City of Philadelphia
Municipal Retirement System

Experience Study Results
and Recommendations

For the period covering
July 1, 2004 – June 30, 2009

Produced by Cheiron

April 2010

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LETTER OF TRANSMITTAL

April 28, 2010

City of Philadelphia Municipal Retirement System
Two Penn Center Plaza – 16th Floor
Philadelphia, PA 19102-1721

Dear Board Members:

At your request, we have completed an experience study of the City of Philadelphia Municipal' Retirement System (Retirement System). Our study compared assumed versus actual experience with respect to all demographic and economic assumptions used in the preparation of the Actuarial Valuations for the five year period from July 1, 2004 through June 30, 2009 in compliance of Pennsylvanian Municipal Pension Plan Funding Standard and Recovery Act (Act 205) Chapter 2, Section 2.01.

This report presents the results of our study as well as alternative assumptions for consideration for changes to several of the actuarial assumptions to be employed for the July 1, 2010 Actuarial Valuation.

We hereby certify that, to the best of our knowledge, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board, and that we meet the Qualification Standards, as defined by the American Academy of Actuaries, to render the opinion contained in this report.

Finally, in preparation of this report, we relied, without audit, on data provided to us by the Retirement System. To the extent there are material omissions or misrepresentations of any of the data elements we relied upon in formulating opinions, we could arrive at different conclusions.

Sincerely,
Cheiron

Kenneth A. Kent, FSA, FCA
Principal Consulting Actuary

Karen Zangara, FSA, MAAA
Actuary

SECTION I
BOARD SUMMARY

At the request of the Retirement Board, Cheiron has performed a study of the experience of the City of Philadelphia Municipal Retirement System (Retirement System). This experience study examines the Retirement System's experience during the five-year period from July 1, 2004 through June 30, 2009, "The Study Period". This report presents the results of our study as well as alternatives to several of the current actuarial assumptions to be employed in future valuations of the Retirement System.

We studied the Retirement System's experience with respect to both "demographic" and "economic" assumptions. Demographic assumptions deal with expected membership behavior. These include the retirement rates, termination rates, disability rates, and mortality rates. Economic assumptions deal with System wide elements such as investment returns, inflation, salary increase rate (salary scale) and administrative expenses. Salary increases can be considered either demographic (membership oriented) or economic (given the inflation component). For this study, we included salary experience under the economic portion of the study.

Before summarizing the key results of our experience study, we present in the graph below a historical review of the deviation of actual experience against anticipated experience based on the assumptions used in past actuarial valuations. The blue bars in the graph represent annual investment experience gains or losses (G/(L)), and the gold bars represent the annual liability experience gains or losses (G/(L)).
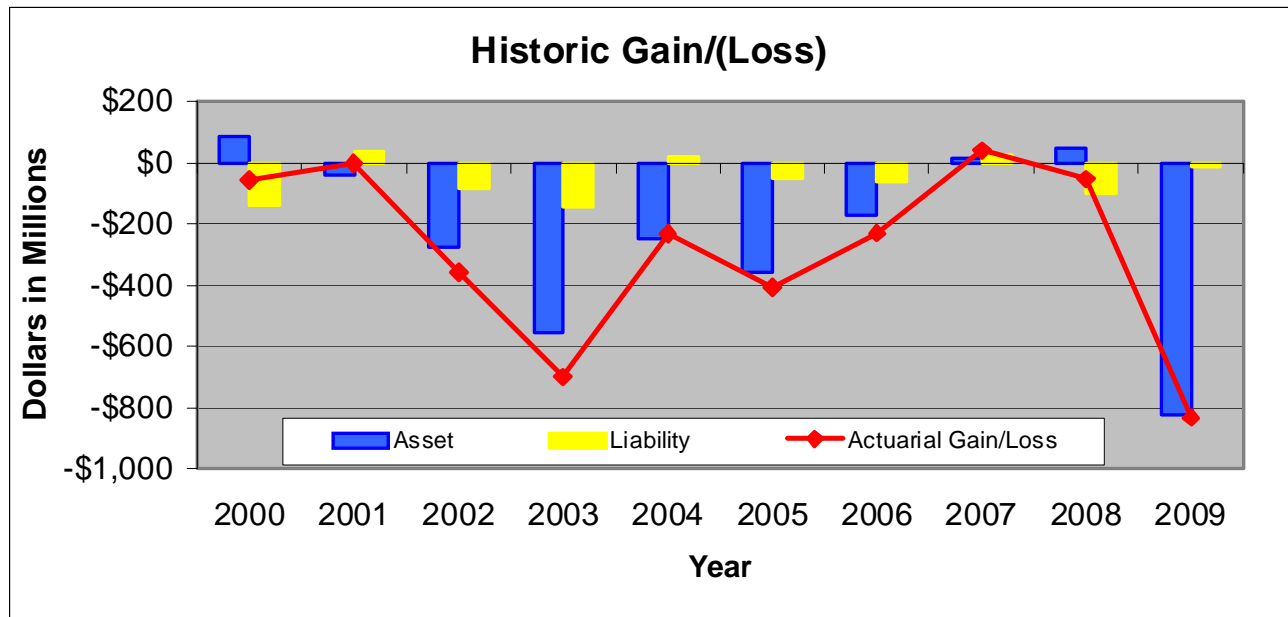
In summary, the graph indicates that for seven out of ten years, the assumptions employed in each year's actuarial valuation produced a liability experience loss, which means that the assumptions underestimated liabilities. The average annual liability loss during this period was $50.3 million or 0.67% of the average annual actuarial liability of $7.5 billion over that period. With respect to the liability experience over the study period, experience in the aggregate produced a greater liability than what the assumptions anticipated.

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On the investment side, the graph indicates that investment performance was less than the assumed rate of return in seven of the ten years. The average annual investment loss over the 10 year period was $232.8 million or 5.5% of the average annual market value of assets of $4.2 billion over that 10 year period.

Summary of principal experience study results and recommendations:

1. **Retirement –** Rates of retirement were lower than expected for Police and Fire Divisions (i.e. Uniform Division). There could be a number of factors impacting members' behavior including the current economic environment and the cost of medical benefits subsequent to the four years of coverage provide by the City. We will illustrate the impact of a partial reflection of these trends for Municipal Plan 67 members and for both Plan 67 and 87 Police and Fire Division members.

    For Municipal Plan 67, actual retirements are higher than expected at the earlier retirement ages. As a greater number of this group is close to retirement, tightening this assumption is important as the anticipated future experience is likely to reflect recent experience. On the other hand, while Municipal Plan 87 shows lower than expected retirements, most participants have a significant period before becoming eligible for retirement, and their behavior is likely to revert back to longer-term trends if the economy rebounds, so we are not presenting an alternative retirement assumption for this plan at this time.

    The changes in retirement assumptions are supported when analyzing the total actual retirements versus expected number of retirements based upon the current assumptions over the five-year testing period. The ratio of actual divided by expected number of retirements during this period demonstrates how well the current assumptions meet the actual experience of the plan. Ideally, this ratio should be about 100% to show that the expected retirements approximately match the actual retirements. However, this ratio analysis must be balanced with the experience graphs (presented within the body of this report) and the data used to determine this ratio, because outlier age groups may skew this ratio accuracy.

Table I-1			
Plan	**Actual Retirements**	**Expected Retirements**	**Ratio: Actual/ Expected**
Uniform Plan 67	568	817	70%
Uniform Plan 87	75	249	30%
Municipal Plan 67	1,501	1,490	116%
Municipal Plan 87	370	528	70%*

   * The ratio for Municipal Plan 87 is partially skewed due to the 100% retirement assumption for participants 65+. Disregarding this data for retirements after 65, the ratio is 93%. See Section III for more details.

2. **Termination -** As the Police and Fire Division 67 Plans mature, there are fewer participants who are likely to leave the System prior to becoming retirement eligible. Furthermore, in evaluating any experience element, we consider the amount of data available to assess whether or not there

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is sufficient information to observe a change in behavior. The technical term is *credibility* or *credible data*. When there are fewer opportunities for the decrements under consideration, then we consider the data to not be credible for determination of a change in trend. Since there were less than 900 opportunities for a termination in employment during the study period, and of these opportunities there were only 22 terminations over this study period, the amount of data available for the Uniform 67 Plans is becoming insufficient for analysis at a credible level. Therefore we are providing an alternative combined table for the Uniform 67 and 87 Plan participants to measure the expectation of employment severance prior to retirement eligibility.

Because the Municipal Plan 87 and Plan 67 are a significant size and the experience over the past five years matches up to the assumptions, no changes are suggested for the turnover rates for these two plans.

The table below provides the actual versus expected terminations from the Police and Fire Division Plans. The small data size of the Uniform Plan 67 supports combining these Plans for the future terminations assumptions.

Table I – 2			
Plan	**Actual Terminations**	**Expected Terminations**	**Ratio: Actual /Expected**
Uniform Plan 67	22	9	253%
Uniform Plan 87	634	529	120%

3. **Disability** – Due to the smaller population testing size, males and females were combined in the disability rate analysis for the Police and Fire Divisions. The Police and Fire Divisions had higher disability rates than expected from ages 30 to 50.

The table below provides the actual versus expected disabled participants from the Police and Fire Division Plans:

Table I – 3			
Plan	**Actual Disabled Participants**	**Expected Disabled Participants**	**Ratio: Actual /Expected**
Uniform Plans	94	63	149%

Based upon this information, we are providing an alternative table that increases the expected disability rates.

The Municipal Division disability rates had more credible data to produce a gender distinct analysis of the disability rates. While overall the current expected rates of disability are slightly higher than the current experience, the difference was attributable to the outlier data at the higher ages (55 – 59) where the amount of credible data is relatively small (15 and 9 disabled males and

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females). Based upon this data size, the current assumption remains reasonable. See Section III of this report for more details.

4. **Mortality** - The 1994 Group Annuity Mortality (GAM 94) table is currently being used for all plans, with adjustments for pre-retirement, post-retirement, and post-disabled mortality. This table is over 15 years old and does not take into account improvements in longevity that have occurred over the past decade. Furthermore, overall the actual mortality experience for all Plans was less than the expected mortality rates determined under the 94 GAM table.

In 2000, the Retired Pensioners 2000 (RP 2000) mortality table was published. These tables take into account decreased mortality rates and are based upon mortality experience among pension participants which is believed to be more representative of life expectancies for the Retirement System.

The table below provides the actual versus expected deaths and the ratio of these values. For each of the separate incidents of mortality, the ratio is less than 100% implying that the current mortality tables are not reflecting improvements in life expectancy:

		Table I – 4		
Plan	**Mortality Incidents**	**Actual Deaths**	**Expected Deaths**	**Ratio: Actual/Expected**
All Plans	Pre-Retirement	194	223	87%
All Plans	Post-Retirement	4,606	5,352	86%
All Plans	Post-Disabled	661	728	91%

The alternative mortality tables suggested in this report are based on the RP 2000 table with modifications to adjust the tables to at least match the Retirement System experience.

5. **Salary Increase** - The salary increase rate represents the year over year increase in pay of continuing actives. The current assumption is 5% annual increase for all participants. Upon reviewing the salary increase by age groups, the rate of salary increase is highest at younger ages and then decreasing over time. Based upon this data, the alternative salary increase assumption is an age-based table with lower salary increase rates for older participants.

The graph on the next page illustrates the five year average rate of salary increases year over year by five year age groups and the alternative salary increase assumption.

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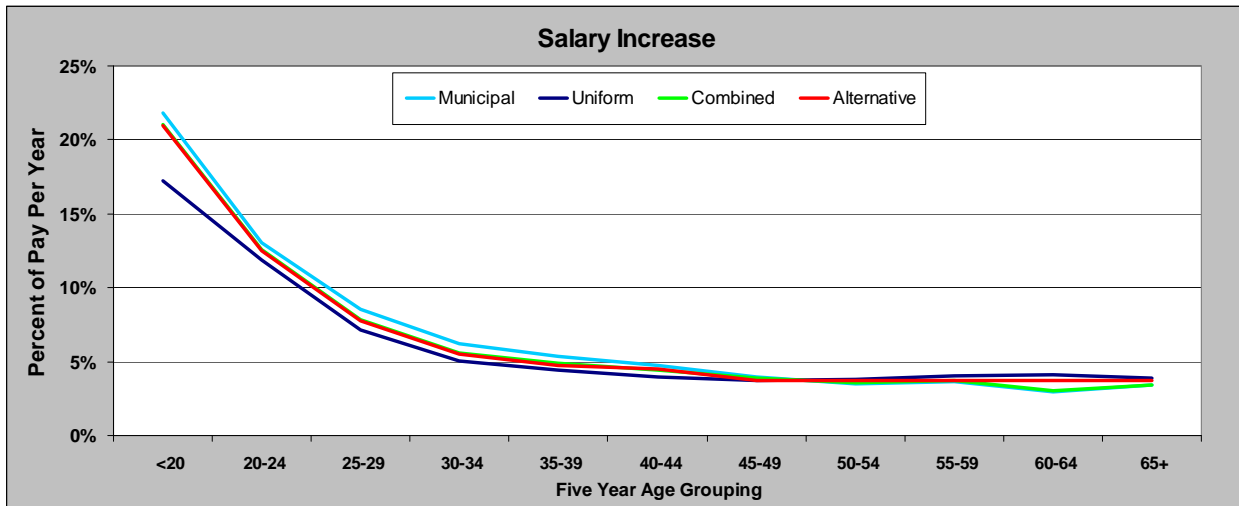
6. **Investment Return Assumption/Discount Rate** - The current investment return assumption is 8.25%. While this rate may be within the range of a variety of acceptable investment return assumptions, it is appropriate to continue to look at decreasing this assumption as a basis for determination of the long term discount of benefit cash flows and determination of the Retirement System's liabilities. We are suggesting a consideration of additional reduction in this assumption. This type of change would to reduce future relative risk of the Retirement System by increasing the liabilities and increasing the likelihood future investment returns will achieve the assumption.

The alternative assumptions would be implemented effective July 1, 2010 upon adoption by the Retirement Board.

On the following page we present Table I-5 summarizing all keys findings and recommendations arising from this study.

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Table I – 5 Recommended Changes to Economic and Demographic Assumptions (All Municipal and Police and Fire Employees)		
	Current Assumption	**Recommended Change**
Demographic		
Retirement Rates	Plan 67 – rates by age Plan 87 – rates by age	Increases for Municipal Plan 67 and decreases for Police and Fire
Termination Rates	Termination Rates by Age	Use same rates for all Police and Fire
Disability Rates	Disability Rates by age	Increase Police and Fire Disability Rates
Active Mortality Rates (Pre-Retirement)	GAM 94	RP 2000 with 5 year set back for Municipal females, 3 year set forward for Police and Fire females, no adjustment for males
Healthy Retiree Mortality Rates (Post-Retirement)	GAM 94	RP 2000 with 2 year set forward for all females and Municipal males, and 1 year set forward for Police and Fire males
Disabled Mortality Rates (Post-Disabled)	GAM 94	RP 2000 Disabled mortality table with a 5% downward adjustment for Municipal; RP 2000 Healthy mortality table with a 30% upwards adjustment for Police and Fire
Miscellaneous Demographic		
Marital Status	70% active/60% retirees with 50% J&S refund of contribution option	No Change
Economic		
Inflation	2.75%	No Change
Investment Return/Discount Rate	8.25%	10 basis points to 8.15% as an example
Salary Increase Rate	5.00%	Salary scale by age
Payroll Growth	4.00%	3.50%
Expenses	Increases annually by 4.0%	No Change

The balance of this report presents the rationale for the alternatives presented above. In Section II, we present detailed analysis and exhibits supporting the various economic assumption changes. In Section III we present similar information with respect to the demographic assumptions.

