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PART I  
INTRODUCTION AND SUMMARY OF FINDINGS

A. Introduction

This Actuarial Experience Study for the City of Philadelphia Municipal Retirement System covers the 5-year period, July 1, 1984 through June 30, 1989. The study contains information for setting actuarial assumptions for use in the July 1, 1989 and future actuarial valuations of the City of Philadelphia Municipal Retirement System. The study provides analysis of the actuarial experience of the Retirement System, compares this experience with the expected experience predicated on current actuarial assumptions being utilized and summarizes the appropriateness of these assumptions.

This Actuarial Experience Study is one of a series of such studies that the Board of Pensions and Retirement has conducted. The most recent study covered the period July 1, 1980 through July 1, 1985. This report has been prepared in accordance with the requirements of Act 205 of 1984 and the guidelines issued by the Public Employee Retirement Study Commission. The Act requires that this Actuarial Experience Study cover 5 years of experience and be performed once every 4 years.

Act 205 requires that the actuarial valuation reports shall be prepared using actuarial assumptions selected jointly by the actuary and the Board. As actuary to the Retirement Board, our recommendations for the actuarial assumptions to be used in conjunction with the July 1, 1989 actuarial

valuation are contained in this report. We look forward to discussing these recommendations with the Board in order that we may concur with the set of assumptions to be utilized for the July 1, 1989 actuarial valuation.

B. Summary of Findings

1. Non-Economic Assumptions

In reviewing the actuarial experience of the Retirement System for the 5-year period of the Study and, where appropriate, comparing these with the results of prior studies, certain findings were noted which resulted in our recommendations, as summarized below, to continue or modify existing non-economic assumptions. For the purpose of this study, the experience of the 1967 Plan and Plan 87 were combined. Analyses were made separately for deaths, disabilities, terminations (quits and discharges), and retirements. Separate studies were made for municipal members and police and fire members.

The study of mortality included active members, retired members, and disabled members. We found that the actual experience for both male and female active members was substantially greater than anticipated. The experience for retired members and disabled members was also greater than the assumptions used in the July 1, 1988 valuation. Accordingly, we recommend a 45% increase in the mortality rates used for active males, a 60% increase in the mortality rates used for active

females, a 10% increase in the mortality rates for retired members and a 50% increase in the mortality rates of disabled municipal members.

We reviewed the proportion of deaths that are service-connected versus those which are ordinary deaths. Based on our data, there were two service-connected deaths in 1985 and no service-related deaths reported for the plan years ending 1986 through 1989. In response to the trend, we recommend that the assumed percentage of service-connected deaths for municipal members be decreased from 5% to 2 1/2% and for police and fire members from 10% to 5%.

The total number of disabilities for municipal members during the period of study was significantly less than anticipated based upon the assumed rates. We therefore recommend that the rates of disabilities for municipal males and females be adjusted downward by 10% and 20%, respectively. For police and fire members, actual experience during the period was also less than the expected experience. We recommend a downward adjustment of these rates by 20%.

Turnover for municipal members has been shown to be considerably greater than anticipated during the 5-year period. Accordingly, we recommend that a 50% increase in the turnover rates be considered. For a 42-year-old employee, the adjusted rate is 3.2% for males and 4.9% for females. Turnover for the Police and Firemen members has also been substantial. While the results call for a drastic increase in the turnover rates, we recommend a 100% rate increase for 1989. Even with

the 100% increase, the average rate of turnover is only around 3%. Note, however, the potential need for an interim review of the experience next year to determine if the rate increase implied by the results is fully warranted or represents a short term aberration in the actual turnover.

The number of retirements during the study, in the aggregate, was unexpectedly less than the assumed rates. Retirements were studied with and without consideration of the 1989 data to carve out any effect of the Early Retirement Window. The prevailing trends are a higher rate of retirement at earlier ages and lower retirement rates at more advanced ages. Accordingly, we recommend smoothing the existing retirement rates in a manner to reflect the incidence of retirement.

## 2. Economic Assumptions

Economic assumptions studied include investment return, rate of salary increase, and rate of covered payroll growth. Selection of these assumptions is somewhat limited by Act 205. The Act provides that economic actuarial assumptions shall either be in the range of economic assumptions specified by the Public Employee Retirement Study Commission or be accompanied with documentation justifying alternative selection in the actuarial valuation report.

The current investment return and rate of salary increase assumptions are 9% and 6% per annum, respectively. These assumptions fall within

the guidelines issued by the Commission. The Act also describes a maximum 3% differential between the investment rate and salary increase assumptions. Although they are at the upper limit, we do not see a need for a change in these assumptions at this time.

The current assumption for the rate of growth in covered payroll is 6% per annum. This assumption exceeds the Commission's guidelines of 4%; however, we believe that experience during the period of this Study justifies continued use of a 6% payroll growth rate assumption.

## PART II

### DISCUSSION OF NON-ECONOMIC EXPERIENCE RESULTS

Part II presents the results of the non-economic experience for the 5-year period July 1, 1984 through June 30, 1989. Separate analyses have been made for the rates of mortality, disability, turnover and retirement.

#### A. Data Processing

The demographic data for this study was taken from the last 5 years' valuations. This procedure represents a divergence from that used for prior experience studies. For prior studies, the 5-year experience study data was provided to us by the City.

Under the new approach, we match the active members' records from one valuation file to the next. These records were matched with the records of individuals coded as having terminated, retired or died during the year. Our analysis indicated 800 to 1,200 mismatches each year, comprising as much as 3% to 4% of all active members. We tested this group of mismatches to successive years of active members and found up to 10% of them returning to active status.

We then took a sample of the mismatches and had the Board identify the circumstance of employment. The Board's findings were varied but relatively consistent in identifying this group as representing additional retirees, deaths or terminations.

Based on our analysis, for the purpose of this study, we assumed 90% of the mismatches represent under-reported deaths, retirees or terminations. We assumed those eligible for retirement had retired. The balance were allocated as additional terminations and deaths.

One other decision made in the production of the study was to look at the experience from 1986 and drop the 1985 data in determining recommended assumption changes. This was done because the 1985 data was derived from the last study and was not subject to the methodology applied to the later years. The tables of Part IV do include 1985 data for compliance with Act 205.

B. Annual Rates of Mortality

1. Active Members Mortality Experience

The mortality experience for active members is summarized in Tables 1 through 3 contained in Part IV of this report. This experience may be summarized as follows:

<u>Mortality Experience for Active Members</u>			
<u>Year Ending June 30</u>	<u>Ratio of Actual to Expected Deaths</u>		
	<u>Municipal</u>		<u>Police and Fire</u>
	<u>Male</u>	<u>Female</u>	
1986	125%	211%	136%
1987	122	200	183
1988	103	110	177
1989	149	255	200
1986 - 1989	125%	194%	174%



The rate of actual deaths for active members is greater than expected. In the 1985 experience study, the assumed rates of active member mortality were decreased. Either the trend in mortality is increasing or the experience in the prior study was unusually low for the years studied. It is possible that as a result of the method used to identify the deaths we have captured death reports previously misreported and counted as terminations. Nonetheless, in view of the change in the pattern of mortality in this study, an increase in the rates of pre-retirement mortality rates is warranted. Accordingly, we recommend that the expected rates of mortality be increased to reflect the higher rates experience. We do not know of any factors which would support the City employees' mortality rates to be significantly better than the population used in the construction of the underlying mortality table. We propose rates for male and female members at 80% of the UP-84 Mortality Table (sex adjusted) up from 55% for males and up from 50% for females.

