496	.00227
29	.0461	.00231
30	.0412	.00236
31	.0371	.00244
32	.0330	.00255
33	.0293	.00269
34	.0272	.00288
35	.0245	.00310
36	.0223	.00336
37	.0211	.00364
38	.0193	.00395
39	.0167	.00428
40	.0180	.00464
41	.0173	.00503
42	.0166	.00545
43	.0160	.00590
44	.0154	.00639
45	.0148	.00693
46	.0143	.00751
47	.0139	.00814
48	.0135	.00882
49	.0132	.00955
50	.0130	.01035
51	.0123	.01121
52	.0126	.01215
53	.0124	.01316
54	.0121	.01426
55	.0117	.01545
56	.0111	.01673
57	.0105	.01812
58	.0093	.01963
59	.0078	.02126

NOTE: Mortality rates shown above cover male lives. Mortality rate on female members figured same as male rate at age four years younger.

SCHEDULE 11ACTIVE SERVICE TABLEMale Members

<u>Age</u>	<u>Living</u>	<u>Withdrawals</u>	<u>Deaths</u>	<u>Total Separations</u>
20	100,000	6,600	205	6,805
21	93,195	6,030	197	6,227
22	86,968	5,488	187	5,675
23	81,293	4,975	177	5,152
24	76,141	4,508	168	4,676
25	71,465	4,081	159	4,240
26	67,225	3,697	150	3,847
27	63,378	3,334	142	3,476
28	59,902	2,983	136	3,119
29	56,783	2,618	131	2,749
30	54,034	2,226	128	2,354
31	51,680	1,917	126	2,043
32	49,637	1,638	127	1,765
33	47,872	1,427	129	1,556
34	46,316	1,260	133	1,393
35	44,923	1,101	139	1,240
36	43,683	996	147	1,143
37	42,540	898	155	1,053
38	41,487	821	164	985
39	40,502	757	173	930
40	39,572	712	184	896
41	38,676	669	195	864
42	37,812	628	206	834
43	36,978	592	218	810
44	36,168	557	231	788
45	35,380	524	245	769
46	34,611	495	260	755
47	33,856	471	276	747
48	33,109	447	292	739
49	32,370	427	309	736

(Continued on next page)

SCHEDULE 11ACTIVE SERVICE TABLEMale Members

<u>Age</u>	<u>Living</u>	<u>Withdrawals</u>	<u>Deaths</u>	<u>Total Separations</u>
(Continued from previous page)				
50	31,654	411	327	738
51	30,896	395	346	741
52	30,155	380	366	746
53	29,409	365	387	752
54	28,657	347	409	756
55	27,901	326	431	757
56	27,144	301	454	755
57	26,389	277	478	755
58	25,634	258	503	741
59	24,893	194	529	723
60	24,170	-	556	556
61	23,614	-	589	589
62	23,025	-	622	622
63	22,403	-	655	655
64	21,748	-	688	688
65	21,060	-	721	721
66	20,339	-	754	754
67	19,585	-	786	786
68	18,799	-	816	816
69	17,983	-	845	845
70	17,138	-	-	-

SCHEDULE 12ACTIVE SERVICE TABLEFemale Members

<u>Age</u>	<u>Living</u>	<u>Withdrawals</u>	<u>Deaths</u>	<u>Total Separations</u>
20	100,000	6,600	179	6,779
21	93,221	6,031	172	6,203
22	87,018	5,491	166	5,657
23	81,361	4,979	160	5,139
24	76,222	4,512	156	4,668
25	71,554	4,086	151	4,237
26	67,317	3,702	145	3,847
27	63,470	3,339	138	3,477
28	59,993	2,988	132	3,120
29	56,873	2,622	126	2,748
30	54,125	2,230	121	2,351
31	51,774	1,921	116	2,037
32	49,737	1,641	113	1,754
33	47,983	1,430	111	1,541
34	46,442	1,263	110	1,373
35	45,069	1,104	110	1,214
36	43,855	1,000	112	1,112
37	42,743	902	115	1,017
38	41,726	826	120	946
39	40,780	763	126	889
40	39,891	718	134	852
41	39,039	675	142	817
42	38,222	634	151	785
43	37,437	599	160	759
44	36,678	565	170	735
45	35,943	532	181	713
46	35,230	504	192	696
47	34,531	480	204	684
48	33,850	457	216	673
49	33,177	438	230	668