SECTION II
ANALYSIS OF ECONOMIC ASSUMPTIONS

We considered the following to be "economic" assumptions in our analysis:

1. Inflation

2. Investment Return/Discount Rate

3. Salary Increase

4. Payroll Growth

5. Expenses

Both the investment and salary increase assumptions are interrelated with the inflation rate. The rate of investment return consists of two components; the "real rate" of return and the inflation component. Similarly, the rate of salary increase is separated into different components: the inflation rate, a merit increase (seniority) and sometimes there is a component set aside for "productivity" gains.

In developing recommendations for these assumptions, several factors are considered:

- o historical data in general (i.e. the markets)
- o historical experience of the plan
- o outlook for the future
- o assumptions used by other public sector plans.

1. Inflation

A. <u>Current Assumptions</u>

The inflation rate is an underlying aspect of all economic assumptions. The difference between other economic assumptions relative to the long term underlying rate of inflation is an important measure. The current 2.75% rate of inflation is supported by the regional rate of inflation over the last five and nine year periods.

B. <u>Experience</u>

1. Historical Experience in General

Based on the Consumer Price Index for all Philadelphia-Wilmington-Atlantic City Urban Consumers, Table II-1 on the next page shows the inflation rates for the past 20 years:

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Table II – 1 Philadelphia/Wilmington/Atlantic City Average (CPI-U)	
Year Ending June 30	**Increase in CPI-U**
1990	4.9%
1991	5.0%
1992	4.0%
1993	2.0%
1994	2.7%
1995	2.5%
1996	2.5%
1997	2.3%
1998	1.1%
1999	2.4%
2000	2.6%
2001	3.3%
2002	2.1%
2003	1.8%
2004	4.4%
2005	3.4%
2006	4.4%
2007	1.6%
2008	5.1%
2009	-2.0%
1990 - 2009	2.80%
2000 - 2009	2.66%
2004 - 2009	2.48%

2. Other Public Sector Plans

The following table shows the rates of inflation reported in the *2007 Public Fund Survey Summary of Findings* published by NASRA. Based on the 2007 survey, large public sector retirement systems are using on average an inflation assumption of 3.5%.
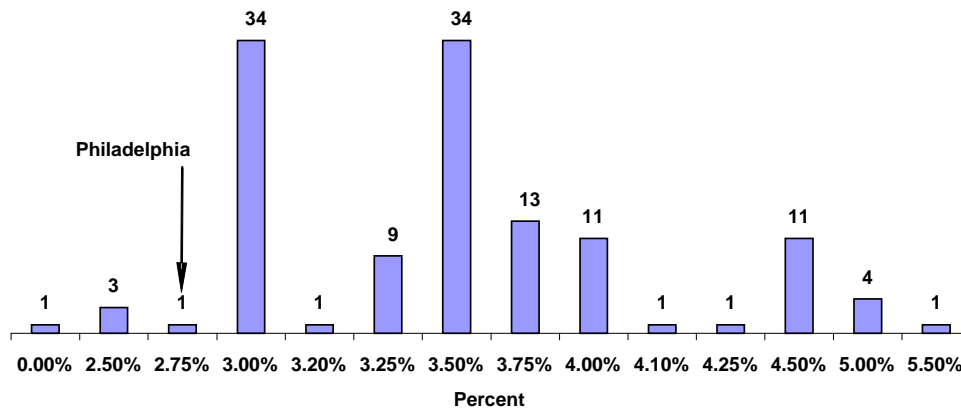
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ANALYSIS OF ECONOMIC ASSUMPTIONS

C. Recommendations

Based on the above factors, the current inflation rate assumption remains reasonable.

2. Investment Return/Discount Rate

A. Current Assumptions

All Municipal and Police and Fire Employees

The Retirement Systems' assets are assumed to earn 8.25% net of expenses. This reflects the recent reduction from 8.75% to 8.25% adopted effective July 1, 2009.

B. Experience

    1. Historical Experience in General

Table II-2 provides the rates of investment returns experienced by the Retirement System during the last 10 fiscal years. Rates of return were computed as the ratio of the net investment earnings to market value of asset.

    Current Assumption: 8.25% per annum

| Table II – 2	
Investment Returns on Market Value of Assets	
Year Ending June 30,	**Return**
1999	10.0%
2000	9.6%
2001	-6.0%
2002	-5.8%
2003	1.8%
2004	16.6%
2005	9.9%
2006	11.3%
2007	17.0%
2008	-4.5%
2009	-19.9%
Compound Averages up to July 1, 2009	
Last 5 Years (2005 – 2009)	1.82%
Last 10 Years (2000 – 2009)	2.35%
Compound Averages up to July 1, 2008	
5 Year Avg (2004 – 2008)	9.76%
10 Year Avg (1999 – 2008)	5.64%

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The investment returns on a 5 and 10 year basis are lower than the current assumption due to the financial market decline during 2008 and 2009. If average returns are determined up to July 1, 2008, then the 5 year average is higher than the current assumption.

However long-term investment return expectations on assets should not be the sole measure used in determination of the value of liabilities under the Retirement System. The higher this assumption the greater the risk the measure of liabilities could be understated and the Retirement System costs will increase in the future. Reducing the investment return/discount rate increases the liability measurement; reducing the risk of future the Retirement System cost increases.

   2. Other Public Sector Plans

The findings from the Public Fund Survey for FY 2007 performed by the National Association of State Retirement Administrators (NASRA) show that the median investment return used by public sector plans is 8.0%, as shown in the graph below.
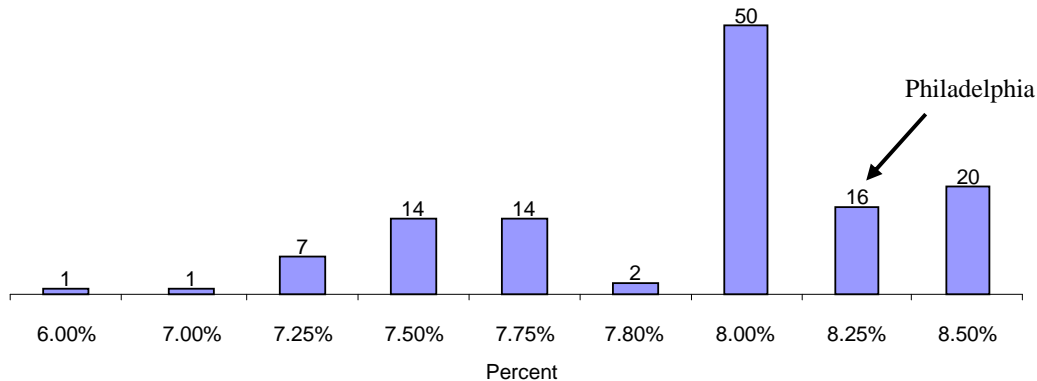
Finally, since the NASRA study was completed, there has been a downward trend in the investment assumption used by many large public sector plans.

C. <u>Alternatives</u>

All Municipal and Police and Fire Employees

Based on historical returns, both in the general markets and actual for the Retirement System, as well as other plans' assumptions, the Retirement System's current 8.25% assumption is not outside the range of acceptable investment return assumptions. Nevertheless, there is a national trend of other large public sector plans to lower their investment assumption. Furthermore, based upon the Retirement System's investment return experience, this trend supports continued consideration to continue decreasing the investment return/discount rate assumption.

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ANALYSIS OF ECONOMIC ASSUMPTIONS

3. Salary Increase

A. Current Assumptions

All Municipal and Police and Fire Employees

The current salary increase assumption for all Municipal and Police and Fire employees is 5.00%. This is based in part on the inflation assumption of 2.75% and coupled historically with a 1.50% seniority/merit, and 0.75% productivity assumption.

B. Experience

All Municipal and Police and Fire Employees

The average salary increase over the testing period is 4.86% for Municipal and 4.82% for Police and Fire participants resulting in 4.84% combined rate which continues to support a 5.0% assumption. However, on review of the data, it was clear that the distribution of salary growth experience by age demonstrates a consistent trend. The Table II-3 below shows the total salary increase rate experienced by the Retirement System during the study period.

	Table II - 3 Average Salary Increases		
Age	**Municipal**	**Police and Fire**	**Combined**
<20	21.78%	17.20%	21.01%
20-24	13.04%	11.89%	12.59%
25-29	8.57%	7.15%	7.86%
30-34	6.23%	5.08%	5.61%
35-39	5.35%	4.39%	4.87%
40-44	4.76%	3.94%	4.43%
45-49	3.92%	3.74%	3.87%
50-54	3.52%	3.79%	3.58%
55-59	3.64%	4.06%	3.71%
60-64	2.96%	4.13%	3.02%
65+	3.38%	3.90%	3.39%
<Total>	4.86%	4.82%	4.84%

C. Recommendations

All Municipal and Police and Fire Employees

Actual increases have been slightly lower than the expected salary increase rate. Also, the current assumption assumes all participants will receive the same salary increase at all ages. Based upon the

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ANALYSIS OF ECONOMIC ASSUMPTIONS

data, we recommend using a table based on ages which will more accurately reflect the salary increase experienced by the plan.

D. Results

The following Table II – 4 and graph shows the age-based salary increase rate that might be applied. Appendix A provides more detailed information on the salary increase experience over the study period.

Table II - 4 Average Salary Increases				
Age	Municipal	Police and Fire	Combined	Alternative Assumption
<20	21.78%	17.20%	21.01%	21.00%
20-24	13.04%	11.89%	12.59%	12.50%
25-29	8.57%	7.15%	7.86%	7.75%
30-34	6.23%	5.08%	5.61%	5.50%
35-39	5.35%	4.39%	4.87%	4.75%
40-44	4.76%	3.94%	4.43%	4.50%
45-49	3.92%	3.74%	3.87%	3.75%
50-54	3.52%	3.79%	3.58%	3.75%
55-59	3.64%	4.06%	3.71%	3.75%
60-64	2.96%	4.13%	3.02%	3.75%
65+	3.38%	3.90%	3.39%	3.75%
<Total>	4.86%	4.82%	4.84%	NA
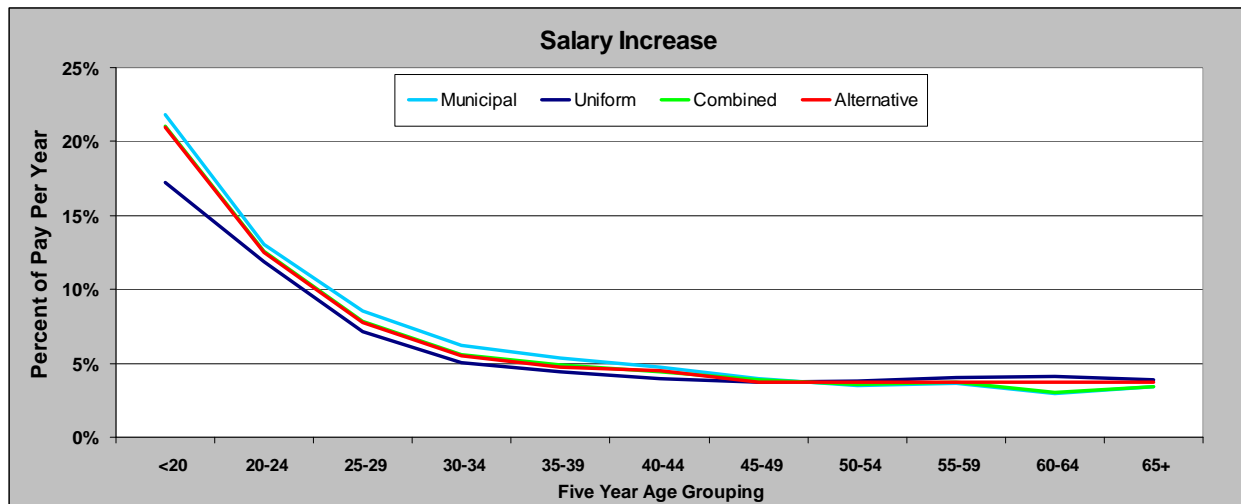
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ANALYSIS OF ECONOMIC ASSUMPTIONS

4. Payroll Growth Rate

A. Current Assumptions

All Municipal and Police and Fire Employees

The Retirement Systems' total payroll growth assumption is currently 4%. This assumption represents the assumed growth in payroll, which includes not only the continuing active participants' year over year increases, but also the participants employed for only a short period of time. It is a reflection of both payroll growth and number of employees covered by the Retirement System.

B. Experience

The Retirement Systems' total payroll growth since 2000 was less than expected. For the Municipal Division, the average of the five year trend is about 2.00% while for the Police and Fire Divisions this is about 3.25%. The following graphs show the experience, the five year trend, and the current assumption for Municipal and Police and Fire Divisions.
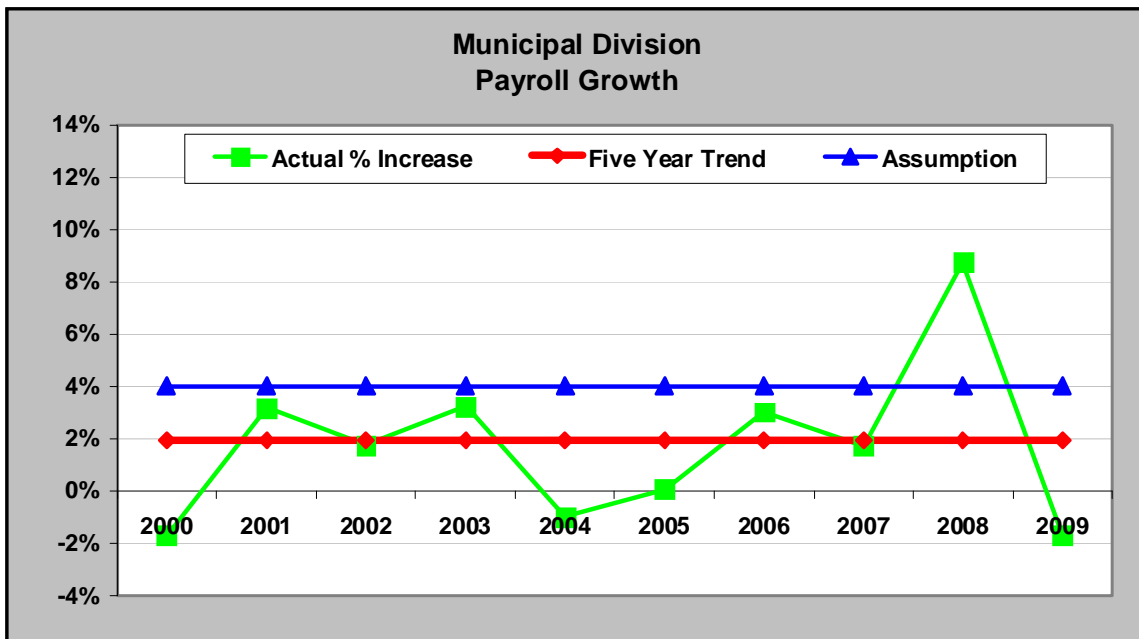
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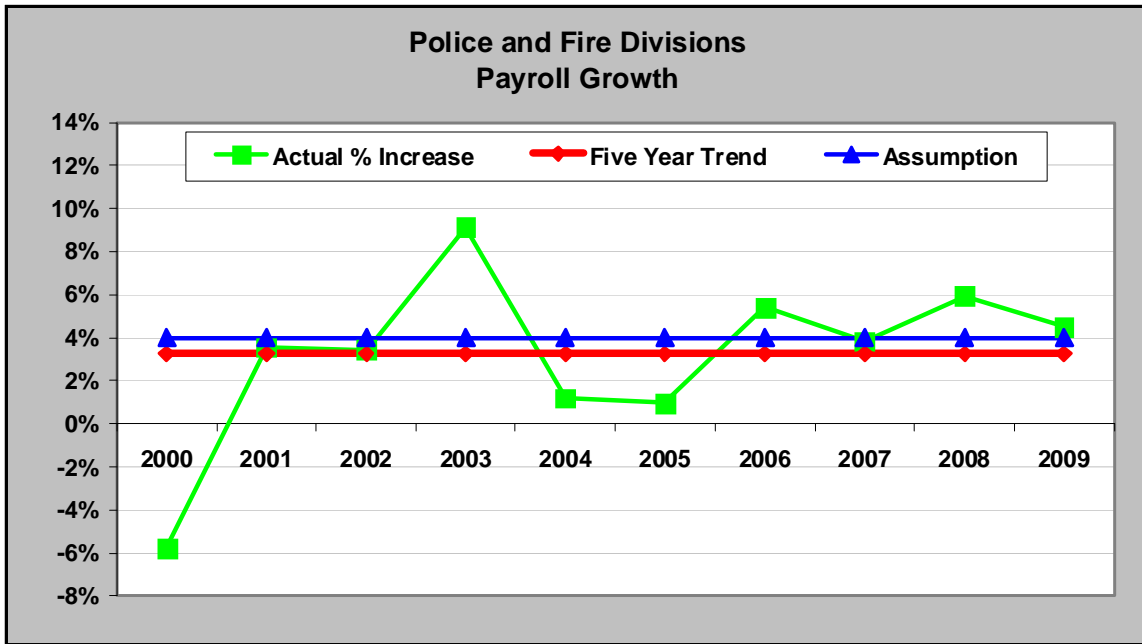
C. Recommendations

All Municipal and Police and Fire Employees

While the current payroll growth assumption may be high compared to the experience, this assumption only impacts the amortization of the initial unfunded liability base under the City's Funding Policy. Lowering this assumption will increase the contribution requirements under the Funding Policy. An alternative to consider would be 3.5%.