A comparison of current to proposed mortality rates is as follows:

Rates of Mortality

<u>Attained Age</u>	<u>Previous Assumptions Used in July 1, 1988 Actuarial Valuation</u>		<u>Proposed Assumptions for Use in July 1, 1989 Actuarial Valuation</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
22	.000642	.000656	.000934	.001050
32	.000664	.000529	.000966	.000846
42	.001550	.000896	.002255	.001434
52	.004149	.002318	.006035	.003709
62	.010277	.005932	.014948	.009491

In addition, the number of deaths during the period of the study was examined in order to review the assumptions regarding the percentage of deaths that are service-connected. A comparison of the actual percentage of deaths that are service-connected with the expected percentage is as follows:

	Number of Service-Connected Deaths	Percentage of Deaths that are Service-Connected	
		<u>Expected</u>	<u>Actual</u>
Municipal Members	0	5%	0%
Police and Fire Members	2	10%	2%

Since there were very few reported service-connected deaths, we recommend the expected percent of service-connected deaths be reduced by one-half. This assumption has a very small impact on overall costs, but is used in determining the difference in the benefit value. The lack of service-related deaths may also reflect in part the fact beneficiaries of members with service-connected deaths chose to apply for non-service related death benefits; since service-connected deaths are offset by workmen's compensation.

## 2. Retired Member Mortality Experience

Mortality experience for retired members and surviving spouses is presented in Tables 4 through 7 of Part IV. The experience for municipal members is presented in Tables 4 and 5 and is summarized as follows:

Retired Municipal Members and Surviving Spouses

<u>Year Ending June 30</u>	<u>Ratio of Actual to Expected Deaths</u>	
	<u>Male</u>	<u>Female</u>
1986	123%	133%
1987	107	115
1988	118	120
1989	<u>163</u>	<u>145</u>
1986 - 1989	128%	128%

Corresponding results for retired police and fire members (and surviving spouses) are presented in Tables 6 and 7. This experience is summarized as follows:

Retired Police and Fire Members and Surviving Spouses

<u>Year Ending June 30</u>	<u>Ratio of Actual to Expected Deaths</u>	
	<u>Male</u>	<u>Female</u> *
1986	114%	141%
1987	121	147
1988	122	126
1989	<u>146</u>	<u>177</u>
1986 - 1989	126%	148%

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\* Substantially all surviving spouses.

The above tables indicated that actual experience was markedly greater than expected. A consistent overall trend of increased mortality is apparent both among the municipal retirees and police and fire retirees

as well as by sex in each group. We recommend an overall rate increase for all retirees to 110% of the UP-84 Mortality Table (sex adjusted). Currently, the City is using 100% for males and 94% for females. If future experience continues to show high rates of mortality, further adjustments may be necessary.

3. Disabled Member Mortality Experience

Tables 8 through 11 of Part IV reflect the post-retirement mortality experience for disabled members. This experience for municipal members is as follows:

Disabled Municipal Members

<u>Year Ending June 30</u>	<u>Ratio of Actual to Expected Deaths</u>	
	<u>Male</u>	<u>Female</u>
1986	147%	188%
1987	170	217
1988	159	200
1989	<u>261</u>	<u>289</u>
1986 - 1989	184%	224%

The corresponding experience for police and fire members is as follows:

### Disabled Police and Fire Members

<u>Year Ending June 30</u>	<u>Ratio of Actual to Expected Deaths</u>	
	<u>Male</u>	<u>Female</u>
1986	92%	--
1987	89	--
1988	106	--
1989	<u>143</u>	<u>--</u>
1986 - 1989	108%	--

Based upon the above, we find that the rate of actual mortality among the disabled members is significantly higher for municipal members than the anticipated rates. The difference in mortality rates of disabled municipal members compared to disabled police and fire members may reflect less physically demanding job requirements and thus more stringent circumstances to be awarded disability as a municipal member. Accordingly, we recommend an increase in this assumption for the municipal group by 50%. We recommend no change for the disabled police and fire members.

A comparison of current to proposed adjustment factors applied to post-retirement mortality tables for municipal members and is:

Post Disability Mortality Adjustment Factors

<u>Attained Age</u>	<u>Previous Assumption Used in the July 1, 1988 Actuarial Valuation</u>		<u>Previous Assumption Used in the July 1, 1989 Actuarial Valuation</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
47	.025029	.018278	.037544	.027417
52	.024032	.017737	.036048	.026606
57	.023062	.017613	.034593	.026420
62	.029261	.022314	.043892	.033471
67	.039046	.029571	.079307	.044357
72	.052871	.042285	.079307	.063428

C. Annual Rates of Disability

The results of our analysis of the rates of disability are presented on Part IV Tables 12, 13, and 14.

The table below summarize the experience by year of the incidence of disability retirement versus expected. While actual number of disability retirement is overall lower than anticipated, experience year to year varied significantly. Also, the 1989 results may be effected by the early retirement incentive window which would make a standard retirement more favorable than a disability retirement. A third factor to consider is that we have adjusted the experience to treat members who become disabled after their age retirement date (age 55 for municipal, age 45 for police and fire) as retirements rather than disabilities. The results of the disability experience is:

<u>Year Ending June 30</u>	<u>Ratio of Actual to Expected Disabilities</u>		<u>Police and Fire</u>
	<u>Municipal</u>		
	<u>Male</u>	<u>Female</u>	
1986	113%	64%	82%
1987	102	100	77
1988	67	31	65
1989	<u>48</u>	<u>24</u>	<u>82</u>
1986 - 1989	83%	55%	77%

From the results of analysis of the incidence of disability, we recommend reducing the rates of disability of municipal males by 10% and municipal females by 20%.

A comparison of the current and proposed rates is as follows:

<u>Attained Age</u>	<u>Previous Assumptions Used in July 1, 1988 Actuarial Valuation</u>		<u>Proposed Assumptions for Use in July 1, 1989 Actuarial Valuation</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
22	.000011	.000012	.000010	.000010
32	.000538	.000329	.000484	.000263
42	.003412	.001844	.003071	.001475
52	.012982	.009251	.011684	.007401

The rates of disability for police and fire members show that experience has been consistently less than expected. This appears to be true at all age groups. Accordingly, we recommend that the disability rates be modified by an overall reduction of 20% for police and fire members.

A comparison of the current and police and fire disability proposed is as follows:

<u>Attained Age</u>	<u>Previous Assumptions Used in July 1, 1988 Actuarial Valuation</u>	<u>Proposed Assumptions for Use in July 1, 1989 Actuarial Valuation</u>
22	.000994	.000795
27	.001370	.001096
32	.002861	.002289
37	.005773	.004618
42	.010598	.008878

In addition to the number of disabilities during this period, we have also examined the proportion of disabilities that are service-connected. A comparison of the assumed proportion of service-connected disabilities with the actual proportion is as follows:

	<u>Proportion of Disabilities that are Service-Connected</u>	
	<u>Expected</u>	<u>Actual</u>
Municipal and Elected Members	10%	17%
Police and Fire Members	20%	48%

The significant increase in service-connected disabilities should be reflected in a change in assumptions for both Municipal members and Police and Fire members. We recommend an increase in the proportion of disabilities that are service-connected as illustrated below:

	<u>Previous Assumptions Used in July 1, 1988 Actuarial Valuation</u>	<u>Proposed Assumptions for Use in July 1, 1989 Actuarial Valuation</u>
Municipal and Elected Members	10%	15%
Police and Fire Members	20%	35%



While the experience showed a greater percentage of service-connected disability than anticipated, there may have been circumstances that caused a short-term increased incidence. In 1989, 59% of all disabilities were service related. Future experience should be reviewed to determine if this trend continues.

D. Annual Rates of Turnover

The results of member turnover analysis are summarized in Tables 15, 16, and 17 of Part IV of this report. This experience may be summarized as follows:

<u>Year Ending June 30</u>	<u>Ratio of Actual to Expected Turnover</u>		
	<u>Municipal and Elected</u>		<u>Police and Fire</u>
	<u>Male</u>	<u>Female</u>	
1986	169%	145%	204%
1987	205	158	237
1988	176	119	296
1989	<u>179</u>	<u>121</u>	<u>459</u>
1986 - 1989	182%	136%	299%

The experience for each of the three groups of employees shown is substantially above then anticipated. In order to reflect this increase we recommend that turnover rates be increased by 50% for both municipal male and female employees.