(Continued on next page)

SCHEDULE 12ACTIVE SERVICE TABLEFemale Members

(Continued from previous page)

<u>Age</u>	<u>Living</u>	<u>Withdrawals</u>	<u>Deaths</u>	<u>Total Separations</u>
50	52,509	425	244	667
51	31,842	408	259	667
52	31,175	393	275	668
53	30,507	378	291	669
54	29,838	361	309	670
55	29,168	341	327	668
56	28,500	316	346	662
57	27,838	292	366	658
58	27,180	255	388	641
59	26,539	207	410	617
60	25,922	-	434	434
61	25,488	-	462	462
62	25,026	-	491	491
63	24,535	-	522	522
64	24,013	-	553	553
65	23,460	-	585	585
66	22,875	-	618	618
67	22,257	-	651	651
68	21,606	-	684	684
69	20,922	-	717	717
70	20,205	-	-	-

SCHEDULE 13City's Rates of Contribution for Subsequent Service of Members
by Classes

Percentage of salary based on age nearest birthday at entry into the System

<u>AGE</u>	<u>MALE - CLASS 1</u>	<u>MALE - CLASS 2</u>	<u>FEMALE</u>
20	1.04	.83	1.57
21	1.06	.88	1.63
22	1.08	.94	1.70
23	1.11	1.00	1.77
24	1.14	1.06	1.84
25	1.18	1.14	1.91
26	1.22	1.21	1.99
27	1.28	1.29	2.07
28	1.34	1.38	2.16
29	1.40	1.47	2.25
30	1.47	1.56	2.34
31	1.53	1.65	2.42
32	1.60	1.73	2.50
33	1.66	1.81	2.59
34	1.73	1.90	2.68
35	1.81	1.99	2.78
36	1.87	2.07	2.85
37	1.94	2.15	2.94
38	2.01	2.24	3.04
39	2.09	2.33	3.13
40	2.16	2.41	3.23
41	2.24	2.50	3.33
42	2.32	2.60	3.42
43	2.39	2.68	3.53
44	2.48	2.78	3.62
45	2.56	2.88	3.75
46	2.66	2.98	3.85
47	2.74	3.09	3.96
48	2.83	3.19	4.08
49	2.91	3.30	4.21
50	3.03	3.41	4.35
51	3.14	3.53	4.47
52	3.25	3.64	4.60
53	3.36	3.76	4.74
54	3.48	3.86	4.88
55	3.59	4.00	5.03
56	3.72	4.13	5.19
57	3.84	4.24	5.32
58	3.95	4.34	5.47
59	4.05	4.42	5.61

(Continued on next page)

SCHEDULE 13City's Rates of Contribution for Subsequent Service of Members
by Classes.

Percentage of salary based on age nearest birthday at entry into the System

<u>AGE</u>	<u>MALE - CLASS 1</u>	<u>MALE - CLASS 2</u>	<u>FEMALE</u>
(Continued from previous page)			
60	4.30	4.55	5.90
61	4.56	4.68	6.16
62	4.82	4.32	6.42
63	5.01	5.01	6.61
64	5.19	5.19	6.79
65	5.37	5.37	6.97
66	5.42	5.42	7.02
67	5.47	5.47	7.07
68	5.51	5.51	
69	5.18	5.18	
70	4.86	4.86	
71	4.55	4.55	5.85
72	4.25	4.25	
73	3.97	3.97	
74	3.70	3.70	
75	3.45	3.45	
76	3.20	3.20	
77	2.98	2.98	
78	2.76	2.76	
79	2.56	2.56	
80	2.37	2.37	
81	2.19	2.19	
82	2.02	2.02	
83	1.86	1.86	
84		1.72	
85	1.58	1.58	
86	1.45	1.45	
87			
88		1.19	
89			
90			
91		.92	
92			
93		.76	

NOTE: Application of above rates to salaries by ages as shown in Schedule 3 produces aggregate City "subsequent service" contributions rate of 3.12%.