5. Expenses

A. Current Assumptions

The expense assumption is based upon the average of the administrative expenses from the past two years incurred by the plan. This amount is then rolled forward to the following year based upon the payroll growth assumption.

B. Recommendation

This assumption is reviewed and updated every year based upon the Plan's experience, thus no change is recommended at this time.

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

In this section, we present the key findings of our experience review of the demographic assumptions used by the Retirement System, including alternative assumptions for consideration. The demographic assumptions included in this review are:

1. Retirement

2. Termination from Active Employment (Other than Death, Disability, or Retirement)

3. Disability

4. Mortality (Active, Retired Healthy, and Retired Disabled)

5. Joint and Survivor with Refund of Contributions Marriage Percentage

For each of the first four sets of assumptions noted above, we determined an actual to expected occurrence ratio at each age (sometimes further segregated by gender). For example, for Municipal Plan 67 there are 1,586 participants who were age 55 during the study period of which 673 retired. Based on the assumption in place during the study, 555.1 of the 1,586 participants were expected to retire. Therefore the ratio of actual to expect retirees is 121%. Another way to say this is, 121% of the number expected to retire during the study period actually did retire.

If the "actual to expected" ratio is greater than one, the assumption may be too low; if it is less than one, the assumption may be too high.

1. Retirement

A. Current Assumptions

All Municipal Employees

Normal Retirement assumptions for City Municipal employees under Plan 67 start at age 55, regardless of service. Under Plan 87, Normal Retirement starts at age 60 with 10 years of service with the exception of those in the Elected group, which start at age 55 with 10 years of service.

All Police and Fire Employees

Normal Retirement assumptions for City Police and Fire employees under Plan 67 start at age 45, regardless of service. Under Plan 87, Normal Retirement starts at age 50 with 10 years of service.

The current retirement rates for all employee groups vary based on age. Once a Municipal employee, or a Police and Fire employee, reaches age 70, we assume 100% probability of retirement.

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ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

B. Experience

All Municipal and Police and Fire Employees

The current assumptions for both employee groups are based on age. Overall, for the Police and Fire employees, the actual retirements during the study period were lower than expected (see the Results section outlined in item D below). The experience shows lower ratios of actual to expected retirements at younger ages for the Police and Fire Divisions.

For the Municipal Division Plan 67, the rates were higher than expected at the younger ages illustrated by ratios greater than 100%.

C. Alternative

All Municipal and Police and Fire Employees

We propose increasing the rates at younger ages for Municipal Plan 67 and lowering the rates for the Police and Fire Divisions.

We also propose that we do not change the assumptions for the Municipals under Plan 87. This group had a smaller number of eligible retirees, which did not support a change in assumptions at this time. The table and graph for this group is provided in the Appendix. The alternative retirement rates are provided in the next section.

D. Results

The following Table III - 1 provides the average retirement age by Division over the past 5 years and in total for all retirees.

Table III - 1			
Year Ending June 30	**Municipal Division**	**Police and Fire Division**	**Total**
2005	59.3	54.4	57.8
2006	59.6	54.4	58.2
2007	59.5	54.7	58.3
2008	59.8	54.3	58.1
2009	59.3	52.2	57.9
All Retirements	**58.0**	**49.1**	**54.5**

This table shows us that for the year ending June 30, 2009, the average retirement age decreased for the Police and Fire Divisions. However, overall the average retirement age was fairly stable.

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ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

The tables and graphs on the following pages compare three items: the number of people eligible to retiree, the number of people expected to retiree based on the current assumptions, and the number of people expected to retire based on the alternative assumptions. The alternative assumptions bring the ratios closer to one, which means the number of people we expect to retire under the alternative assumptions is closer to the actual number of people who retired.

One aspect of these results that will be prevalent throughout the study and exhibited by the graphs is that at later ages the number of exposures to retirement can be relatively small. For example, Municipal 67 at age 67 there were only 28 participants that reached that age, there are 5.6 participants expected to retire from this group but only 3 participants that did retire. However with so few exposures the results are an illustration that the data is not sufficient to be credible and is discounted when considering a change in the assumption for this age.

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ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 2
1967 Municipal Division Active Members
Retirement for Males and Females

Age	Exposed	Total Actual Retirements	Expected Retirements	Alternative Retirements	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
55	1586	673	555.1	634.4	42.4%	35.0%	40.0%	121%	106%
56	911	210	182.2	191.3	23.1%	20.0%	21.0%	115%	110%
57	704	139	84.48	112.6	19.7%	12.0%	16.0%	165%	123%
58	551	108	66.12	88.2	19.6%	12.0%	16.0%	163%	123%
59	432	85	51.84	69.1	19.7%	12.0%	16.0%	164%	123%
60	331	78	39.72	66.2	23.6%	12.0%	20.0%	196%	118%
61	228	50	27.36	45.6	21.9%	12.0%	20.0%	183%	110%
62	166	45	66.4	58.1	27.1%	40.0%	35.0%	68%	77%
63	111	24	22.2	22.2	21.6%	20.0%	20.0%	108%	108%
64	78	18	15.6	15.6	23.1%	20.0%	20.0%	115%	115%
65	59	18	11.8	11.8	30.5%	20.0%	20.0%	153%	153%
66	39	13	7.8	7.8	33.3%	20.0%	20.0%	167%	167%
67	28	3	5.6	5.6	10.7%	20.0%	20.0%	54%	54%
68	33	6	6.6	6.6	18.2%	20.0%	20.0%	91%	91%
69	33	5	6.6	6.6	15.2%	20.0%	20.0%	76%	76%
70+	148	26	148	148.0	17.6%	100.0%	100.0%	18%	18%
Total	5,438	1,501	1,297	1,490	27.6%	23.9%	27.4%	116%	101%
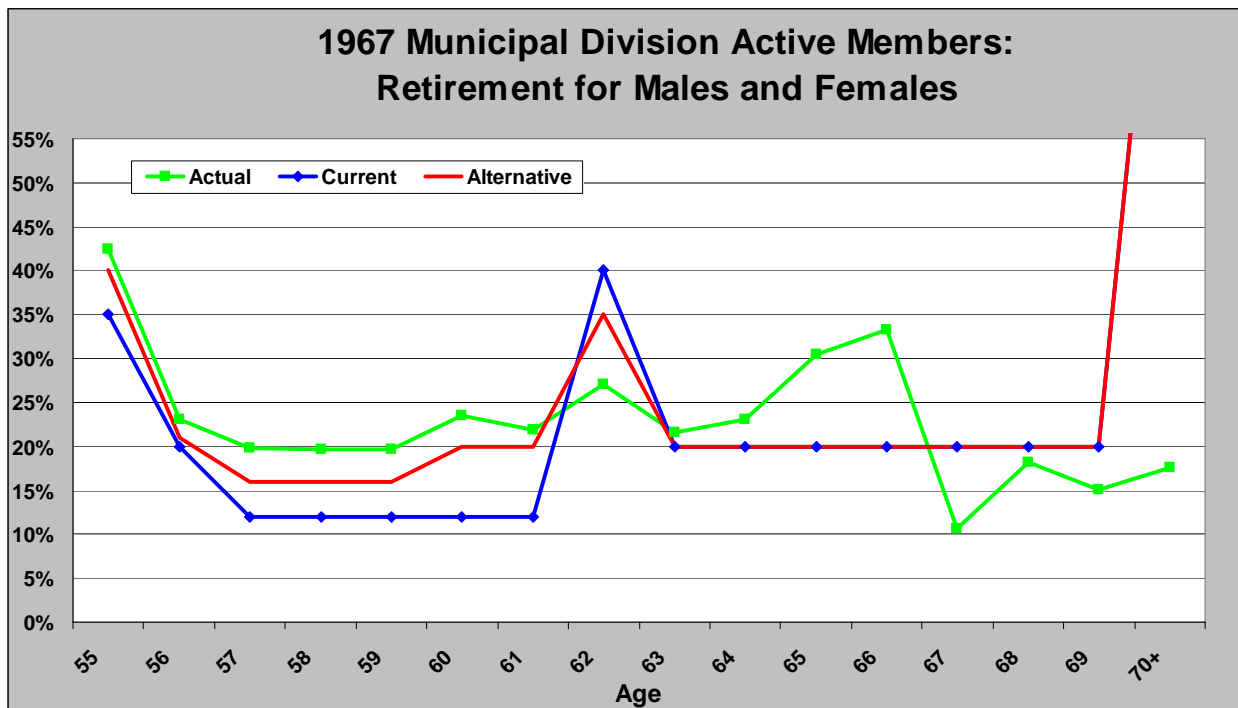
1967 Municipal Division Active Members: Retirement for Males and Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

<table>
<tr><td colspan="11" align="center">Table III - 3
1967 Police and Fire Division Active Members
Retirement for Males and Females</td></tr>
<tr>
<th>Age</th>
<th>Exposed</th>
<th>Total Actual Retirements</th>
<th>Expected Retirements</th>
<th>Alternative Retirements</th>
<th>Actual Rates</th>
<th>Expected Rates</th>
<th>Alternative Rates</th>
<th>Ratio: Actual over Expected</th>
<th>Ratio: Actual over Alternative</th>
</tr>
<tr><td>45</td><td>400</td><td>39</td><td>32</td><td>28.0</td><td>9.8%</td><td>8.0%</td><td>7.0%</td><td>122%</td><td>139%</td></tr>
<tr><td>46</td><td>463</td><td>27</td><td>37.04</td><td>32.4</td><td>5.8%</td><td>8.0%</td><td>7.0%</td><td>73%</td><td>83%</td></tr>
<tr><td>47</td><td>503</td><td>31</td><td>40.24</td><td>35.2</td><td>6.2%</td><td>8.0%</td><td>7.0%</td><td>77%</td><td>88%</td></tr>
<tr><td>48</td><td>521</td><td>26</td><td>41.68</td><td>36.5</td><td>5.0%</td><td>8.0%</td><td>7.0%</td><td>62%</td><td>71%</td></tr>
<tr><td>49</td><td>526</td><td>18</td><td>42.08</td><td>36.8</td><td>3.4%</td><td>8.0%</td><td>7.0%</td><td>43%</td><td>49%</td></tr>
<tr><td>50</td><td>521</td><td>32</td><td>62.52</td><td>36.5</td><td>6.1%</td><td>12.0%</td><td>7.0%</td><td>51%</td><td>88%</td></tr>
<tr><td>51</td><td>543</td><td>25</td><td>65.16</td><td>38.0</td><td>4.6%</td><td>12.0%</td><td>7.0%</td><td>38%</td><td>66%</td></tr>
<tr><td>52</td><td>516</td><td>30</td><td>61.92</td><td>36.1</td><td>5.8%</td><td>12.0%</td><td>7.0%</td><td>48%</td><td>83%</td></tr>
<tr><td>53</td><td>502</td><td>35</td><td>60.24</td><td>35.1</td><td>7.0%</td><td>12.0%</td><td>7.0%</td><td>58%</td><td>100%</td></tr>
<tr><td>54</td><td>482</td><td>41</td><td>81.94</td><td>33.7</td><td>8.5%</td><td>17.0%</td><td>7.0%</td><td>50%</td><td>122%</td></tr>
<tr><td>55</td><td>393</td><td>54</td><td>78.6</td><td>78.6</td><td>13.7%</td><td>20.0%</td><td>20.0%</td><td>69%</td><td>69%</td></tr>
<tr><td>56</td><td>343</td><td>57</td><td>68.6</td><td>68.6</td><td>16.6%</td><td>20.0%</td><td>20.0%</td><td>83%</td><td>83%</td></tr>
<tr><td>57</td><td>261</td><td>52</td><td>52.2</td><td>52.2</td><td>19.9%</td><td>20.0%</td><td>20.0%</td><td>100%</td><td>100%</td></tr>
<tr><td>58</td><td>176</td><td>29</td><td>35.2</td><td>35.2</td><td>16.5%</td><td>20.0%</td><td>20.0%</td><td>82%</td><td>82%</td></tr>
<tr><td>59</td><td>129</td><td>24</td><td>25.8</td><td>25.8</td><td>18.6%</td><td>20.0%</td><td>20.0%</td><td>93%</td><td>93%</td></tr>
<tr><td>60</td><td>72</td><td>20</td><td>14.4</td><td>14.4</td><td>27.8%</td><td>20.0%</td><td>20.0%</td><td>139%</td><td>139%</td></tr>
<tr><td>61</td><td>38</td><td>14</td><td>7.6</td><td>9.5</td><td>36.8%</td><td>20.0%</td><td>25.0%</td><td>184%</td><td>147%</td></tr>
<tr><td>62</td><td>16</td><td>5</td><td>3.2</td><td>4.0</td><td>31.3%</td><td>20.0%</td><td>25.0%</td><td>156%</td><td>125%</td></tr>
<tr><td>63</td><td>11</td><td>4</td><td>2.2</td><td>2.8</td><td>36.4%</td><td>20.0%</td><td>25.0%</td><td>182%</td><td>145%</td></tr>
<tr><td>64</td><td>6</td><td>3</td><td>1.2</td><td>1.5</td><td>50.0%</td><td>20.0%</td><td>25.0%</td><td>250%</td><td>200%</td></tr>
<tr><td>65+</td><td>12</td><td>2</td><td>3.2</td><td>3.0</td><td>16.7%</td><td>26.7%</td><td>25.0%</td><td>63%</td><td>67%</td></tr>
<tr><td>Total</td><td>6,434</td><td>568</td><td>817</td><td>644</td><td>8.8%</td><td>12.7%</td><td>10.0%</td><td>70%</td><td>88%</td></tr>
</table>
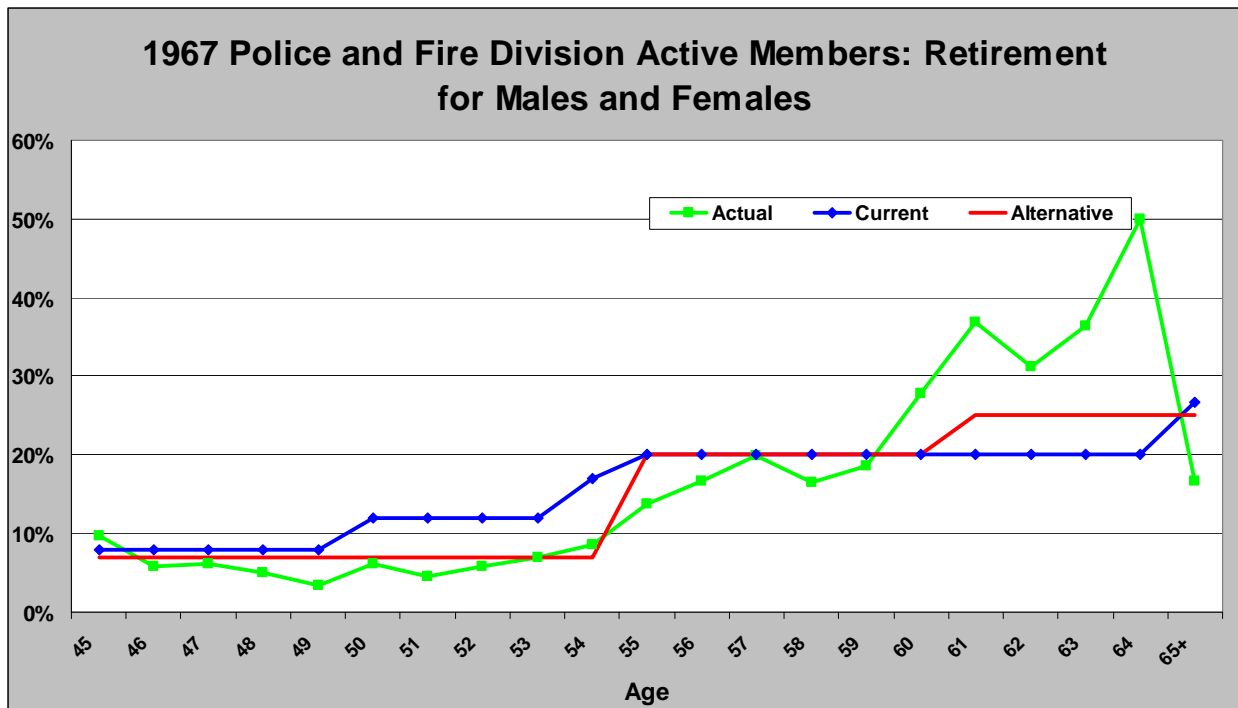
1967 Police and Fire Division Active Members: Retirement for Males and Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 4
1987 Police and Fire Division Active Members
Retirement for Males and Females