For police and fire members, the experience is dramatically higher. While the current trend indicates almost a three-fold increase in the expected rates of employee turnover, we recommend that turnover rates for police and fire members be increased initially by 100% and that experience be tracked next year to determine if a still greater rate is needed.

A comparison of current and proposed turnover rates for active members is as follows:

### Turnover Rates

#### Municipal and Elected Members

<u>Attained Age</u>	<u>Previous Assumptions Used in the July 1, 1988 Actuarial Valuation</u>		<u>Previous Assumptions Used in the July 1, 1989 Actuarial Valuation</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
22	.108630	.104857	.162945	.157286
32	.043734	.062923	.065601	.094385
42	.020864	.032550	.031296	.048825
52	.013355	.021126	.020033	.031689

#### Police and Fire Active Members

<u>Attained Age</u>	<u>Previous Assumptions Used in July 1, 1988 Actuarial Valuation</u>	<u>Proposed Assumptions for Use in July 1, 1989 Actuarial Valuation</u>
22	.020660	.041320
32	.013772	.027544
42	.004732	.009464

#### E. Annual Rates of Retirement

The retirement experience is summarized in Tables 18, 19, and 20 of Part IV. In recognition of the impact on the 1989 experience resulting from the Early Retirement Window we have shown aggregate 3-year average average age at retirement which exclude 1985 and 1989 experience as well as the 4-year averages which include 1989. The average age of retirement are:

Year Ending June 30	Average Retirement Age		
	Municipal and Elected		Police and Fire
	Male	Female	
1986	60.17	61.78	49.96
1987	60.24	62.07	50.00
1988	60.83	62.95	49.26
1989	60.63	61.60	49.39
1986 - 1989	60.47	62.10	49.65
1986 - 1988	60.41	62.27	49.74

This experience tends to support a conclusion that the rates of retirement have been fairly stable over the period of the study.

Another way of analyzing actual experience is to summarize the ratio of actual versus expected experience by retirement age. This experience is summarized as follows:

Ratio of Actual to Expected Retirement

Age	Inclusive of Retirement Window and 1989 Retirees Average Retirement Age			Exclusive all 1989 Retirees		
	Municipal and Elected		Police and Fire	Municipal and Elected		Police and Fire
	Male	Female		Male	Female	
45	--	--	104%	--	--	117%
46	--	--	111	--	--	134
47	--	--	95	--	--	111
48	--	--	113	--	--	132
49	--	--	103	--	--	118
50	--	--	85	--	--	103
51	--	--	87	--	--	103
52	--	--	91	--	--	108
53	--	--	97	--	--	115
54	--	--	83	--	--	96
55	108%	70%	73	122%	80%	85
56	107	86	102	127	105	111
57	96	68	80	112	84	90
58	84	69	66	106	84	82
59	104	94	94	125	119	111
60	69	87	77	83	108	90
61	109	79	84	128	98	107
62	89	64	75	108	77	91
63	89	82	55	107	103	57
64	77	80	111	86	96	129
65	98	74		115	88	
66	79	92		84	110	
67	119	100		138	119	
68	86	106		96	135	
69	69	119		90	145	
	95%	79%	96%	111%	96%	111%

While the average normal retirement age is consistent from year to year, actual incidence of retirement shows a number of members are retiring earlier than expected. To compensate for the trend of earlier retirement, we recommend adjusting the rates for the 1967 Plan for both municipal and police and fire members at selected ages. There was not sufficient data to analyze retirement rates in Plan 87.

A comparison of the current and proposed retirement rates for the 1967 Plan members is:

Age	Previous Assumption for Use in July 1, 1988 Actuarial Valuation			Proposed Assumption for Use in July 1, 1989 Actuarial Valuation		
	Municipal and Elected		Police and Fire	Municipal and Elected		Police and Fire
	Male	Female		Male	Female	
45	--	--	.150	--	--	.160
46	--	--	.090	--	--	.110
47	--	--	.100	--	--	.110
48	--	--	.105	--	--	.120
49	--	--	.115	--	--	.120
50	--	--	.120	--	--	.120
51	--	--	.125	--	--	.125
52	--	--	.145	--	--	.145
53	--	--	.150	--	--	.160
54	--	--	.170	--	--	.160
55	.175	.175	.180	.190	.150	.170
56	.090	.090	.120	.120	.090	.200
57	.090	.090	.225	.120	.110	.200
58	.090	.090	.225	.100	.110	.200
59	.090	.090	.225	.110	.100	.240
60	.115	.115	.230	.110	.115	.240
61	.115	.115	.230	.130	.115	.240
62	.300	.300	.300	.300	.250	.280
63	.180	.180	.300	.180	.180	.280
64	.180	.180	.300	.210	.180	.320
65	.300	.300	.300	.320	.280	.350
66	.225	.225	.300	.200	.230	.350
67	.200	.200	.300	.250	.230	.350
68	.200	.200	.300	.200	.230	.350
69	.200	.200	.300	.200	.250	.350
70+	1.000	.1000	1.000	1.000	1.000	1.000

All the retirement experience presented in this report has been adjusted to treat disabilities after retirement age as retirements.

### PART III

#### DISCUSSION OF ECONOMIC EXPERIENCE RESULTS

Part III presents the results of the economic experience for the 5-year period July 1, 1984 through June 30, 1989. Economic assumptions analyzed include the rate of investment return, the rate of individual salary growth, and the rate of total payroll growth. These three measures are dependent upon one another. Accordingly, the economic actuarial assumptions are considered together, rather than separately.

Act 205, adopted by the Commonwealth of Pennsylvania in 1984, provides that economic assumptions shall either be within the range specified by the Public Employee Retirement Study Commission or shall be accompanied in the actuarial valuation report with documentation justifying their use.

In their preliminary guidelines, the Public Employee Retirement Study Commission has stipulated that the acceptable assumptions, without further justification, include an assumed rate of investment return not to exceed 9% per annum, a rate of individual salary increases not more than three percentage points less than the assumed rate of investment return, and a rate of covered payroll growth of not more than 4% per annum. Assumptions used in the July 1, 1988 actuarial valuation reflect a 9% interest rate, a 6% rate of salary growth, and a 6% rate of covered payroll growth. Accordingly, the 9% investment return and the 6% salary growth rates are at the upper limits of the Commission's guidelines. The current 6% assumed rate of covered payroll growth

exceeds the Commission's 4% guidelines; however, as discussed below, we believe that continued use is justified.

A. Investment Return

Rates of investment return, after investment expenses, have been determined on an actuarial asset valuation basis from year to year. The actuarial asset valuation method is one which uses a three year average of the ratio of market to cost value of equities applied to the cost value of equities. The market value of all other assets are used. Under this approach, we are smoothing the effect of fluctuation of unrealized gains and loss of the equities held. The actual rates of return on Actuarial Adjusted Market Value basis as well as the pure market basis are:

<u>Year Ending June 30</u>	<u>Yield at Adjusted Market Value</u>	<u>Yield at Market Value</u>
1985	14.4%	16.1%
1986	18.6	23.1
1987	15.1	10.7
1988	6.3	1.0
1989	9.0	13.6
Average for 1985 - 1989	12.7%	12.9%

Although the average yield during the 5-year period is significantly greater than the assumed 9% investment return used in the actuarial valuation, the volatility of the rates as well as both past experience study results, where rates were 8.8% in a 5 year average, and the limitations of Act 205 lead us to recommend retaining the current 9% assumption.