SCHEDULE 14Rates of Mortality for Members Aged 60 Years and OverCombined Annuity Table $3\frac{1}{2}\%$ Interest

<u>Age</u>	<u>Rate of Mortality</u>	<u>Age</u>	<u>Rate of Mortality</u>
60	.02302	85	.16027
61	.02493	86	.17249
62	.02700	87	.18553
63	.02923	88	.19944
64	.03164	89	.21425
65	.03425	90	.22999
66	.03707	91	.24669
67	.04012	92	.26439
68	.04341	93	.28310
69	.04697	94	.30285
70	.05081	95	.32364
71	.05495	96	.34548
72	.05943	97	.36835
73	.06425	98	.39225
74	.06945	99	.41712
75	.07506	100	.44294
76	.08109	101	.46963
77	.08759	102	.49712
78	.09458	103	.52531
79	.10210	104	.55409
80	.11018	105	.58331
81	.11886		
82	.12817		
83	.13814		
84	.14883		

NOTE: Mortality rates shown above cover male lives. Mortality rate on female members figured same as male rate at an age four years younger.

SCHEDULE 15MONTHLY PENSION PAYMENTS IF ALL MEMBERS AGE 60 OR OVERRETIRED IMMEDIATELY

Based on 1935 salaries

(Harbor Department excluded)

<u>Present Attained Age</u>	<u>1/70 per year served</u>	<u>Additional to make 30% minimum</u>	<u>Total Monthly Pension</u>
60	\$ 2,464	\$ 1,242	\$ 3,706
61	2,247	1,338	3,585
62	2,292	1,183	3,475
63	2,681	1,417	4,098
64	2,199	913	3,112
65	2,120	987	3,107
66	1,900	589	2,489
67	1,866	592	2,458
68	1,811	580	2,391
69	796	315	1,111
70	1,044	325	1,369
71	665	160	825
72	360	142	1,002
73	761	169	930
74	449	115	564
75	532	80	612
76	573	157	730
77	537	109	696
78	292	37	329
79	344	86	430
80	427	26	453
81	223		223
82	329	16	345
83	178	11	189
84	70		70
85	179	13	192
86	126		126
87			
88	156	9	165
89			
90			
91	46	14	60
92			
93	<u>31</u>	<u>29</u>	<u>60</u>
TOTAL -	\$28,248	\$10,654	\$38,902

SCHEDULE 1GPERCENTAGE ANNUAL PAYMENT REQUIRED TO
AMORTIZE AN OBLIGATION OVER VARYING PERIODS

3½% Interest

<u>Number of Years</u>	<u>Annual Payment</u>
20	7.036%
21	6.804
22	6.593
23	6.402
24	6.227
25	6.067
26	5.921
27	5.785
28	5.660
29	5.545
30	5.437
31	5.337
32	5.244
33	5.157
34	5.076
35	5.000
36	4.928
37	4.861
38	4.798
39	4.739
40	4.683
41	4.630
42	4.580
43	4.533
44	4.488
45	4.445
46	4.401
47	4.367
48	4.331
49	4.296
50	4.263