Age	Exposed	Total Actual Retirements	Expected Retirements	Alternative Retirements	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
45-49	29	1	5.01	0.5	3.4%	17.3%	11.0%	20%	200%
50	299	19	89.53	59.7	6.4%	29.9%	20.0%	21%	32%
51	246	14	32.67	19.8	5.7%	13.3%	8.1%	43%	71%
52	186	8	27.96	18.1	4.3%	15.0%	9.7%	29%	44%
53	156	6	25.2	16.8	3.8%	16.2%	10.8%	24%	36%
54	109	7	19.83	13.9	6.4%	18.2%	12.7%	35%	50%
55	75	5	15.02	10.9	6.7%	20.0%	14.6%	33%	46%
56	53	5	11.99	9.0	9.4%	22.6%	17.0%	42%	56%
57	32	2	7.8	5.8	6.3%	24.4%	18.1%	26%	34%
58	17	2	3.97	3.0	11.8%	23.4%	17.8%	50%	66%
59	9	0	2.28	1.7	0.0%	25.3%	18.7%	0%	0%
60	8	2	1.98	1.5	25.0%	24.8%	18.5%	101%	135%
61	4	3	1.04	0.8	75.0%	25.9%	19.8%	288%	380%
62	1	0	0.3	0.2	0.0%	29.5%	24.0%	0%	0%
63	3	0	0.83	0.6	0.0%	27.7%	21.0%	0%	0%
64	2	0	0.52	0.4	0.0%	26.0%	21.0%	0%	0%
65+	4	1	3.3	3.1	25.0%	82.5%	76.3%	30%	33%
Total	1,233	75	249	166	6.1%	20.2%	13.4%	30%	45%
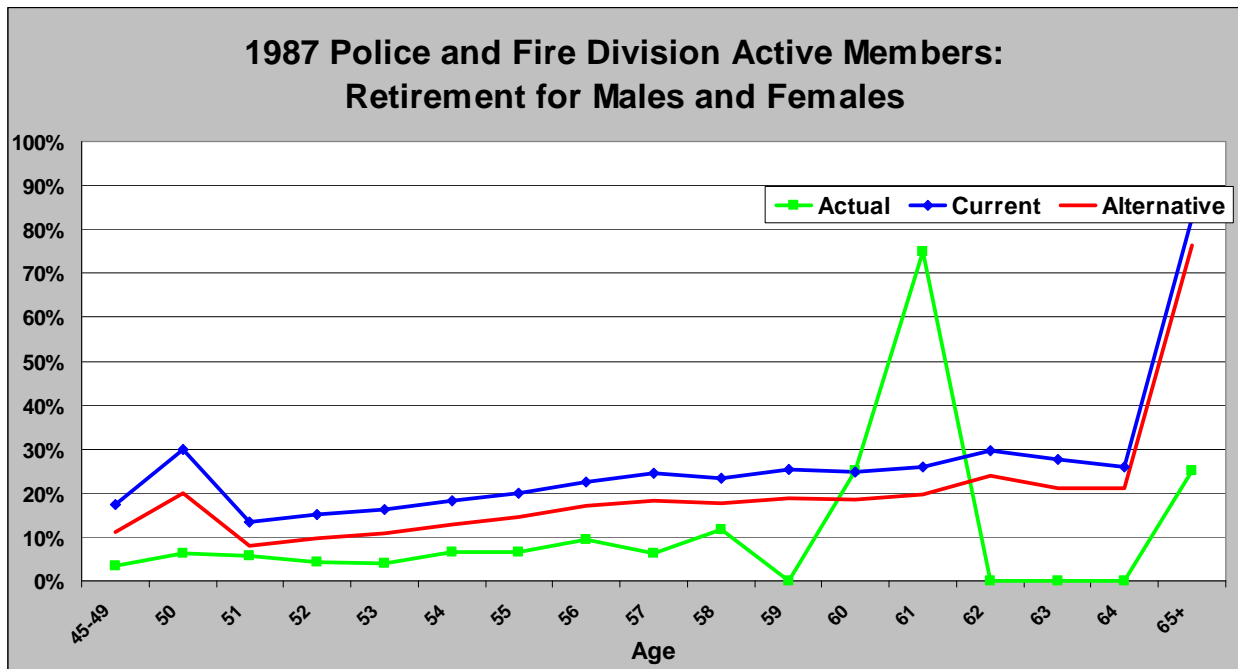
1987 Police and Fire Division Active Members: Retirement for Males and Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

There are no proposed changes for Municipal Division Plan 87 because the graph versus experience is very similar, and the only outlier when analyzing the data by ages is from the 65+ age group. If this data was disregarded, then the ratio would equal 93%.

Age	Exposed	Total Actual Retirements	Expected Retirements	Alternative Retirements	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
55	22	1	3.12	3.1	4.5%	14.2%	14.2%	32%	32%
56	22	2	1.59	1.6	9.1%	7.2%	7.2%	126%	126%
57	21	2	2.46	2.5	9.5%	11.7%	11.7%	81%	81%
58	21	1	1.26	1.3	4.8%	6.0%	6.0%	79%	79%
59	22	3	1.98	2.0	13.6%	9.0%	9.0%	152%	152%
60	332	93	95.8	95.8	28.0%	28.9%	28.9%	97%	97%
61	233	49	42.75	42.7	21.0%	18.3%	18.3%	115%	115%
62	177	49	58.04	58.0	27.7%	32.8%	32.8%	84%	84%
63	133	30	34.26	34.3	22.6%	25.8%	25.8%	88%	88%
64	96	17	23.92	23.9	17.7%	24.9%	24.9%	71%	71%
65+	492	123	263.18	263.2	25.0%	53.5%	53.5%	47%	47%
Total	**1,571**	**370**	**528**	**528**	**23.6%**	**33.6%**	**33.6%**	**70%**	**70%**

Table III - 5
1987 Municipal Division Active Members
Retirement for Males and Females

1987 Municipal Division Active Members:
Retirement for Males and Females
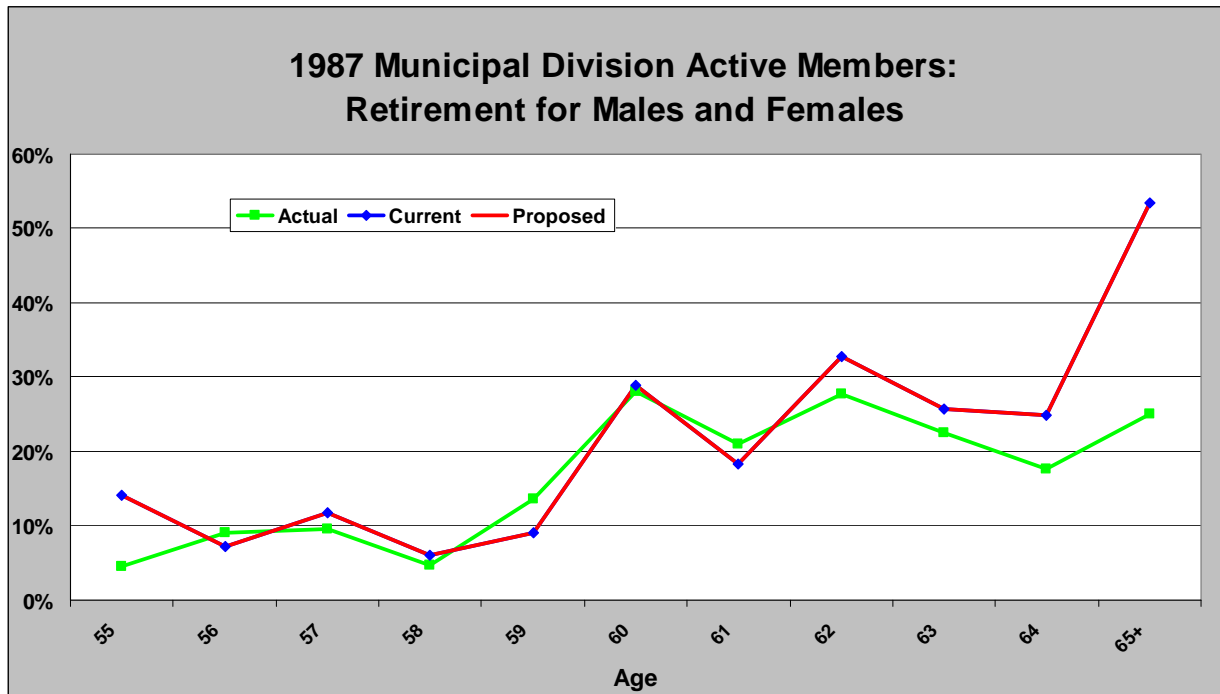
SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

2. Termination from Active Employment

A. Current Assumptions

All Municipal and Police and Fire Employees

Current termination assumptions for all Municipal and Police and Fire employees are age based. Under Plan 67, the rates are set to zero at ages 55 and above for the Municipal Division and ages 45 and above for the Police and Fire Divisions reflecting the point in time when retirement assumptions are expected to take over for turnover. Under Plan 87, the rates are set to zero at ages 71 and above accounting for the service requirement for retirement under this plan for Municipal and Elected, and ages 66 and above for Police and Fire.

B. Experience

All Municipal and Police and Fire Employees

The actual termination experience for Police and Fire Plan 67 reflect a small number of participants. For the Police and Fire Divisions Plan 87, the termination rates were slightly higher than expected. For the Municipal Division, the termination rates were primarily matching the current experience of the plan.

C. Alternative

All Municipal and Police and Fire Employees

Based on the limited credible data for the Police and Fire Division Plan 67, we recommend combining the data from these two groups to have one termination rate assumption for all Uniform members using the current Police and Fire Division Plan 87 termination rates. The Municipal Division's current termination rates appear to be suitable based upon the Plans' experience.

The next section shows the proposed assumptions for both Municipal and Police and Fire employees over the study period.

D. Results

The following tables and graphs compare three items; the number of people eligible to for the termination decrement, the number of people expected to terminate based on the current assumptions, and the number of people expected to terminate based on the alternative assumptions. For Plan 67, the alternative assumptions bring the ratios closer to one, which implies the number of people we expect to terminate under the alternative assumptions is closer to the actual number of people who terminated. Due to the small sampling size for this group, it is difficult to match the assumptions to the actual behavior. The Plan 87 is also provided below for the Police and Fire Divisions. The third table and graph below shows Plan 67 and Plan 87 combined. We are also providing the Municipal Division tables and graphs in support for not changing these assumptions.

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

				Table III - 6					
				1967 Police and Fire Division Active Members					
				Terminations for Males and Females					
Age	**Exposed**	**Total Actual Terminations**	**Expected Terminations**	**Proposed Terminations**	**Actual Rates**	**Expected Rates**	**Proposed Rates**	**Ratio: Actual over Expected**	**Ratio: Actual over Proposed**
<20	0	0	0	0.0	0.0%	0.0%	0.0%	0%	0%
20-24	0	0	0	0.0	0.0%	0.0%	0.0%	0%	0%
25-29	0	0	0	0.0	0.0%	0.0%	0.0%	0%	0%
30-34	0	0	0	0.0	0.0%	0.0%	0.0%	0%	0%
35-39	81	1	1	1.7	1.2%	1.4%	2.1%	91%	58%
40-44	811	21	8	10.8	2.6%	0.9%	1.3%	277%	195%
45-49	0	0	0	0.0	0.0%	0.0%	0.7%	0%	0%
Total	**892**	**22**	**9**	**12.5**	**2.5%**	**1.0%**	**1.4%**	**253%**	**176%**
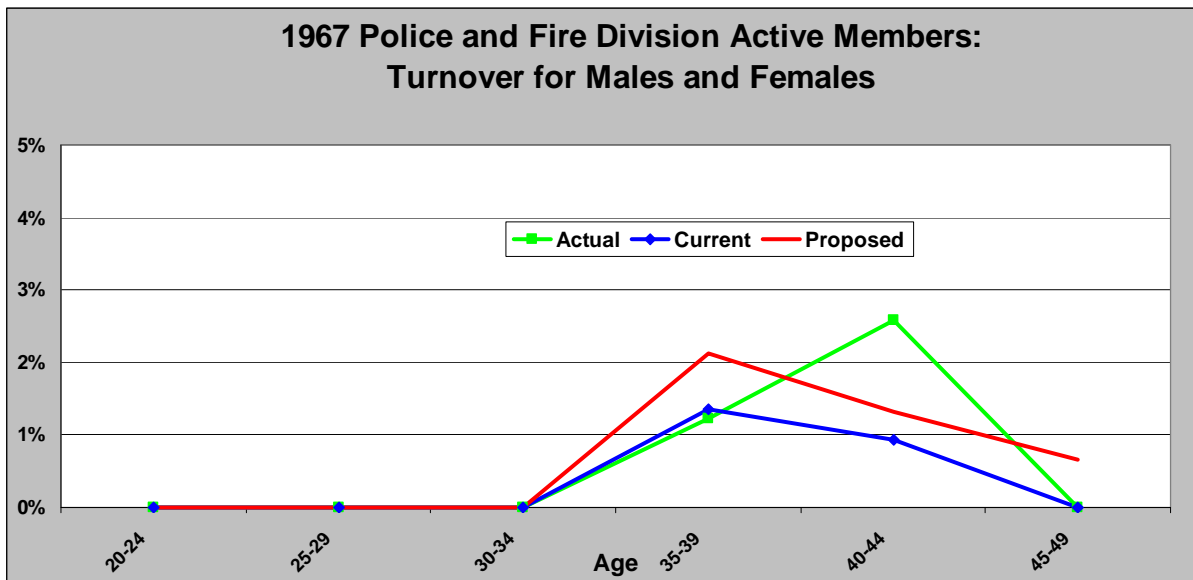
1967 Police and Fire Division Active Members:
Turnover for Males and Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 7
1987 Police and Fire Division Active Members
Terminations for Males and Females