B. Rate of Salary Increase

Comparisons of total average wage increases for continuing members during the 5-year period are summarized in Tables 21 and 22 of Part IV. The 5-year average rate of salary increase is 6.15% for municipal members and 6.25% for police and fire members. The rates summarized by year are:

Average Salary Increase

<u>Fiscal Year Ending June 30</u>	<u>Municipal and Elected</u>	<u>Police and Fire</u>
1985	11.998%	10.701%
1986	2.133	.701
1987	7.328	10.256
1988	7.211	6.047
1989	<u>2.777</u>	<u>4.016</u>
Average 5 Years	6.147%	6.248%

Accordingly, we recommend a continuation of the current 6% long-range individual salary increase assumption.

C. Rate of Covered Payroll Growth

In addition to projecting individual salary growth, the valuation projects the annual rate of growth for the total covered payroll. This assumption accounts for growth in covered participants, increases in overtime and increase in longevity pay. It is necessary since the unfunded actuarial accrued liability is funded as a level percentage of covered payroll. During the past 5 years, the rate of growth of covered payroll has averaged

5.1%. This decrease over the expected rate of 6% reflects the reduction due to the early retirement window and other decrements which are reflected in a reduction of total active members over this period from 32,517 as of July 1, 1985 to 31,383 as of July 1, 1989. This decrease is a 3.5% active employee decrease or an average annual decrease of .7%. Adjusting the actual rate, over the period for the reduction of active members, we arrived at an adjusted rate of 5.8%.

Based on the above, we recommend the continuation of the current assumption that covered payroll grow at 6% per annum.

# PART IV

## TABULAR SUMMARY OF EXPERIENCE RESULTS

<u>Table</u>	<u>Divisions by Membership</u>	<u>Description</u>
1	Municipal and Elected Active	Mortality: Male
2	Municipal and Elected Active	Female
3	Police and Fire Active	Male/Female Combined
4	Municipal and Elected Retired	Mortality: Male
5	Municipal and Elected Retired	Female
6	Police and Fire Retired	Male
7	Police and Fire Retired	Female
8	Municipal and Elected Disabled	Mortality: Male
9	Municipal and Elected Disabled	Female
10	Police and Fire Disabled	Male
11	Police and Fire Disabled	Female
12	Municipal and Elected Active	Disability: Male
13	Municipal and Elected Active	Female
14	Police and Fire Active	Male/Female Combined
15	Municipal and Elected Active	Turnover: Male
16	Municipal and Elected Active	Female
17	Police and Fire Active	Male/Female Combined
18	Municipal and Elected Active	Retirement: Male
19	Municipal and Elected Active	Female
20	Police and Fire Active	Male/Female Combined
21	Municipal and Elected Active	Annual Salary Increase: Male/Female Combined
22	Police and Fire Active	Annual Salary Increase: Male/Female Combined

## DESCRIPTION OF SUMMARY TABLES

- Expected Rate Per 1,000: The expected number of decrements (i.e., deaths, disabilities, turnover or retirements) for every 1,000 members for every year of service based upon the July 1, 1988 actuarial valuation.
- Adjustments to Data: Employees who were classified as terminations but who had attained service retirement age were reclassified as retirements. Employees who became disabled after eligibility for a service pension were also classified as retirements.

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
 -----  
 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
 -----

TABLE 1  
 -----  
 MUNICIPAL DIVISION ACTIVE MEMBERS  
 MORTALITY FOR MALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL	
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989
20 - 24	.642	0	0	0	0	0	0	0	0	0	0	0	0
25 - 29	.582	0	3	2	2	3	10	0	0	0	0	0	0
30 - 34	.664	1	4	7	3	3	18	1	1	1	1	1	5
35 - 39	.986	6	3	6	3	11	29	2	2	2	2	2	10
40 - 44	1.550	5	5	5	2	5	22	2	2	3	3	3	13
45 - 49	2.549	10	3	2	7	7	29	4	4	4	4	4	20
50 - 54	4.149	12	11	4	4	10	41	7	7	7	6	7	34
55 - 59	6.525	10	8	12	8	8	46	9	9	8	8	8	42
60 - 64	10.277	5	7	5	6	5	28	7	7	7	7	7	36
65 - 69	16.299	2	0	1	0	3	6	3	3	3	3	3	15
70+	24.477	3	1	0	0	0	4	1	1	1	0	1	4
TOTAL		54	45	44	35	55	233	36	36	36	34	37	179

RATIO OF ACTUAL TO EXPECTED DEATHS  
 -----

1985	150%
1986	125
1987	122
1988	103
1989	149
1985-1989	130%
1986-1989	125%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 2

MUNICIPAL DIVISION ACTIVE MEMBERS  
MORTALITY FOR FEMALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS						
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988	1989	TOTAL
20 - 24	.656	0	0	2	0	0	2	0	0	0	0	0	0
25 - 29	.584	0	3	2	0	5	10	0	0	0	0	0	0
30 - 34	.529	0	4	2	4	3	13	0	0	0	0	0	0
35 - 39	.604	0	0	4	1	4	9	0	0	0	0	0	0
40 - 44	.896	1	0	1	1	2	5	0	0	1	1	1	3
45 - 49	1.409	0	1	3	3	6	13	1	1	1	1	1	5
50 - 54	2.318	1	3	1	0	1	6	2	2	2	2	2	10
55 - 59	3.772	1	3	3	0	4	11	2	2	2	3	3	12
60 - 64	5.932	3	3	1	1	1	9	2	2	2	2	3	11
65 - 69	9.343	1	1	0	1	2	5	1	1	1	1	1	5
70+	14.817	0	1	1	0	0	2	0	1	1	0	0	2
TOTAL		7	19	20	11	28	85	8	9	10	10	11	48

RATIO OF ACTUAL TO EXPECTED DEATHS

1985	88%
1986	211
1987	200
1988	110
1989	255
1985-1989	173%
1986-1989	194%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 3  
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POLICE AND FIRE DIVISION ACTIVE MEMBERS  
MORTALITY FOR MALES AND FEMALES COMBINED

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL	
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989
20 - 24	.642	0	0	1	0	0	1	0	0	0	0	0	0
25 - 29	.582	0	0	1	3	2	6	0	0	0	0	0	0
30 - 34	.664	2	1	2	4	2	11	1	1	1	1	0	4
35 - 39	.986	2	2	5	5	2	16	2	2	2	2	2	10
40 - 44	1.550	5	7	7	5	6	30	3	3	3	4	3	16
45 - 49	2.549	5	1	4	2	5	17	2	2	2	3	3	13
50 - 54	4.149	3	2	0	3	2	10	2	2	2	2	2	10
55 - 59	6.525	3	2	2	0	2	9	1	1	1	1	1	5
60 - 64	10.277	0	0	0	1	0	1	0	0	0	0	0	0
65 - 69	16.299	0	0	0	0	0	0	0	0	0	0	0	0
70+	24.477	0	0	0	0	1	1	0	0	0	0	0	0
TOTAL		20	15	22	23	22	102	11	11	12	13	11	58

RATIO OF ACTUAL TO EXPECTED DEATHS

1985	182%
1986	136
1987	183
1988	177
1989	200
1985-1989	176%
1986-1989	174%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 4  
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MUNICIPAL DIVISION NONACTIVE MEMBERS  
MORTALITY FOR RETIRED MALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS						
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988	1989	TOTAL
35 - 39	1.792	0	0	0	0	0	0	0	0	0	0	0	0
40 - 44	2.818	0	0	0	0	0	0	0	0	0	0	0	0
45 - 49	4.635	0	0	0	0	0	0	0	0	0	0	0	0
50 - 54	7.543	0	0	0	0	0	0	0	0	0	0	0	0
55 - 59	11.863	12	16	18	11	12	69	8	7	7	8	7	37
60 - 64	18.685	30	36	25	43	46	180	22	21	22	23	24	112
65 - 69	29.634	32	38	42	50	67	229	38	39	42	42	43	204
70 - 74	44.504	40	65	47	52	80	284	47	45	46	49	51	238
75 - 79	68.628	44	56	55	57	80	292	52	53	51	52	53	261
80 - 84	104.310	36	52	43	53	79	263	42	43	45	48	51	229
85 - 89	155.147	25	33	28	31	55	172	30	28	28	29	30	145
90 - 94	232.983	11	9	16	18	25	79	12	11	14	14	14	65
95+	349.505	2	3	1	2	5	13	3	3	3	3	2	14
TOTAL		232	308	275	317	449	1,581	254	250	258	268	275	1,305