SCHEDULE 17

Total Number of Members and Monthly Salaries by Attained Age

Harbor Department

<u>Attained Age</u>	<u>No.</u>	<u>Salary</u>	<u>Attained Age</u>	<u>No.</u>	<u>Salary</u>
20	2	\$ 200	60	7	\$ 856
21	2	145	61	5	704
22	3	327	62	7	935
23	4	427	63	2	280
24	2	200	64	5	761
25	1	90	65	3	280
26	3	776	66	5	635
27	3	274	67	3	400
28	2	225	68	2	390
29	7	731	69	2	199
30	4	401	70		
31	5	759	71	1	148
32	4	508	72	2	189
33	5	683	73		
34	7	954	74	1	94
35	6	982	75	2	259
36	3	454	76	1	112
37	7	908			
38	9	1,278			
39	11	1,474			
40	10	1,409			
41	11	1,570			
42	6	883			
43	10	1,480			
44	15	2,361			
45	14	2,136			
46	14	2,375			
47	13	2,040			
48	6	739			
49	13	1,807			
50	12	1,606			
51	16	2,721			
52	7	1,163			
53	10	1,797			
54	7	1,106			
55	7	981			
56	4	543			
57	6	992			
58	7	1,055			
59	13	1,765			
			TOTALS -	344	\$48,537

SCHEDULE 10Number of Members and Total Monthly Salaries by Attained AgeHarbor Department

<u>Attained Age</u>	<u>MALE - CLASS 1</u>		<u>MALE - CLASS 2</u>		<u>FEMALE</u>	
	<u>No.</u>	<u>Salary</u>	<u>No.</u>	<u>Salary</u>	<u>No.</u>	<u>Salary</u>
19			2	\$ 200		
21			2	145		
22			3	327		
23			3	292	1	\$ 135
24			2	200		
25					1	90
26	1	\$ 90	7	686		
27			2	184	1	90
28					2	225
29	3	337	3	340	1	104
30			3	279	1	122
31			3	496	2	261
32	2	302	2	206		
33			5	683		
34	2	295	2	267	3	392
35			4	635	2	247
36			2	319	1	135
37	1	144	4	629	1	135
38	2	450	7	828		
39	3	573	7	811	1	90
40	3	388	5	771	2	250
41	3	460	6	840	2	270
42	2	423	4	460		
43	2	400	8	1,080		
44	3	533	12	1,773		
45	5	923	8	1,055	1	156
46	5	1,023	9	1,352		
47	2	398	10	1,542	1	100
48	1	202	4	467	1	120
49	1	140	12	1,667		
50	3	525	8	931	1	150
51	4	701	11	1,745	2	275
52	2	360	5	803		
53	4	911	5	751	1	135
54	1	250	5	721	1	135

(Continued on next page)

SCHEDULE 18Number of Members and Total Monthly Salaries by Attained AgeHarbor Department

<u>Attained Age</u>	<u>MALE - CLASS 1</u>		<u>MALE - CLASS 2</u>		<u>FEMALE</u>	
	<u>No.</u>	<u>Salary</u>	<u>No.</u>	<u>Salary</u>	<u>No.</u>	<u>Salary</u>
(Continued from previous page)						
55	1	\$ 130	5	\$ 739	1	\$ 112
56	1	212	3	331		
57	2	376	4	616		
58	3	456	3	459	1	140
59	2	390	11	1,375		
60	1	144	6	712		
61	1	216	4	408		
62	1	150	5	630	1	125
63			2	280		
64	2	385	3	376		
65			3	280		
66			5	635		
67	1	180	2	220		
68	1	140	1	250		
69			2	199		
70						
71			1	148		
72			2	189		
73						
74			1	94		
75			2	259		
76			1	112		
TOTALS -	71	\$12,657	241	\$31,884	32	\$3,996

SCHEDULE 19Number of Members and Monthly Salaries by Years of Prior ServiceHarbor Department