Age	Exposed	Total Actual Terminations	Expected Terminations	Proposed Terminations	Actual Rates	Expected Rates	Proposed Rates	Ratio: Actual over Expected	Ratio: Actual over Proposed
<20	3	0	0	0.1	0.0%	3.0%	3.0%	0%	0%
20-24	1074	34	30	30.4	3.2%	2.8%	2.8%	112%	112%
25-29	3419	108	121	120.7	3.2%	3.5%	3.5%	89%	89%
30-34	5170	164	140	140.2	3.2%	2.7%	2.7%	117%	117%
35-39	6929	168	148	146.9	2.4%	2.1%	2.1%	114%	114%
40-44	5151	106	72	68.4	2.1%	1.4%	1.3%	148%	155%
45-49	2720	46	18	17.8	1.7%	0.7%	0.7%	258%	258%
50-54	208	2	0	0.3	1.0%	0.2%	0.2%	606%	601%
55+	87	6	0	0.1	6.9%	0.2%	0.2%	4615%	4464%
Total	24,761	634	529	525	2.6%	2.1%	2.1%	120%	121%
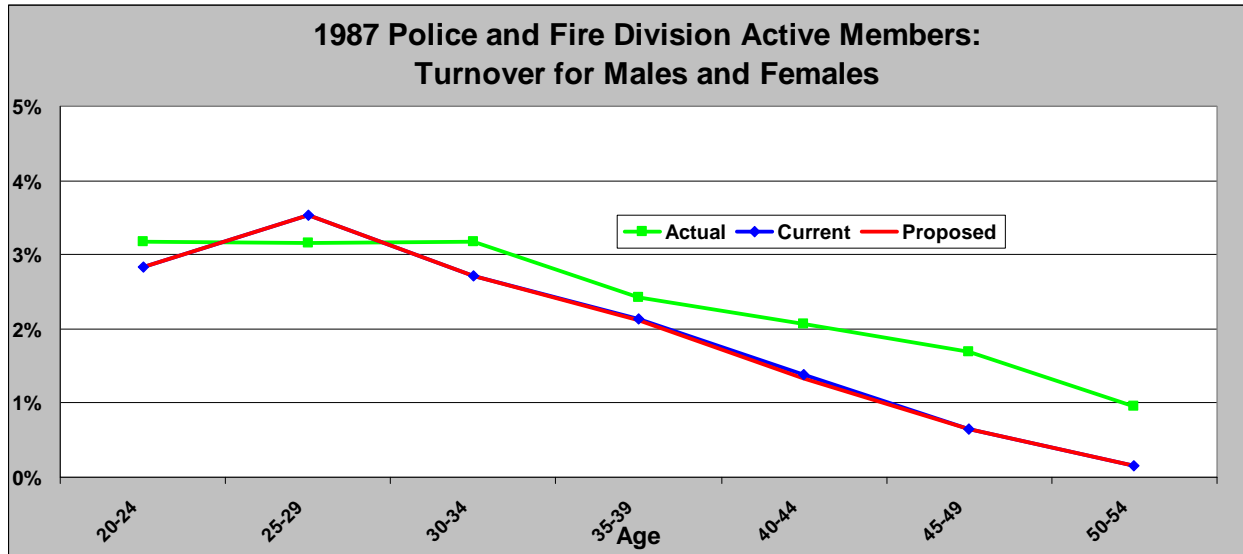
1987 Police and Fire Division Active Members: Turnover for Males and Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 8
Police and Fire Divisions Active Members
Terminations for Males and Females

Age	Exposed	Total Actual Terminations	Expected Terminations	Alternative Terminations	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	3	0	0	0.1	0.0%	3.0%	3.0%	0%	0%
20-24	1,074	34	30	30.4	3.2%	2.8%	2.8%	112%	112%
25-29	3,419	108	121	120.7	3.2%	3.5%	3.5%	89%	89%
30-34	5,170	164	140	140.2	3.2%	2.7%	2.7%	117%	117%
35-39	7,010	169	149	148.6	2.4%	2.1%	2.1%	114%	114%
40-44	5,962	126	79	79.1	2.1%	1.3%	1.3%	159%	159%
45-49	2,720	46	18	17.8	1.7%	0.7%	0.7%	258%	258%
50-54	208	2	0	0.3	1.0%	0.2%	0.2%	606%	601%
55+	87	6	0	0.1	6.9%	0.2%	0.2%	4615%	4464%
<Total>	25,653	655	537	537.4	2.6%	2.1%	2.1%	122%	122%

Police and Fire Divisions Active Members: Turnover for Males and Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

There are no proposed changes for Municipal Divisions termination rates because there is credible data available for both Plan 87 and Plan 67, and the current assumptions reflect the experience of the plan for most ages. The one exception is that Municipal Plan 67 for ages 50-54 has a large number of terminations, however if this one outlier is disregarded, then the ratio is 95%. The following tables and graphs provide the data for these groups.

Age	Exposed	Total Actual Terminations	Expected Terminations	Alternative Terminations	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	-	0	0	0	0.0%	0.0%	0.0%	0%	0%
20-24	-	0	0	0	0.0%	0.0%	0.0%	0%	0%
25-29	-	0	0	0	0.0%	0.0%	0.0%	0%	0%
30-34	51	4	3	3	7.8%	5.7%	5.7%	137%	138%
35-39	772	34	34	34	4.4%	4.4%	4.4%	99%	99%
40-44	3,118	103	106	106	3.3%	3.4%	3.4%	97%	97%
45-49	6,555	176	191	191	2.7%	2.9%	2.9%	92%	92%
50-54	8,555	482	179	179	5.6%	2.1%	2.1%	269%	269%
Total	19,051	799	514	514	4.2%	2.7%	2.7%	155%	156%

Table III - 9
1967 Municipal Division Active Members
Terminations for Males and Females

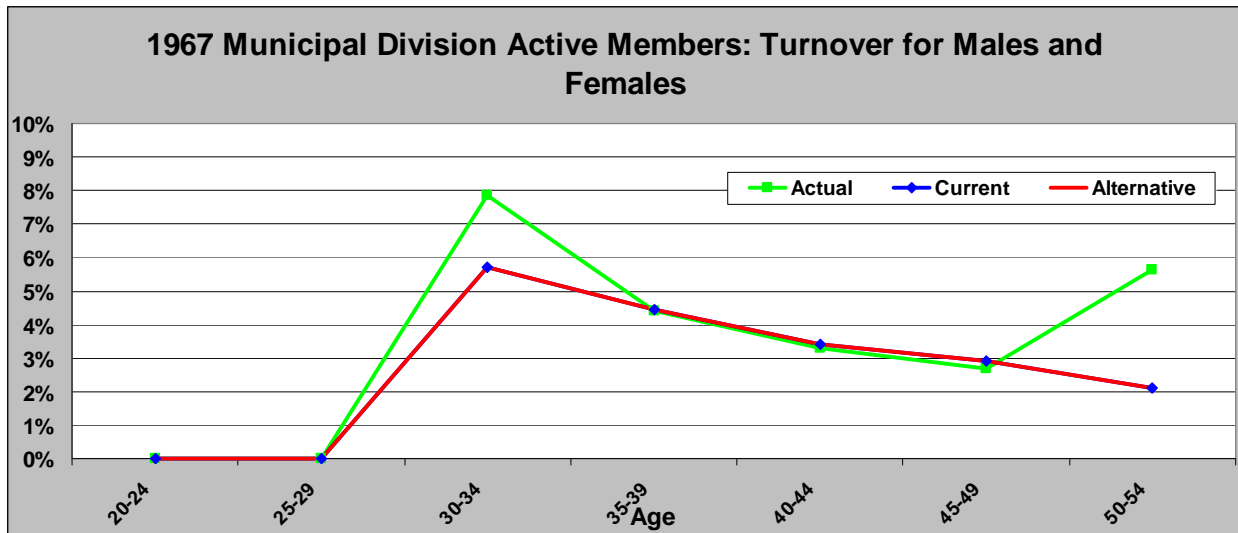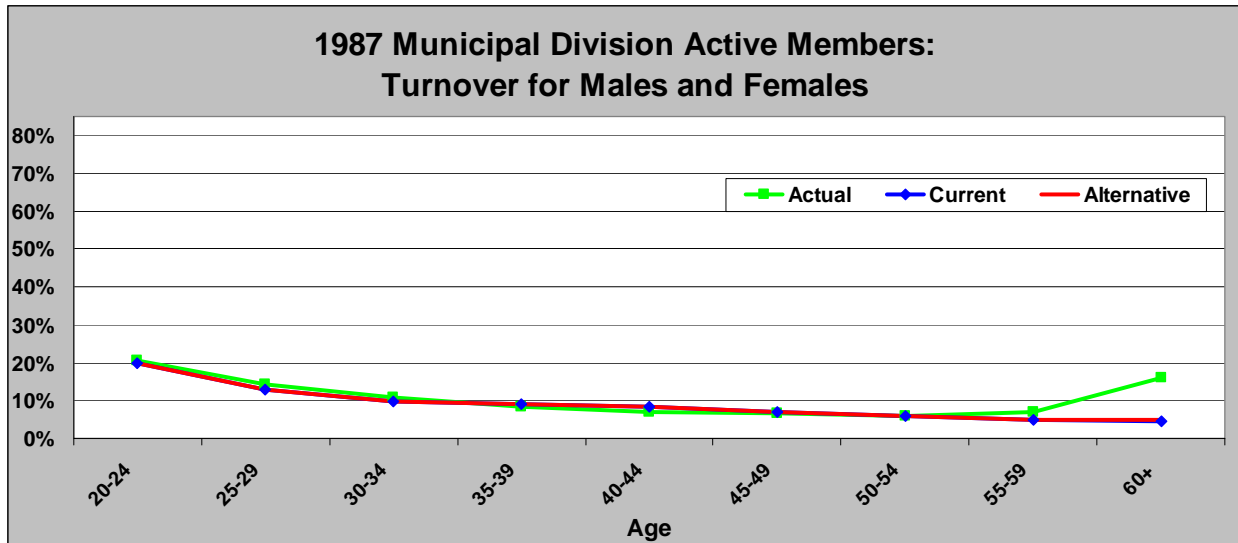1967 Municipal Division Active Members: Turnover for Males and Females

CITY OF PHILADELPHIA MUNICIPAL RETIREMENT SYSTEM
EXPERIENCE STUDY RESULTS AND RECOMMENDATIONS
FOR THE PERIOD COVERING JULY 1, 2004 – JUNE 30, 2009

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Age	Exposed	Total Actual Terminations	Expected Terminations	Alternative Terminations	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	429	348	105	105.0	81.1%	24.5%	24.5%	331%	331%
20-24	2,192	454	437	436.2	20.7%	19.9%	19.9%	104%	104%
25-29	5,911	834	772	772.0	14.1%	13.1%	13.1%	108%	108%
30-34	6,884	751	681	680.5	10.9%	9.9%	9.9%	110%	110%
35-39	8,373	692	754	753.6	8.3%	9.0%	9.0%	92%	92%
40-44	8,392	592	704	704.1	7.1%	8.4%	8.4%	84%	84%
45-49	7,999	532	569	568.6	6.7%	7.1%	7.1%	94%	94%
50-54	6,778	403	402	401.7	5.9%	5.9%	5.9%	100%	100%
55-59	4,961	354	248	238.7	7.1%	5.0%	4.8%	143%	148%
60+	2,221	357	98	106.9	16.1%	4.4%	4.8%	366%	334%
<Total>	54,140	5,317	4,768	4,767.3	9.8%	8.8%	8.8%	112%	112%

Table III - 10
1987 Municipal Division Active Members
Terminations for Males and Females

1987 Municipal Division Active Members: Turnover for Males and Females

3. Disability

A. Current Assumptions

All Municipal and Police and Fire Employees

Current assumptions for all Municipal and Police and Fire employees are based on age. The rates are set to zero to reflect retirement eligibility at age 60 and above for all Municipal employees and at age 55 and above for all Police and Fire employees. This is done because the benefits for retirement and disability are equal.

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

B. Experience

All Municipal and Police and Fire Employees

The study shows that the expected number of participants becoming disabled for the Police and Fire Divisions was lower than the actual, and the expected number of participants becoming disabled for the Municipal Division was relatively close to the actual.

C. Alternative

All Municipal and Police and Fire Employees

We recommend not changing the assumptions for the Municipal Plans and increasing the assumptions for Police and Fire Division Plans.

D. Results

The following tables and graphs compare three things; the number of people eligible to become disabled, the number of people expected to become disabled based on the current assumptions, and the number of people expected to become disabled based on the alternative assumptions. The alternative assumptions bring the ratios closer to one, which implies the number of people we expect to become disabled is closer to the actual number of people who were disabled.

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 11
Police and Fire Division Active Members
Disability for Males and Females

Age	Exposed	Total Actual Disabilities	Expected Disabilities	Alternative Disabilities	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	3	0	0	0.0	0.0%	0.1%	0.1%	0%	0%
20-24	1074	0	0.9	0.9	0.0%	0.1%	0.1%	0%	0%
25-29	3419	3	3.81	3.8	0.1%	0.1%	0.1%	79%	79%
30-34	5173	11	8.44	10.3	0.2%	0.2%	0.2%	130%	106%
35-39	7010	28	14.85	23.1	0.4%	0.2%	0.3%	189%	121%
40-44	5973	25	12.47	19.7	0.4%	0.2%	0.3%	200%	127%
45-49	5148	19	12.81	17.0	0.4%	0.2%	0.3%	148%	112%
50-54	3768	8	10	10.0	0.212%	0.265%	0.265%	80%	80%
Total	31568	94	63.28	84.9	0.3%	0.2%	0.3%	149%	111%
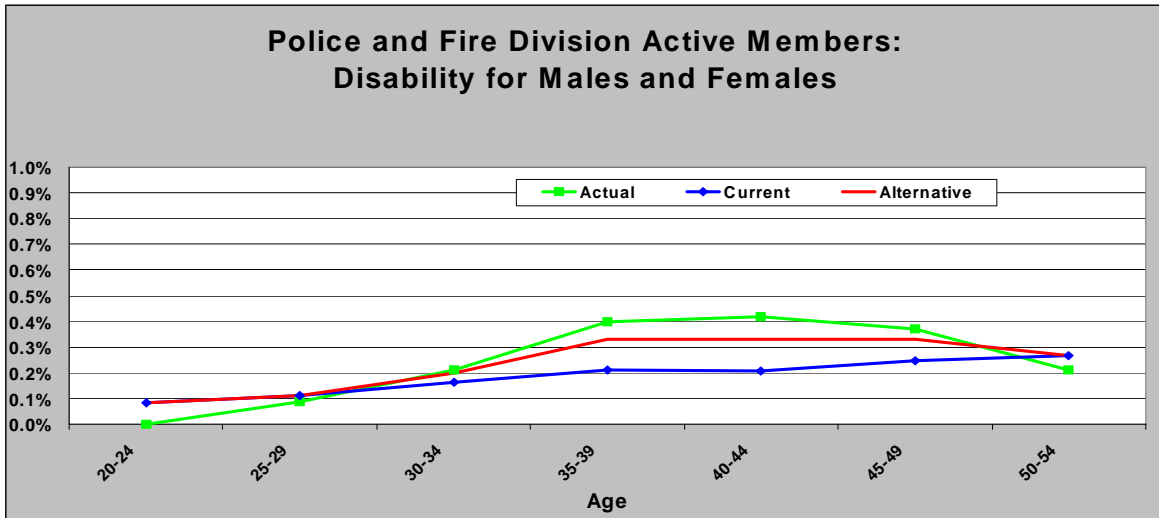
Police and Fire Division Active Members: Disability for Males and Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

There are no proposed changes for Municipal Divisions disability rates because the current assumptions reflect the experience of the plan for most ages. The one exception is for ages 55-59, which has a lower number of actual disability occurrences than expected; however, due to the smaller size of the data it is reasonable to view the basic trend of the disability rates as illustrated by the graphs.