RATIO OF ACTUAL TO EXPECTED DEATHS  
-----

1985	91%
1986	123
1987	107
1988	118
1989	163
1985-1989	120%
1986-1989	128%



CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
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 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
 -----

TABLE 5  
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MUNICIPAL DIVISION NONACTIVE MEMBERS  
 MORTALITY FOR RETIRED FEMALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL		
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989	
35 - 39	1.136	0	0	0	0	0	0	0	0	0	0	0	0	0
40 - 44	1.684	0	0	1	0	0	1	0	0	0	0	0	0	0
45 - 49	2.649	0	0	2	2	3	7	0	0	0	0	0	0	0
50 - 54	4.357	1	1	2	2	0	6	1	0	0	0	0	1	1
55 - 59	7.090	5	5	3	9	4	26	4	3	3	3	3	16	16
60 - 64	11.151	14	19	22	9	23	87	10	10	10	10	10	50	50
65 - 69	17.564	33	28	28	35	33	157	22	22	22	23	23	112	112
70 - 74	27.856	45	36	36	39	41	197	34	33	34	35	37	173	173
75 - 79	41.834	65	53	52	40	77	287	41	43	45	46	47	222	222
80 - 84	64.510	73	59	34	46	66	278	39	41	44	48	52	224	224
85 - 89	98.051	53	37	38	55	52	235	30	31	32	35	37	165	165
90 - 94	145.838	32	28	26	25	27	138	16	18	19	19	19	91	91
95+	219.004	3	8	3	9	16	39	3	5	5	7	8	28	28
TOTAL		324	274	247	271	342	1,458	200	206	214	226	236	1,082	1,082

RATIO OF ACTUAL TO EXPECTED DEATHS  
 -----

1985	162%
1986	133
1987	115
1988	120
1989	145
1985-1989	135%
1986-1989	128%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 6

POLICE AND FIRE DIVISION NONACTIVE MEMBERS  
MORTALITY FOR RETIRED MALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL	
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989
35 - 39	1.792	0	0	0	0	0	0	0	0	0	0	0	0
40 - 44	2.818	0	1	0	0	0	1	0	0	0	0	0	0
45 - 49	4.635	1	6	11	15	10	43	2	2	2	2	3	11
50 - 54	7.543	4	9	9	7	15	44	6	5	5	6	6	28
55 - 59	11.863	8	13	12	17	16	66	10	9	10	10	11	50
60 - 64	18.685	16	9	14	21	23	83	11	11	12	14	15	63
65 - 69	29.634	18	18	19	14	26	95	20	18	17	15	15	85
70 - 74	44.504	23	36	37	33	47	176	24	30	29	28	27	138
75 - 79	68.628	25	27	38	27	37	154	24	26	29	31	31	141
80 - 84	104.310	27	25	22	22	30	126	23	24	24	24	26	121
85 - 89	155.147	14	17	14	19	17	81	13	16	17	17	16	79
90 - 94	232.983	5	6	5	12	10	38	5	5	5	7	8	30
95+	349.505	0	0	2	2	1	5	0	0	1	1	1	3
TOTAL		141	167	183	189	232	912	138	146	151	155	159	749

RATIO OF ACTUAL TO EXPECTED DEATHS

1985	102%
1986	114
1987	121
1988	122
1989	146
1985-1989	121%
1986-1989	126%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 7  
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POLICE AND FIRE DIVISION NONACTIVE MEMBERS  
MORTALITY FOR RETIRED FEMALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL	
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989
35 - 39	1.136	0	0	0	0	1	1	0	0	0	0	0	0
40 - 44	1.684	0	0	1	1	1	3	0	0	0	0	0	0
45 - 49	2.649	0	1	0	0	2	3	1	0	0	0	0	1
50 - 54	4.357	0	1	0	1	1	3	1	0	0	0	0	1
55 - 59	7.090	2	1	0	3	3	9	2	1	1	1	1	6
60 - 64	11.151	2	2	4	2	5	15	1	2	2	2	2	9
65 - 69	17.564	7	6	7	12	15	47	7	6	6	6	5	30
70 - 74	27.856	7	17	17	9	17	67	12	11	11	12	12	58
75 - 79	41.834	11	14	21	13	29	88	18	17	16	16	17	84
80 - 84	64.510	15	30	27	30	32	134	21	20	21	22	23	107
85 - 89	98.051	12	25	29	27	37	130	16	16	18	19	19	88
90 - 94	145.838	4	19	19	9	10	61	8	10	9	8	9	44
95+	219.004	0	5	1	4	8	18	2	3	2	2	3	12
TOTAL		60	121	126	111	161	579	89	86	86	88	91	440

RATIO OF ACTUAL TO EXPECTED DEATHS  
-----

1985	67%
1986	141
1987	147
1988	126
1989	177
1985-1989	132%
1986-1989	148%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 8

MUNICIPAL DIVISION NONACTIVE MEMBERS  
MORTALITY FOR DISABLED MALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL	
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989
35 - 39	9.677	1	0	0	0	1	2	1	0	0	0	0	1
40 - 44	15.217	0	1	0	0	3	4	1	0	0	0	0	1
45 - 49	25.029	0	3	1	7	3	14	2	1	1	2	2	8
50 - 54	24.032	5	11	8	6	6	36	7	5	4	4	3	23
55 - 59	23.062	12	9	13	13	14	61	8	7	7	7	7	36
60 - 64	29.261	9	14	21	16	28	88	11	11	10	9	9	50
65 - 69	39.046	9	11	17	15	32	84	8	9	10	11	11	49
70 - 74	52.871	5	8	4	10	17	44	6	6	6	7	8	33
75 - 79	74.118	4	1	4	5	11	25	3	3	4	5	5	20
80 - 84	112.655	3	3	4	0	4	14	2	1	1	1	1	6
85 - 89	167.559	0	1	1	0	0	2	1	0	0	0	0	1
90 - 94	251.622	0	1	0	1	1	3	0	0	0	0	0	0
95+	377.465	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		48	63	73	73	120	377	50	43	43	46	46	228

RATIO OF ACTUAL TO EXPECTED DEATHS

1985	96%
1986	147
1987	170
1988	159
1989	261
1985-1989	167%
1986-1989	184%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 9  
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MUNICIPAL DIVISION NONACTIVE MEMBERS  
MORTALITY FOR DISABLED FEMALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS						
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988	1989	TOTAL
35 - 39	7.835	0	0	0	0	0	0	0	0	0	0	0	0
40 - 44	11.623	1	0	0	0	0	1	0	0	0	0	0	1
45 - 49	18.278	0	0	1	0	2	3	1	0	0	0	0	1
50 - 54	17.737	2	2	2	1	3	10	1	1	0	0	0	2
55 - 59	17.613	0	4	0	1	2	7	2	1	1	1	1	6
60 - 64	22.314	1	2	2	3	2	10	2	2	2	2	2	10
65 - 69	29.571	4	3	5	3	5	20	2	2	2	2	2	10
70 - 74	42.285	0	1	1	4	9	15	2	1	1	2	2	8
75 - 79	57.731	1	3	1	0	2	7	1	0	0	1	1	3
80 - 84	89.024	0	0	0	0	1	1	1	0	0	0	0	1
85 - 89	135.311	0	0	0	1	0	1	1	1	0	0	1	3
90 - 94	201.257	1	0	1	2	0	4	1	0	0	0	0	1
95+	302.226	0	0	0	1	0	1	0	0	0	0	0	0
TOTAL		10	15	13	16	26	80	15	8	6	8	9	46