<u>Years Prior Service</u>	<u>Number</u>	<u>Monthly Salary</u>
0-- $\frac{1}{2}$	17	\$ 1,947
$\frac{1}{2}$ - $1\frac{1}{2}$	36	4,136
$1\frac{1}{2}$ - $2\frac{1}{2}$	53	6,458
$2\frac{1}{2}$ - $3\frac{1}{2}$	17	2,376
$3\frac{1}{2}$ - $4\frac{1}{2}$	11	1,428
$4\frac{1}{2}$ - $5\frac{1}{2}$	8	1,066
$5\frac{1}{2}$ - $6\frac{1}{2}$	13	1,441
$6\frac{1}{2}$ - $7\frac{1}{2}$	8	1,260
$7\frac{1}{2}$ - $8\frac{1}{2}$	16	2,454
$8\frac{1}{2}$ - $9\frac{1}{2}$	11	1,631
$9\frac{1}{2}$ - $10\frac{1}{2}$	10	1,663
$10\frac{1}{2}$ - $11\frac{1}{2}$	19	2,673
$11\frac{1}{2}$ - $12\frac{1}{2}$	30	4,601
$12\frac{1}{2}$ - $13\frac{1}{2}$	19	2,800
$13\frac{1}{2}$ - $14\frac{1}{2}$	25	4,110
$14\frac{1}{2}$ - $15\frac{1}{2}$	21	3,225
$15\frac{1}{2}$ - $16\frac{1}{2}$	10	1,662
$16\frac{1}{2}$ - $17\frac{1}{2}$	4	596
$17\frac{1}{2}$ - $18\frac{1}{2}$	2	416
$18\frac{1}{2}$ - $19\frac{1}{2}$	2	325
$19\frac{1}{2}$ - $20\frac{1}{2}$	4	605
$20\frac{1}{2}$ - $21\frac{1}{2}$	1	250
$21\frac{1}{2}$ - $22\frac{1}{2}$	3	574
$22\frac{1}{2}$ - $23\frac{1}{2}$	3	680
$23\frac{1}{2}$ - $24\frac{1}{2}$	<u>1</u>	<u>160</u>
	344	\$48,537

Total number of years of prior service - - - - - 2,781

Average " " " " " " per member 8.08

SCHEDULE 20MONTHLY RETIREMENT ALLOWANCE PAYABLE IF ALL MEMBERS AGE 60OR OVER RETIRED IMMEDIATELY

Based on 1935 salaries

Harbor Department

<u>Present Attained Age</u>	<u>1/70 per Year served</u>	<u>Additional to make 30% minimum</u>	<u>Total Monthly Retirement Allowance</u>
60	\$ 126	\$ 131	\$ 257
61	144	67	211
62	140	132	272
63	78	9	87
64	176	59	235
65	25	59	84
66	96	94	190
67	92	28	120
68	71	46	117
69	10	50	60
70			
71	32	13	45
72	19	37	56
73			
74	20	8	28
75	19	59	78
76	19	14	33
	<hr/>	<hr/>	<hr/>
TOTAL	\$1,067	\$806	\$1,873

SCHEDULE 21

BASIC ACTUARIAL TABLES FOR COMPUTING OPTIONAL ALLOWANCES

American Annuitants' Select Table $3\frac{1}{2}\%$

Age Adjustment		Annuity Values		
Difference in Age	Addition to younger age to obtain equivalent equal ages	Age	Single Life	Joint Life
0	0.00	50	14.635	11.608
1	0.51	51	14.324	11.298
2	1.04	52	14.009	10.987
3	1.59	53	13.693	10.677
4	2.16	54	13.373	10.368
5	2.75	55	13.052	10.059
6	3.36	56	12.730	9.751
7	3.99	57	12.406	9.445
8	4.63	58	12.081	9.140
9	5.30	59	11.756	8.839
10	5.98	60	11.431	8.540
11	6.68	61	11.106	8.244
12	7.40	62	10.781	7.952
13	8.13	63	10.458	7.664
14	8.88	64	10.136	7.381
15	9.64	65	9.816	7.102
16	10.42	66	9.498	6.828
17	11.21	67	9.183	6.559
18	12.01	68	8.872	6.296
19	12.83	69	8.563	6.038
20	13.66	70	8.259	5.787
		71	7.959	5.542
		72	7.663	5.304
		73	7.373	5.072
		74	7.088	4.847
		75	6.808	4.628
		76	6.534	4.417
		77	6.267	4.212
		78	6.006	4.015
		79	5.751	3.824
		80	5.503	3.641

Above tables constructed on basis of male lives. For female lives, subtract four years from age before making "equal age" adjustment.