Table III - 12									
Municipal Division Active Members									
Disability for Males									
Age	**Exposed**	**Total Actual Disabilities**	**Expected Disabilities**	**Alternative Disabilities**	**Actual Rates**	**Expected Rates**	**Alternative Rates**	**Ratio: Actual over Expected**	**Ratio: Actual over Alternative**
<20	169	0	0	0.0	0.0%	0.0%	0.0%	0%	0%
20-24	1125	0	0.05	0.1	0.0%	0.0%	0.0%	0%	0%
25-29	2702	0	0.75	0.7	0.0%	0.0%	0.0%	0%	0%
30-34	3151	6	3.02	3.0	0.2%	0.1%	0.1%	199%	199%
35-39	4404	7	9.35	9.3	0.2%	0.2%	0.2%	75%	75%
40-44	5685	18	12.86	12.9	0.3%	0.2%	0.2%	140%	140%
45-49	7770	37	37.14	37.1	0.5%	0.5%	0.5%	100%	100%
50-54	8210	56	62.4	62.4	0.7%	0.8%	0.8%	90%	90%
55-59	4724	15	49.11	49.1	0.3%	1.0%	1.0%	31%	31%
Total	**37940**	**139**	**174.68**	**174.7**	**0.4%**	**0.5%**	**0.5%**	**80%**	**80%**

Municipal Division Active Members: Disability for Males

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

|									
				Table III - 13 Municipal Division Active Members Disability for Females					
Age	Exposed	Total Actual Disabilities	Expected Disabilities	Alternative Disabilities	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	260	0	0.01	0.0	0.0%	0.0%	0.0%	0%	0%
20-24	1067	0	0.05	0.0	0.0%	0.0%	0.0%	0%	0%
25-29	3209	0	0.43	0.4	0.0%	0.0%	0.0%	0%	0%
30-34	3784	0	1.47	1.5	0.0%	0.0%	0.0%	0%	0%
35-39	4741	9	4.05	4.0	0.2%	0.1%	0.1%	222%	222%
40-44	5825	13	10.13	10.1	0.2%	0.2%	0.2%	128%	128%
45-49	6785	25	19.41	19.4	0.4%	0.3%	0.3%	129%	129%
50-54	7159	39	37.36	37.4	0.5%	0.5%	0.5%	104%	104%
55-59	4532	9	37.67	37.7	0.2%	0.8%	0.8%	24%	24%
Total	37362	95	110.58	110.6	0.3%	0.3%	0.3%	86%	86%
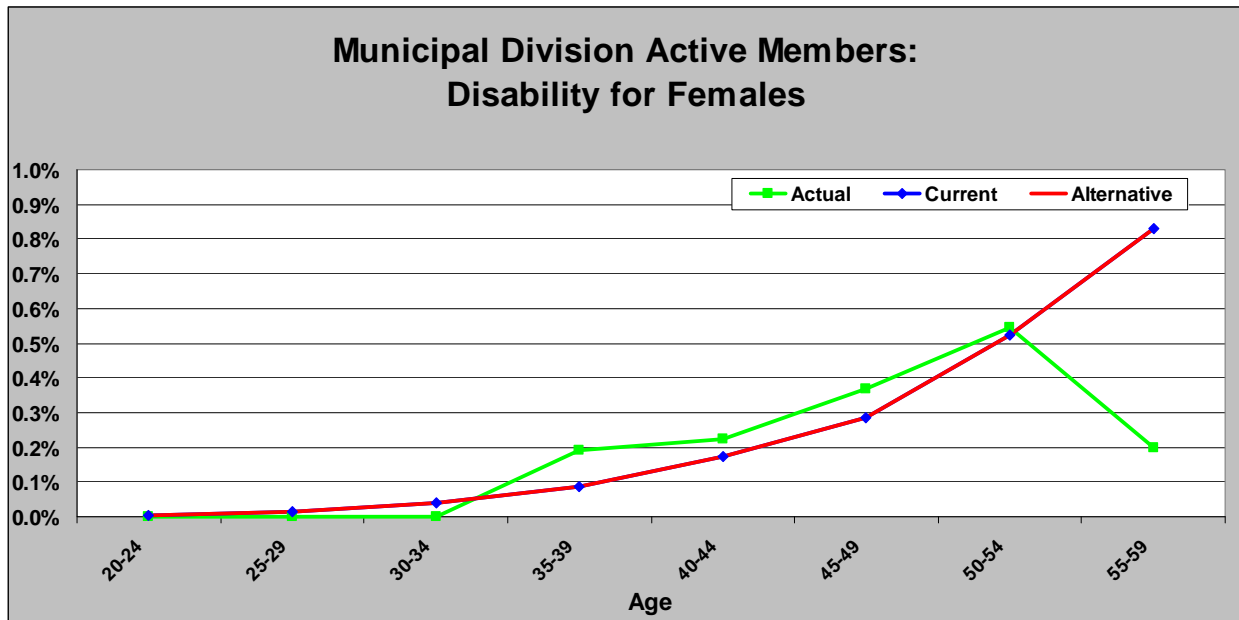
4. Mortality

A. Current Assumptions

All Municipal and Police and Fire Employees Active Lives

Current mortality assumptions for all Municipal employees use the GAM 94 table for male and female.

All Municipal and Police and Fire Retired Healthy Lives

Current mortality assumptions for all healthy retired members use 150% of the GAM 94 table for all males and females, except for Municipal males, 140% of GAM 94 table is used.

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

All Municipal and Police and Fire <u>Retired Disabled</u> Lives

Current mortality assumptions for all disabled Municipal and Police and Fire members use GAM 94 with the application of an adjustment factor based upon age. These factors are listed in Appendix B.

B. <u>Experience</u>

All Municipal and Police and Fire Employees <u>Active</u> Lives

Deaths among active lives are typically small and may not provide meaningful statistics on pre-retirement mortality in a five year period broken out between males and females. However, for the Municipal Division, there were about 40,000 exposures for each gender which provides a large enough sampling to analyze each group separately. The actual mortality rates were less than the expected for both groups.

For the Police and Fire Divisions, the exposures were about 26,000 for males and only 7,000 for females. While the male group has a more sizable sample and is probably sufficient to complete analysis on the mortality rates, the female population is smaller. Nevertheless, both groups had lower mortality rates than expected.

All Municipal and Police and Fire <u>Retired Healthy</u> Lives

Mortality for retirees and beneficiaries gives us a larger group to analyze actual versus expected experience. The tables in the next section, split by male and females, show actual and expected experience among members for retirees and beneficiaries combined. The actual mortality among retirees and beneficiaries (male and female) for Municipal, Police and Fire members is lower than expected by the GAM 94 table.

All Municipal and Police and Fire <u>Retired Disabled</u> Lives

Mortality for disabled lives gives us an even smaller group to analyze actual versus expected experience. However, based upon the data, the actual mortality among disabled lives (male and female) for both Municipal and Police and Fire members was lower than expected.

C. <u>Alternatives</u>

All Municipal and Police and Fire Employees <u>Active</u> Lives

As stated above, our active mortality measurement is too small statistically to create an entirely new mortality table. However, the data is large enough to use a current mortality table and adjust accordingly to the current mortality experience. We recommend changing the active mortality to the Society of Actuaries recently published RP 2000 table. All males would use the standard RP 2000 mortality table, the Municipal females would use this table set back five years, and the Police and Fire females would use this table set forward 3 years The proposed experience for all Municipal and Police and Fire active employees is shown in the next section.

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

All Municipal and Police and Fire <u>Retired Healthy</u> Lives

Because the current mortality assumptions are higher than actual experience, we recommend replacing the GAM 94 mortality table with the more recent RP 2000 table. We recommend that the assumption for all Municipal healthy retirees use the RP 2000 Healthy Combined table, for both male and females.

We recommend the RP 2000 Healthy table set forward one year for Police and Fire Division. We also recommend the RP 2000 Healthy Table set forward two years for all females, and also for Municipal males.

Overall, the change to the RP 2000 tables for both Police and Fire and Municipal employees shows a more reasonable reflection of actual experience. Below are the graphs for Municipal and Police and Fire members (male and female) that show how the proposed RP 2000 tables are more in line with actual experience.

All Municipal and Police and Fire <u>Retired Disabled</u> Lives

As with the retired healthy lives, we recommend replacing the GAM 94 mortality table with the RP 2000 Healthy Combined tables, for both Police and Fire Divisions males and females, with a 30% adjustment factor to increase the mortality rates.

We recommend the RP 2000 Disabled Mortality tables with a negative five percent adjustment factor to decrease the mortality rates for males and females for the Municipal Division.

D. <u>Results</u>

The following tables and graphs compare three things; the number of people exposed to the mortality assumption, the number of people expected to die based on the current assumptions, and the number of people expected to die based on the alternative assumptions. As you can see, the alternative assumptions bring the ratios to at least 100% of the actual experience, which means the number of people we expect to die is not less than the actual number of participants who died during the period studied.
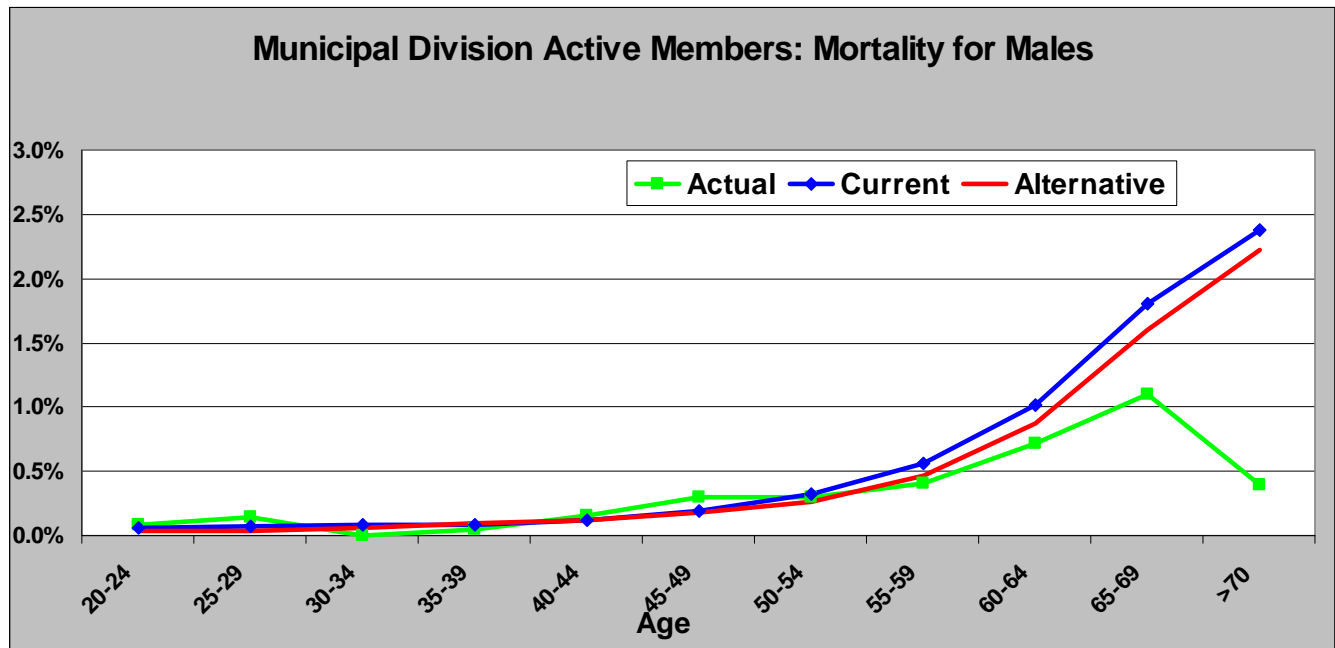
SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Active Mortality Analysis

		Table III - 14 Municipal Division Active Members Mortality for Males							
Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	169	0	0	0	0.0%	0.1%	0.0%	0%	0%
20-24	1,125	1	1	0	0.1%	0.1%	0.0%	154%	241%
25-29	2,702	4	2	1	0.1%	0.1%	0.0%	203%	381%
30-34	3,151	0	3	2	0.0%	0.1%	0.1%	0%	0%
35-39	4,404	2	4	4	0.0%	0.1%	0.1%	50%	50%
40-44	5,685	9	7	7	0.2%	0.1%	0.1%	124%	128%
45-49	7,770	23	15	14	0.3%	0.2%	0.2%	152%	169%
50-54	8,210	25	27	22	0.3%	0.3%	0.3%	94%	114%
55-59	4,724	19	26	21	0.4%	0.6%	0.5%	74%	89%
60-64	1,528	11	15	13	0.7%	1.0%	0.9%	75%	87%
65-69	457	5	8	7	1.1%	1.8%	1.6%	63%	71%
>70	254	1	5	6	0.4%	2.4%	2.2%	22%	18%
Total	40,179	100	111	97	0.2%	0.3%	0.2%	90%	104%

Municipal Division Active Members: Mortality for Males

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

		Table III - 15							
		Municipal Division Active Members							
		Mortality for Females							
Age	**Exposed**	**Total Actual Deaths**	**Expected Deaths**	**Alternative Deaths**	**Actual Rates**	**Expected Rates**	**Alternative Rates**	**Ratio: Actual over Expected**	**Ratio: Actual over Alternative**
<20	260	0	0	0	0.0%	0.0%	0.0%	0%	0%
20-24	1,067	0	0	0	0.0%	0.0%	0.0%	0%	0%
25-29	3,209	0	1	1	0.0%	0.0%	0.0%	0%	0%
30-34	3,784	0	2	1	0.0%	0.0%	0.0%	0%	0%
35-39	4,741	3	3	2	0.1%	0.1%	0.0%	113%	180%
40-44	5,825	2	5	3	0.0%	0.1%	0.1%	41%	61%
45-49	6,785	9	8	6	0.1%	0.1%	0.1%	117%	154%
50-54	7,159	13	12	10	0.2%	0.2%	0.1%	104%	136%
55-59	4,532	12	13	9	0.3%	0.3%	0.2%	92%	134%
60-64	1,780	7	10	6	0.4%	0.6%	0.3%	71%	119%
65-69	516	0	5	3	0.0%	1.1%	0.7%	0%	0%
>70	404	1	4	4	0.2%	1.4%	1.0%	24%	26%
Total	**40,062**	**47**	**63**	**44**	**0.1%**	**0.2%**	**0.1%**	**75%**	**107%**
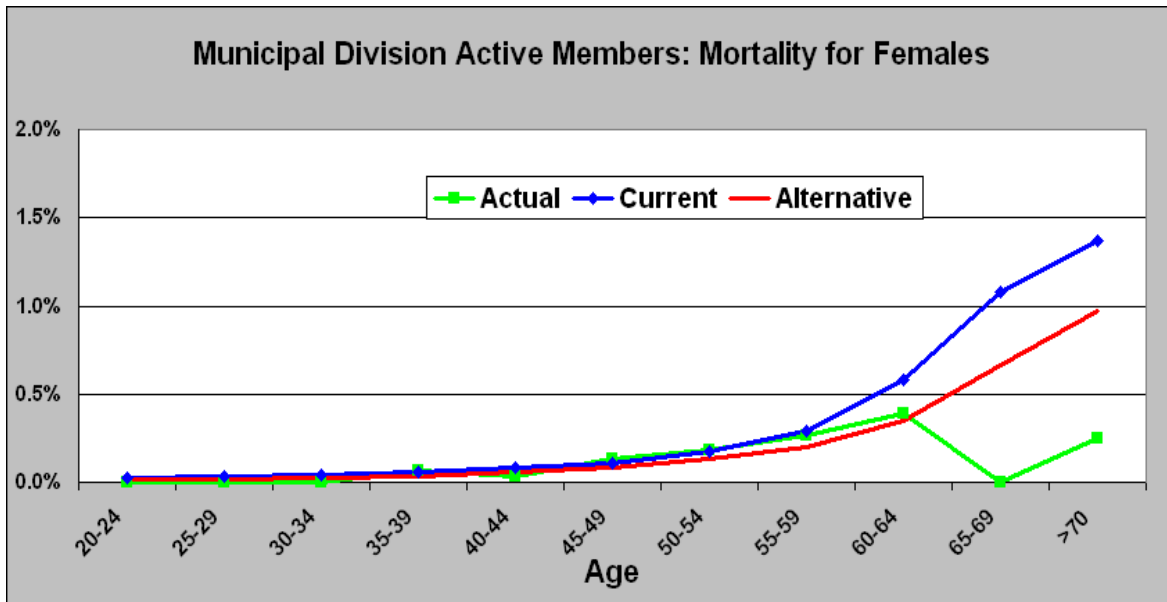
Municipal Division Active Members: Mortality for Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 16
Police and Fire Divisions Active Members
Mortality for Males