RATIO OF ACTUAL TO EXPECTED DEATHS

1985	67%
1986	188
1987	217
1988	200
1989	289
1985-1989	192%
1986-1989	224%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 10  
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POLICE AND FIRE DIVISION ACTIVE MEMBERS  
 MORTALITY FOR DISABLED MALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL	
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989
35 - 39	9.677	0	0	0	0	0	0	2	1	1	0	1	5
40 - 44	15.217	4	2	1	0	5	12	5	4	4	4	4	21
45 - 49	25.029	1	3	2	2	3	11	7	6	7	8	10	38
50 - 54	24.032	5	12	5	6	8	36	10	8	8	7	8	41
55 - 59	23.062	14	12	10	12	9	57	11	10	10	9	9	49
60 - 64	29.261	8	11	11	17	25	72	9	10	11	11	12	53
65 - 69	39.046	7	9	4	14	12	46	9	8	8	9	9	43
70 - 74	52.871	6	2	8	7	17	40	3	6	7	8	8	32
75 - 79	74.118	4	2	7	8	15	36	2	4	4	5	5	20
80 - 84	112.655	2	1	6	2	4	15	1	3	3	3	3	13
85 - 89	167.559	1	1	2	0	0	4	1	0	0	0	1	2
90 - 94	251.622	0	0	0	0	2	2	0	0	0	0	0	0
95+	377.465	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		52	55	56	68	100	331	60	60	63	64	70	317

RATIO OF ACTUAL TO EXPECTED DEATHS  
 -----

1985	87%
1986	92
1987	89
1988	106
1989	143
1985-1989	103%
1986-1989	108%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
 -----  
 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 11  
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POLICE AND FIRE DIVISION ACTIVE MEMBERS  
 MORTALITY FOR DISABLED FEMALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DEATHS					EXPECTED DEATHS					TOTAL	
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988		1989
35 - 39	7.835	0	0	0	0	0	0	0	0	0	0	0	0
40 - 44	11.623	0	1	0	0	0	1	0	0	0	0	0	0
45 - 49	18.278	0	0	0	0	0	0	0	0	0	0	0	0
50 - 54	17.737	0	0	0	0	0	0	0	0	0	0	0	0
55 - 59	17.613	1	0	0	0	0	1	0	0	0	0	0	0
60 - 64	22.314	0	0	0	0	0	0	0	0	0	0	0	0
65 - 69	29.571	0	0	0	0	0	0	0	0	0	0	0	0
70 - 74	42.285	0	0	0	0	0	0	0	0	0	0	0	0
75 - 79	57.731	0	0	0	0	0	0	0	0	0	0	0	0
80 - 84	89.024	0	0	0	0	0	0	0	0	0	0	0	0
85 - 89	135.311	0	0	0	0	0	0	0	0	0	0	0	0
90 - 94	201.257	0	0	0	0	0	0	0	0	0	0	0	0
95+	302.226	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		1	1	0	0	0	2	0	0	0	0	0	0

RATIO OF ACTUAL TO EXPECTED DEATHS  
 -----

1985	0
1986	0
1987	0
1988	0
1989	0
1985-1989	0%
1986-1989	0%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 12  
-----

MUNICIPAL DIVISION ACTIVE MEMBERS  
DISABILITY FOR MALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DISABILITIES					EXPECTED DISABILITIES						
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988	1989	TOTAL
20 - 24	.011	0	0	0	0	0	0	0	0	0	0	0	0
25 - 29	.039	0	0	0	0	0	0	0	0	0	0	0	0
30 - 34	.538	2	1	0	0	1	4	1	1	1	1	1	5
35 - 39	1.536	4	7	7	1	1	20	4	4	4	4	4	20
40 - 44	3.412	8	9	7	5	7	36	6	6	7	7	8	34
45 - 49	7.292	7	14	15	9	4	49	13	12	12	12	12	61
50 - 54	12.982	17	20	17	15	9	78	23	22	21	21	21	108
TOTAL		38	51	46	30	22	187	47	45	45	45	46	228

RATIO OF ACTUAL TO EXPECTED DISABILITIES  
-----

1985	81%
1986	113
1987	102
1988	67
1989	48
1985-1989	82%
1986-1989	83%



CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
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 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 13  
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MUNICIPAL DIVISION ACTIVE MEMBERS  
 DISABILITY FOR FEMALES

AGE	EXPECTED RATE PER 1,000	ACTUAL DISABILITIES					EXPECTED DISABILITIES					TOTAL	
		1985	1986	1987	1988	1989	1985	1986	1987	1988	1989		
20 - 24	.012	0	0	0	0	0	0	0	0	0	0	0	
25 - 29	.082	0	0	0	0	0	0	0	0	0	0	0	
30 - 34	.329	1	1	0	1	0	3	0	0	0	0	0	
35 - 39	.785	2	1	0	0	0	3	1	1	1	1	4	
40 - 44	1.849	0	0	1	0	0	1	2	2	2	2	10	
45 - 49	4.247	7	3	7	1	2	20	4	4	4	5	22	
50 - 54	9.251	10	4	6	3	2	25	7	7	7	8	38	
TOTAL		20	9	14	5	4	52	13	14	14	16	17	74

RATIO OF ACTUAL TO EXPECTED DISABILITIES  
 -----

1985	154%
1986	64
1987	100
1988	31
1989	24
1985-1989	75%
1986-1989	55%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
 -----  
 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 14  
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POLICE AND FIRE DIVISION ACTIVE MEMBERS  
 DISABILITY FOR MALES AND FEMALES COMBINED

AGE	EXPECTED RATE PER 1,000	ACTUAL DISABILITIES					EXPECTED DISABILITIES						
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988	1989	TOTAL
20 - 24	.994	0	0	0	0	0	0	0	0	0	0	0	0
25 - 29	1.370	1	1	1	0	0	3	1	1	1	1	1	5
30 - 34	2.861	3	1	1	2	4	11	5	5	4	4	4	22
35 - 39	5.773	8	11	7	5	14	45	16	16	15	14	13	74
40 - 44	10.598	19	27	28	24	19	117	26	27	28	29	27	137
TOTAL		31	40	37	31	37	176	48	49	48	48	45	238

RATIO OF ACTUAL TO EXPECTED DISABILITIES  
 -----

1985	65%
1986	82
1987	77
1988	65
1989	82
1985-1989	74%
1986-1989	77%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
 -----  
 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 15  
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MUNICIPAL DIVISION ACTIVE MEMBERS  
 TURNOVER FOR MALES

AGE	EXPECTED RATE PER	ACTUAL TURNOVERS					TOTAL	EXPECTED TURNOVERS					TOTAL
		1985	1986	1987	1988	1989		1985	1986	1987	1988	1989	
20 - 24	108.629	12	48	52	40	26	178	39	35	33	29	29	165
25 - 29	76.672	61	145	194	143	120	663	113	109	103	94	89	508
30 - 34	43.733	71	144	195	147	167	724	95	94	91	87	89	456
35 - 39	27.648	63	146	155	161	166	691	73	76	74	71	69	363
40 - 44	20.864	26	100	101	95	127	449	37	39	42	47	52	217
45 - 49	16.683	7	54	56	50	51	218	29	28	27	28	29	141
50 - 54	13.355	8	49	54	28	21	160	24	24	23	22	22	115
TOTAL		248	686	807	664	678	3,083	410	405	393	378	379	1,965

RATIO OF ACTUAL TO EXPECTED TURNOVERS  
 -----

1985	60%
1986	169
1987	205
1988	176
1989	179
1985-1989	158%
1986-1989	182%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 16