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	3	0	0	0	0.0%	0.1%	0.0%	0%	0%
20-24	916	1	1	0	0.1%	0.1%	0.0%	185%	295%
25-29	2,731	1	2	1	0.0%	0.1%	0.0%	50%	94%
30-34	3,996	4	3	2	0.1%	0.1%	0.1%	120%	174%
35-39	5,452	6	5	5	0.1%	0.1%	0.1%	121%	122%
40-44	4,606	2	6	6	0.0%	0.1%	0.1%	35%	36%
45-49	4,130	10	8	7	0.2%	0.2%	0.2%	127%	140%
50-54	3,136	7	10	8	0.2%	0.3%	0.3%	70%	85%
55-59	1,385	7	7	6	0.5%	0.6%	0.5%	96%	114%
60-64	156	1	1	1	0.6%	1.0%	0.9%	71%	83%
65-69	21	0	0	0	0.0%	1.8%	1.6%	0%	0%
>70	1	0	0	0	0.0%	2.4%	2.2%	0%	0%
Total	26,533	39	44	37	0.1%	0.2%	0.1%	90%	104%
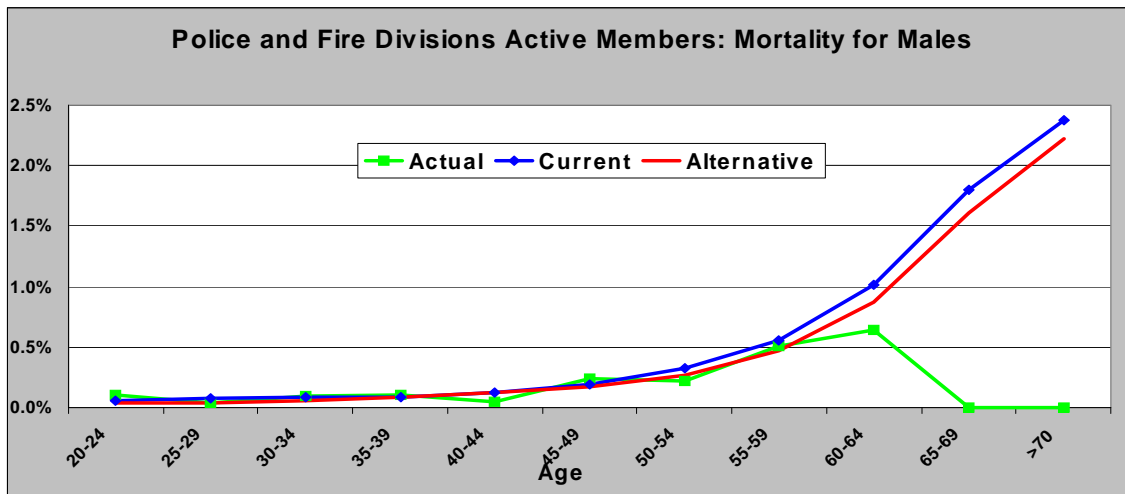
Police and Fire Divisions Active Members: Mortality for Males

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 17
Police and Fire Divisions Active Members
Mortality for Females

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<20	0	0	0	0	0.0%	0.0%	0.0%	0%	0%
20-24	158	0	0	0	0.0%	0.0%	0.0%	0%	0%
25-29	688	0	0	0	0.0%	0.0%	0.0%	0%	0%
30-34	1,177	0	0	1	0.0%	0.0%	0.0%	0%	0%
35-39	1,558	2	1	1	0.1%	0.1%	0.1%	230%	180%
40-44	1,367	2	1	2	0.1%	0.1%	0.1%	179%	130%
45-49	1,018	2	1	2	0.2%	0.1%	0.2%	174%	117%
50-54	632	0	1	2	0.0%	0.2%	0.3%	0%	0%
55-59	170	2	0	1	1.2%	0.3%	0.5%	426%	248%
60-64	19	0	0	0	0.0%	0.6%	1.0%	0%	0%
65-69	0	0	0	0	0.0%	1.1%	1.7%	0%	0%
>70	0	0	0	0	0.0%	1.4%	2.3%	0%	0%
Total	6,787	8	5	8	0.1%	0.1%	0.1%	146%	102%
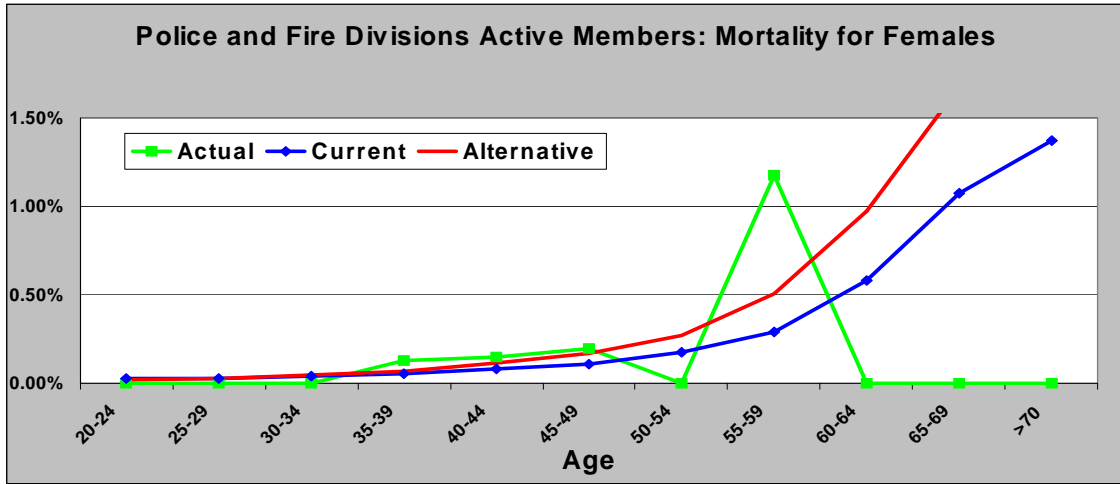
Police and Fire Divisions Active Members: Mortality for Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Non-Active Mortality Analysis – Retired Participants

					Table III - 18				
					Municipal Division Non-active Members				
					Mortality for Retired Males				
Age	**Exposed**	**Total Actual Deaths**	**Expected Deaths**	**Alternative Deaths**	**Actual Rates**	**Expected Rates**	**Alternative Rates**	**Ratio: Actual over Expected**	**Ratio: Actual over Alternative**
<55	1,900	30	4	3	1.6%	0.6%	0.5%	697%	900%
55-59	5,561	61	47	36	1.1%	0.8%	0.6%	65%	84%
60-64	6,674	110	95	75	1.6%	1.4%	1.1%	32%	40%
65-69	5,532	120	140	111	2.2%	2.5%	2.0%	21%	27%
70-74	5,282	217	211	180	4.1%	4.0%	3.4%	14%	17%
75-79	4,917	282	314	287	5.7%	6.3%	5.8%	10%	10%
80-84	3,454	311	358	339	9.0%	10.6%	10.0%	8%	9%
>85	2,579	392	489	459	15.2%	13.6%	13.6%	6%	7%
Total	35,899	1,523	1,658	1,490	4.2%	4.6%	4.2%	92%	102%
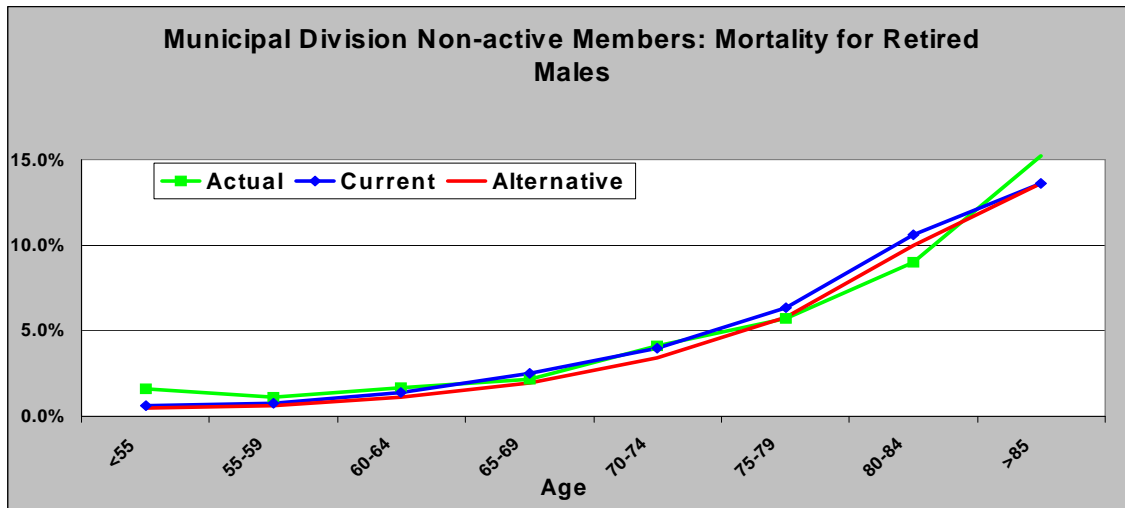
Municipal Division Non-active Members: Mortality for Retired Males

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 19
Municipal Division Non-active Members
Mortality for Retired Females

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<55	2,518	23	4	4	0.9%	0.3%	0.3%	574%	610%
55-59	4,467	48	21	21	1.1%	0.4%	0.4%	109%	108%
60-64	6,067	71	54	53	1.2%	0.9%	0.9%	42%	43%
65-69	6,368	93	102	96	1.5%	1.6%	1.5%	23%	24%
70-74	6,268	177	158	161	2.8%	2.5%	2.5%	15%	14%
75-79	6,181	254	265	259	4.1%	4.3%	4.2%	9%	9%
80-84	5,349	340	395	373	6.4%	7.4%	7.0%	6%	6%
>85	6,134	750	1,026	813	12.2%	10.2%	9.6%	2%	3%
Total	43,352	1,756	2,025	1,780	4.1%	4.7%	4.1%	87%	99%
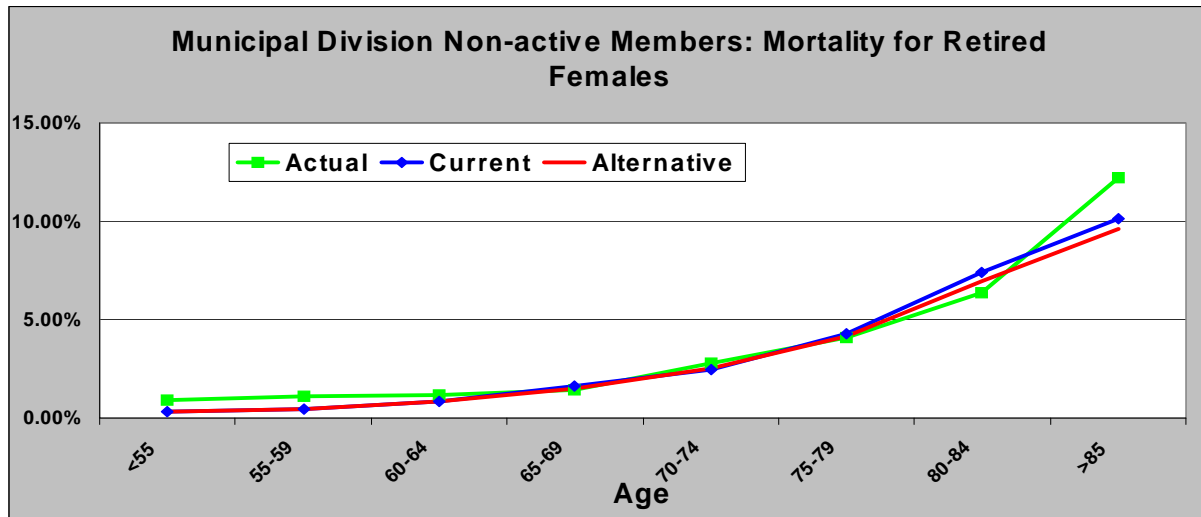
Municipal Division Non-active Members: Mortality for Retired Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 20
Police and Fire Divisions Non-Active Members
Mortality for Retired Males

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<45	433	7	1	0	1.6%	0.2%	0.2%	1148%	1618%
45-49	699	8	2	1	1.1%	0.3%	0.2%	327%	513%
50-54	2,390	11	12	7	0.5%	0.5%	0.3%	57%	94%
55-59	6,314	61	55	35	1.0%	0.8%	0.5%	13%	20%
60-64	7,626	90	117	77	1.2%	1.5%	1.0%	6%	9%
65-69	5,872	90	156	104	1.5%	2.7%	1.8%	4%	7%
70-74	3,648	109	155	110	3.0%	4.3%	3.0%	5%	6%
75-79	2,480	129	168	128	5.2%	6.8%	5.2%	4%	5%
80-84	1,279	99	140	111	7.7%	11.3%	9.0%	5%	6%
>85	909	126	191	151	13.9%	14.6%	12.3%	4%	5%
Total	31,650	730	997	725	2.3%	3.1%	2.3%	73%	101%
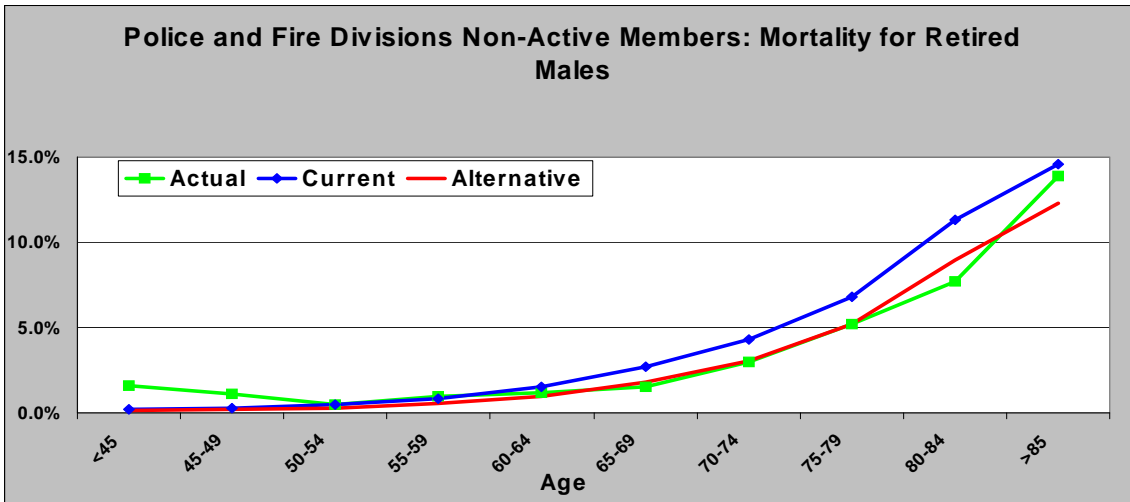
Police and Fire Divisions Non-Active Members: Mortality for Retired Males

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 21
Police and Fire Divisions Non-Active Members
Mortality for Retired Females