MUNICIPAL DIVISION ACTIVE MEMBERS  
TURNOVER FOR FEMALES

AGE	EXPECTED RATE PER 1,000	ACTUAL TURNOVERS					EXPECTED TURNOVERS						
		1985	1986	1987	1988	1989	TOTAL	1985	1986	1987	1988	1989	TOTAL
20 - 24	104.856	8	36	51	38	30	163	34	33	31	31	33	162
25 - 29	87.901	33	108	125	101	103	470	72	75	73	73	77	370
30 - 34	62.923	48	127	127	108	92	502	67	71	70	75	78	361
35 - 39	42.613	37	89	78	67	93	364	51	55	55	60	64	285
40 - 44	32.549	16	38	52	45	58	209	33	35	37	43	48	196
45 - 49	26.248	13	37	30	21	32	133	23	25	26	30	33	137
50 - 54	21.125	5	19	26	15	23	88	18	18	18	21	23	98
TOTAL		160	454	489	395	431	1,929	298	312	310	333	356	1,609

RATIO OF ACTUAL TO EXPECTED TURNOVERS

1985	54%
1986	146
1987	158
1988	119
1989	121
1985-1989	120%
1986-1989	136%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
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 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 17  
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POLICE AND FIRE DIVISION ACTIVE MEMBERS  
 TURNOVER FOR MALES AND FEMALES COMBINED

AGE	EXPECTED RATE PER	ACTUAL TURNOVERS					TOTAL	EXPECTED TURNOVERS					TOTAL
		1985	1986	1987	1988	1989		1985	1986	1987	1988	1989	
20 - 24	20.660	0	5	3	26	37	71	2	2	2	3	1	10
25 - 29	19.932	8	20	22	45	73	168	14	13	14	16	14	71
30 - 34	13.772	13	33	40	37	70	193	24	22	20	22	18	104
35 - 39	7.720	13	52	43	56	60	224	21	21	19	18	16	95
40 - 44	4.732	12	31	51	40	40	174	11	11	12	12	12	58
TOTAL		46	141	159	204	280	830	72	69	67	69	61	338

RATIO OF ACTUAL TO EXPECTED TURNOVERS  
 -----

1985	64%
1986	204
1987	237
1988	296
1989	459
1985-1989	252%
1986-1989	299%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
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 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 18  
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MUNICIPAL DIVISION ACTIVE MEMBERS  
 RETIREMENT FOR MALES

AGE	RATE PER 1,000	ACTUAL RETIREMENTS	EXPECTED RETIREMENTS	RATIO OF ACTUAL TO EXPECTED RETIREMENT
55	175	348	323	108%
56	90	150	140	107
57	90	127	132	96
58	90	103	123	84
59	90	120	115	104
60	115	90	130	69
61	115	127	117	109
62	300	232	260	89
63	180	94	106	89
64	180	69	90	77
65	300	130	132	98
66	225	54	68	79
67	200	57	48	119
68	200	30	35	86
69	200	18	26	69
TOTAL		1,749	1,845	81%

AVERAGE AGE AT RETIREMENT  
 -----

1985	60.01
1986	60.17
1987	60.24
1988	60.83
1989	60.63
1985-1989	60.38
1986-1989	60.47
1986-1988	60.41

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM

RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989

TABLE 19

MUNICIPAL DIVISION ACTIVE MEMBERS  
RETIREMENT FOR FEMALES

AGE	RATE PER 1,000	ACTUAL RETIREMENTS	EXPECTED RETIREMENTS	RATIO OF ACTUAL TO EXPECTED RETIREMENT
55	175	113	162	70%
56	90	66	77	86
57	90	48	71	68
58	90	45	65	69
59	90	59	63	94
60	115	65	75	87
61	115	53	67	79
62	300	105	163	64
63	180	64	78	82
64	180	52	65	80
65	300	67	91	74
66	225	48	52	92
67	200	39	39	100
68	200	34	32	106
69	200	31	26	119
TOTAL		889	1,126	79%

AVERAGE AGE AT RETIREMENT

1985	60.69
1986	61.78
1987	62.07
1988	62.95
1989	61.60
1985-1989	61.82
1986-1989	62.10
1986-1988	62.27

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
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 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 20  
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POLICE AND FIRE DIVISION ACTIVE MEMBERS  
 RETIREMENT FOR MALES AND FEMALES COMBINED

AGE	RATE PER 1,000	ACTUAL RETIREMENTS	EXPECTED RETIREMENTS	RATIO OF ACTUAL TO EXPECTED RETIREMENT
45	150	341	327	104%
46	90	166	149	111
47	100	125	132	95
48	105	131	116	113
49	115	109	106	103
50	120	77	91	85
51	125	71	82	87
52	145	74	81	91
53	150	68	70	97
54	170	55	66	83
55	180	43	59	73
56	200	58	57	102
57	225	41	51	80
58	225	27	41	66
59	225	32	34	94
60	230	20	26	77
61	230	16	19	84
62	300	12	16	75
63	300	6	11	55
64	300	10	9	111
TOTAL		1,482	1,543	96%

AVERAGE AGE AT RETIREMENT  
 -----

1985	50.45
1986	49.96
1987	50.00
1988	49.26
1989	49.39
1985-1989	49.81
1986-1989	49.65
1986-1988	49.74



CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
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 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 21  
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MUNICIPAL DIVISION ACTIVE MEMBERS  
 ANNUAL SALARY INCREASES FOR MALES AND FEMALES COMBINED

BEGINNING AGE	7/01/84 TO 7/01/85	7/01/85 TO 7/01/86	7/01/86 TO 7/01/87	7/01/87 TO 7/01/88	7/01/88 TO 7/01/89	7/01/84 TO 7/01/89
20 - 24	15.528%	3.700%	9.339%	9.878%	5.266%	8.835%
25 - 29	13.860	3.869	9.706	8.796	4.678	8.134
30 - 34	12.518	3.080	8.967	8.105	3.724	7.171
35 - 39	11.845	2.409	7.824	7.241	2.846	6.245
40 - 44	11.680	1.873	6.913	7.049	2.405	5.647
45 - 49	11.449	1.415	6.214	6.838	1.911	5.316
50 - 54	11.299	1.295	6.012	6.402	1.687	5.255
55 - 59	11.299	1.283	5.875	6.600	2.068	5.505
60 - 64	11.005	.932	5.740	5.910	2.388	5.178
65 - 69	10.531	1.355	6.838	5.310	3.873	5.526
70+	9.217%	-.032%	8.654%	6.403%	6.077%	5.901%
AVERAGE ANNUAL RATE OF INCREASE FOR AGES 20 - 70+:	11.998%	2.133%	7.328%	7.211%	2.777%	6.147%

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM  
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 RESULTS OF EXPERIENCE STUDY FOR FISCAL YEARS 1985-1989  
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TABLE 22  
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POLICE AND FIRE DIVISION ACTIVE MEMBERS  
 ANNUAL SALARY INCREASES FOR MALES AND FEMALES COMBINED

BEGINNING AGE	7/01/84 TO 7/01/85	7/01/85 TO 7/01/86	7/01/86 TO 7/01/87	7/01/87 TO 7/01/88	7/01/88 TO 7/01/89	7/01/89 TO 7/01/84
20 - 24	13.634%	1.767%	17.011%	9.942%	11.497%	10.363%
25 - 29	12.517	1.417	13.155	7.818	5.747	8.065
30 - 34	11.129	.902	11.361	6.778	4.567	6.896
35 - 39	10.662	.656	10.088	5.830	4.108	6.218
40 - 44	10.210	.507	9.453	5.532	3.512	5.708
45 - 49	10.037	.507	9.214	5.457	3.271	5.448
50 - 54	9.801	.455	9.135	5.164	3.301	5.488
55 - 59	9.451	.445	9.056	6.271	3.025	5.661
60 - 64	9.294	.057	9.217	5.753	2.489	4.950
65 - 69	9.555	.000	7.929	5.443	2.682	5.225
70+	9.233%	.000%	8.464%	5.007%	.000%	5.546%
AVERAGE ANNUAL RATE OF INCREASE FOR AGES 20 - 70+:	10.701%	.701%	10.256%	6.047%	4.016%	6.248%

PCYA/VAL/89/2A

PART V

ACTUARIAL FACTORS AND  
ASSUMPTIONS USED IN THE JULY 1, 1988 VALUATION

The actuarial factors and assumptions used in determining cost estimates are presented below.

1. Member Data: The member data used in the determination of the experience consists of pertinent information with respect to the active, retired, disabled and deferred vested municipal and uniformed members of the City of Philadelphia Municipal Retirement System as supplied by the Philadelphia Board of Pensions and Retirement to the actuary for each of the annual valuations covered by the study.
2. Annual Rate of Withdrawal Prior to Retirement: The assumed annual rates of withdrawal may best be illustrated by the following probabilities at quinquennial ages:

<u>Attained Age</u>	<u>Municipal and Elected Officials</u>		<u>Uniformed</u>
	<u>Males</u>	<u>Females</u>	<u>Unisex</u>
20	.120022	.109707	.021000
25	.090326	.100505	.020300
30	.055510	.073123	.016544
35	.032213	.049504	.009848
40	.023083	.035723	.005592
45	.018176	.028560	.000000
50	.014635	.023075	.000000
55	.000000	.000000	.000000

In addition, it is assumed that a terminating employee who is vested (10 years of service) will elect a refund of employee contributions

unless his age plus years of service at termination sum to 55 or more (rule of 55), in which event he will be assumed to elect a deferred pension commencing at service retirement age.

3. Annual Rate of Disability Prior to Retirement: The assumed annual rates of disability may best be illustrated by the following probabilities at quinquennial ages:

<u>Attained Age</u>	<u>Municipal and Elected Officials</u>		<u>Uniformed</u>
	<u>Males</u>	<u>Females</u>	<u>Unisex</u>
20	.000010	.000012	.000994
25	.000028	.000054	.001220
30	.000339	.000230	.002265
35	.001137	.000602	.004608
40	.002661	.001423	.008668
45	.005740	.003288	.016239
50	.010706	.007249	.020000
55	.014193	.010450	.020000
60	.015000	.011250	.020000
65	.000000	.000000	.000000

In addition, it is assumed that 90% of all disabilities among municipal and elected members are ordinary (10% are service-connected) and that 80% of all disabilities among uniformed members are ordinary (20% are service-connected).

4. Annual Rate of Mortality Prior to Retirement: It is assumed that deaths among active municipal and elected male members may be represented by 55% of the UP-84 Mortality Table with ages set forward one year. Deaths among municipal and elected female members are assumed to be represented by 50% of the UP-84 Mortality Table with ages set back

four years. In addition, it is assumed that 95% of all deaths among active municipal and elected members are ordinary (5% are service-connected).

It is assumed that deaths among active uniformed members may be represented by 55% of the UP-84 Mortality Table with ages set forward one year. In addition, it is assumed that 90% of all deaths among active uniformed members are ordinary (10% are service-connected).

5. Service Retirement: It is assumed that active members in the 1967 Plan will retire in accordance with the following rates:

<u>Attained Age</u>	<u>Municipal and Elected Officials Unisex</u>	<u>Uniformed Unisex</u>
45	--	.150
46	--	.090
47	--	.100
48	--	.105
49	--	.115
50	--	.120
51	--	.125
52	--	.145
53	--	.150
54	--	.170

(Illustration continued on following page)

<u>Attained Age</u>	<u>Municipal and Elected Officials Unisex</u>	<u>Uniformed Unisex</u>
55	.175	.180
56	.090	.200
57	.090	.225
58	.090	.225
59	.090	.225
60	.115	.230
61	.115	.230
62	.300	.300
63	.180	.300
64	.180	.300
65	.300	.300
66	.225	.300
67	.200	.300
68	.200	.300
69	.200	.300
70+	1.000	1.000

The corresponding rates for members under Plan 1987 are as follows:

<u>Age</u>	<u>Municipal and Elected Officials</u>		<u>Uniformed</u>		
	<u>Full Benefits</u>		<u>Reduced Benefits</u>	<u>Full Benefits</u>	
	<u>First Year Eligible</u>	<u>Subsequent Years</u>		<u>First Year Eligible</u>	<u>Subsequent Years</u>
40	--	--	.040	.500	.125
41	--	--	.040	.500	.125
42	--	--	.040	.500	.125
43	--	--	.040	.500	.125
44	--	--	.040	.500	.125
45	--	--	.040	.500	.125
46	--	--	.040	.480	.125
47	--	--	.040	.460	.125
48	--	--	.040	.440	.125
49	--	--	.040	.420	.125

(Illustration continued on following page)

Age	<u>Municipal and Elected Officials</u>			<u>Uniformed</u>		
	Reduced Benefits	Full Benefits First Year Eligible*	Subsequent Years	Reduced Benefits	Full Benefits First Year Eligible	Subsequent Years
50	--	--	--	.040	.400	.125
51	--	--	--	.040	.400	.125
52	.033	.450	.060	.040	.400	.140
53	.033	.420	.060	.040	.400	.150
54	.033	.390	.060	.040	.400	.170
55	.033	.360	.060	.040	.400	.190
56	.033	.330	.060	.040	.400	.215
57	.033	.300	.060	.040	.400	.225
58	.033	.300	.060	.040	.400	.225
59	.033	.300	.080	.040	.400	.230
60	.033	.300	.100	.040	.400	.230
61	.033	.350	.150	.040	.400	.245
62	.033	.430	.300	.040	.400	.295
63	.033	.500	.187	.040	.400	.265
64	.033	.500	.199	.040	.400	.260
65	.033	.600	.309	1.000	.400	1.000
66	.033	.600	.232	--	--	--
67	.033	.600	.214	--	--	--
68	.033	.600	.214	--	--	--
69	.033	.600	.238	--	--	--
70	1.000	.600	1.000	--	--	--

\* Earlier of age 62 and 10 years of service, or 33 years of service.

6. Annual Rate of Mortality After Retirement: Post-retirement mortality has been assumed to follow 100% of the UP-84 Mortality Table with ages set forward one year for males and to follow 94% of the UP-84 Mortality Table with ages set back four years for females. Post-disablement mortality has been assumed to follow the above mentioned table with adjustment factors applied at each age.

7. Salary Scale: It is assumed that salaries, including longevity and overtime, will increase at a compound annual rate of 6.0% per annum.

8. Rate of Investment Return: It is assumed that the assets of the fund will accumulate at a compound annual rate of 9% per annum, net of the annual expenses incurred in the investment of the fund's assets by the equity and debt money managers contracted by the Board of Pensions and Retirement.
9. Expenses: The administrative expenses of servicing the Retirement System are estimated based upon the estimated operating budget of the Board of Pensions and Retirement for fiscal year 1988 excluding the costs of the money managers contracted to invest the fund's assets.
10. Value of Investments: Assets held by the fund exclusive of equity securities are valued at market value as reported by the City. Equity securities are determined based on the product of (i) the average of the ratio of the market value of the equity securities to their cost value as of the valuation date and the two immediately preceding July 1 dates (but not prior to July 1, 1984) and (ii) the corresponding cost value of the equity securities as of the valuation date.
11. Family Composition: It is assumed that 70% of all active members and 60% of all non-active members will be survived by a spouse and that female (male) spouses are four years younger (older) than members.
12. Form of Annuity: It is assumed that all members will elect Option 4 unless otherwise indicated in the participant's data.



13. Capitalized Value of Bonds: In order that both current assets and non-active liabilities be valued on the same basis, the portion of the fixed income portfolio which can be matched with expected future payments is determined based on the valuation interest rate and the difference between this value of assets and the market value of assets is subtracted from the accrued liability.
14. Rate of Covered Payroll Growth: It is assumed that the annual rate of growth of total covered payroll is 6% per annum.