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<45	483	7	0	0	1.4%	0.1%	0.1%	1707%	2042%
45-49	409	4	1	1	1.0%	0.2%	0.2%	959%	1051%
50-54	924	7	2	2	0.8%	0.3%	0.2%	286%	297%
55-59	1,350	10	6	6	0.7%	0.4%	0.4%	113%	112%
60-64	1,536	20	14	13	1.3%	0.9%	0.9%	51%	52%
65-69	1,527	28	25	23	1.8%	1.6%	1.5%	29%	30%
70-74	1,590	50	40	41	3.1%	2.5%	2.5%	17%	17%
75-79	1,740	62	75	73	3.6%	4.3%	4.2%	9%	10%
80-84	1,644	96	121	115	5.8%	7.4%	7.0%	6%	6%
>85	2,248	313	387	303	13.9%	10.2%	9.6%	2%	2%
Total	13,451	597	672	578	4.4%	5.0%	4.3%	89%	103%
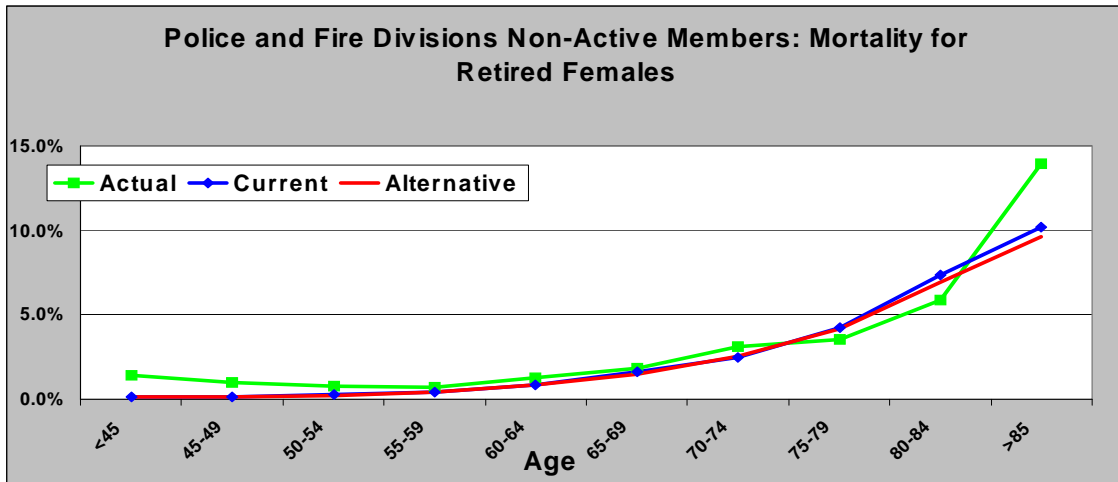
Police and Fire Divisions Non-Active Members: Mortality for Retired Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Non-Active Mortality Analysis – Disabled Participants

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<45	179	2	2	4	1.1%	1.6%	2.1%	94%	52%
45-49	358	9	7	9	2.5%	1.9%	2.4%	28%	23%
50-54	775	16	23	23	2.1%	3.0%	3.0%	9%	9%
55-59	1,149	32	44	42	2.8%	3.8%	3.6%	5%	5%
60-64	957	32	40	41	3.3%	4.0%	4.3%	5%	5%
65-69	743	37	41	38	5.0%	5.6%	5.2%	5%	5%
70-74	564	26	45	37	4.6%	8.0%	6.6%	4%	5%
75-79	466	34	41	41	7.3%	8.8%	8.8%	5%	5%
80-84	325	44	38	37	13.5%	12.7%	11.6%	5%	5%
>85	192	35	36	29	18.2%	13.6%	13.5%	6%	7%
Total	5,708	267	316	301	4.7%	5.5%	5.3%	84%	89%
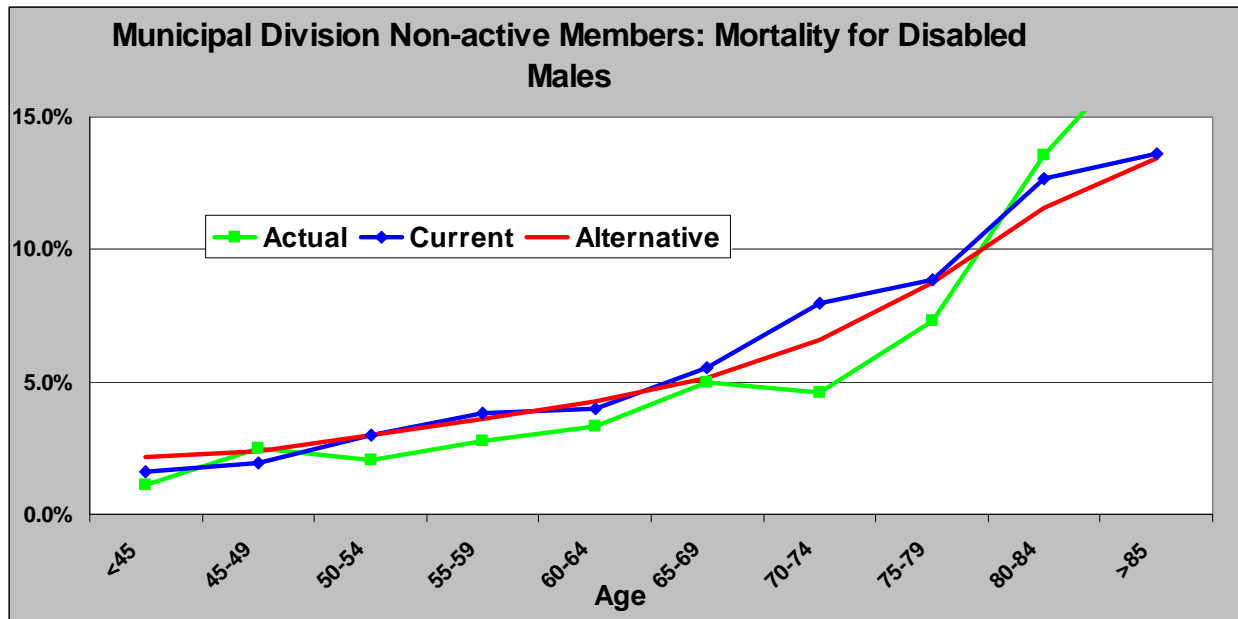
Table III - 22
Municipal Division Non-active Members
Mortality for Disabled Males

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

<table>
<tr><td colspan="11" align="center">Table III - 23
Municipal Division Non-active Members
Mortality for Disabled Females</td></tr>
<tr>
<td>Age</td>
<td>Exposed</td>
<td>Total Actual Deaths</td>
<td>Expected Deaths</td>
<td>Alternative Deaths</td>
<td>Actual Rates</td>
<td>Expected Rates</td>
<td>Alternative Rates</td>
<td>Ratio: Actual over Expected</td>
<td>Ratio: Actual over Alternative</td>
</tr>
<tr><td><45</td><td>93</td><td>5</td><td>1</td><td>1</td><td>5.4%</td><td>1.7%</td><td>0.7%</td><td>400%</td><td>760%</td></tr>
<tr><td>45-49</td><td>166</td><td>3</td><td>3</td><td>1</td><td>1.8%</td><td>2.0%</td><td>0.9%</td><td>153%</td><td>344%</td></tr>
<tr><td>50-54</td><td>329</td><td>8</td><td>8</td><td>4</td><td>2.4%</td><td>2.5%</td><td>1.3%</td><td>62%</td><td>118%</td></tr>
<tr><td>55-59</td><td>431</td><td>11</td><td>12</td><td>8</td><td>2.6%</td><td>2.6%</td><td>1.8%</td><td>43%</td><td>65%</td></tr>
<tr><td>60-64</td><td>284</td><td>8</td><td>11</td><td>6</td><td>2.8%</td><td>3.8%</td><td>2.3%</td><td>47%</td><td>77%</td></tr>
<tr><td>65-69</td><td>325</td><td>6</td><td>14</td><td>10</td><td>1.8%</td><td>4.5%</td><td>3.0%</td><td>35%</td><td>51%</td></tr>
<tr><td>70-74</td><td>240</td><td>13</td><td>9</td><td>10</td><td>5.4%</td><td>3.2%</td><td>4.1%</td><td>57%</td><td>51%</td></tr>
<tr><td>75-79</td><td>163</td><td>7</td><td>9</td><td>9</td><td>4.3%</td><td>5.5%</td><td>5.7%</td><td>55%</td><td>54%</td></tr>
<tr><td>80-84</td><td>161</td><td>14</td><td>13</td><td>13</td><td>8.7%</td><td>8.9%</td><td>7.8%</td><td>38%</td><td>40%</td></tr>
<tr><td>>85</td><td>120</td><td>12</td><td>19</td><td>14</td><td>10.0%</td><td>10.2%</td><td>9.5%</td><td>26%</td><td>36%</td></tr>
<tr><td>Total</td><td>2,312</td><td>87</td><td>99</td><td>76</td><td>3.8%</td><td>4.3%</td><td>3.3%</td><td>88%</td><td>115%</td></tr>
</table>

Municipal Division Non-active Members: Mortality for Disabled Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<45	251	4	1	0	1.6%	0.5%	0.2%	360%	1117%
45-49	295	2	1	1	0.7%	0.4%	0.2%	305%	585%
50-54	636	2	4	2	0.3%	0.6%	0.3%	103%	174%
55-59	1,445	14	15	9	1.0%	1.0%	0.6%	26%	44%
60-64	2,079	38	32	24	1.8%	1.5%	1.1%	12%	17%
65-69	1,470	31	39	30	2.1%	2.7%	2.1%	10%	13%
70-74	980	47	42	35	4.8%	4.3%	3.5%	9%	11%
75-79	872	64	59	53	7.3%	6.8%	6.1%	7%	8%
80-84	538	49	59	54	9.1%	11.3%	10.5%	7%	7%
>85	271	46	55	52	17.0%	14.6%	14.4%	7%	8%
Total	8,837	297	308	261	3.4%	3.5%	3.0%	97%	114%
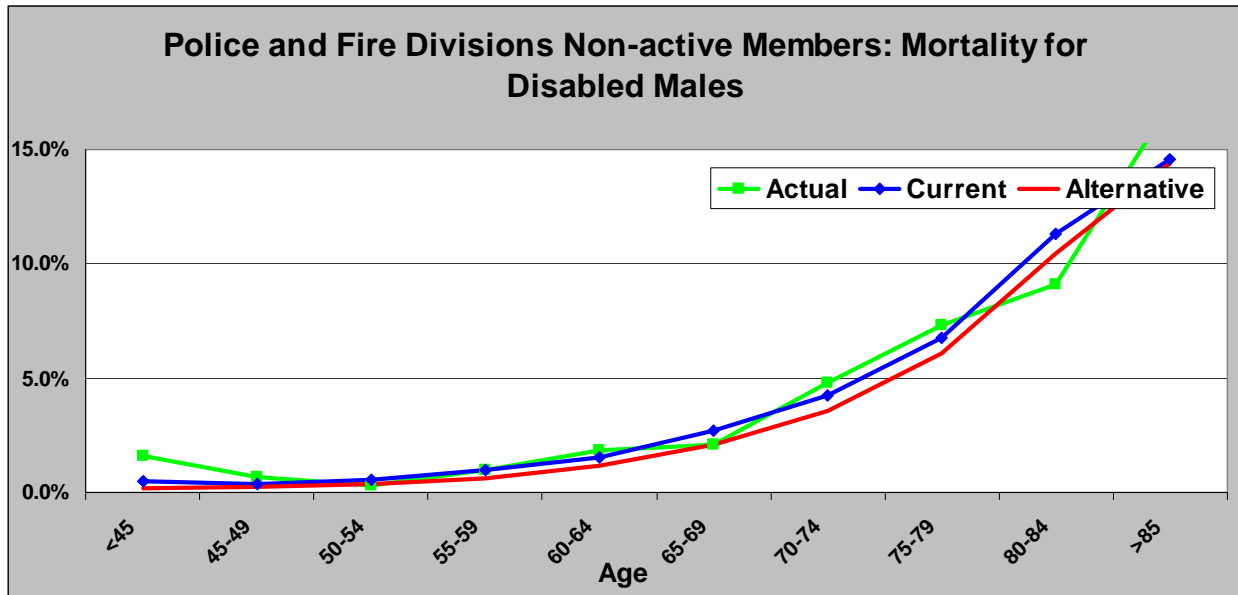
Table III - 24
Police and Fire Divisions Non-active Members
Mortality for Disabled Males

Police and Fire Divisions Non-active Members: Mortality for Disabled Males

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

Table III - 25
Police and Fire Divisions Non-active Members
Mortality for Disabled Females

Age	Exposed	Total Actual Deaths	Expected Deaths	Alternative Deaths	Actual Rates	Expected Rates	Alternative Rates	Ratio: Actual over Expected	Ratio: Actual over Alternative
<45	157	0	0	0	0.0%	0.3%	0.1%	0%	0%
45-49	148	0	0	0	0.0%	0.2%	0.2%	0%	0%
50-54	198	3	1	1	1.5%	0.3%	0.3%	0%	0%
55-59	191	1	1	1	0.5%	0.5%	0.5%	0%	0%
60-64	93	5	1	1	5.4%	0.9%	0.9%	0%	0%
65-69	24	0	0	0	0.0%	1.6%	1.6%	0%	0%
70-74	10	0	0	0	0.0%	2.5%	2.7%	0%	0%
75-79	11	1	0	0	9.1%	4.3%	4.4%	0%	0%
80-84	0	0	0	0	0.0%	0.0%	7.3%	0%	0%
>85	4	0	1	1	0.0%	0.0%	10.1%	0%	0%
Total	836	10	5	4	1.2%	0.6%	0.5%	206%	238%
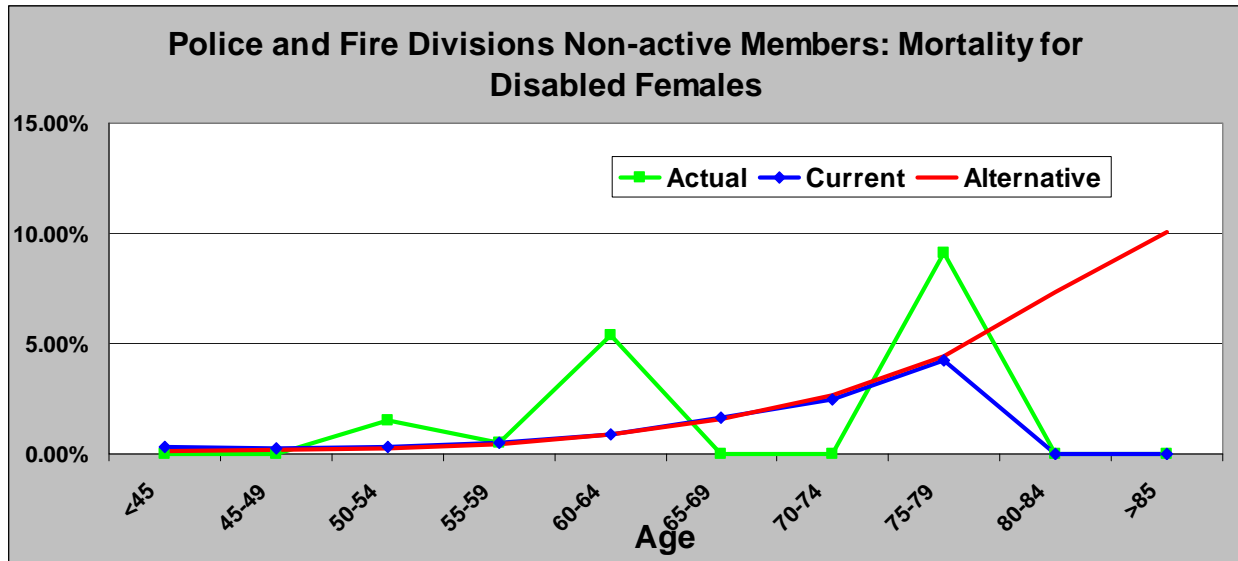
Police and Fire Divisions Non-active Members: Mortality for Disabled Females

SECTION III
ANYALYSIS OF DEMOGRAPHIC ASSUMPTIONS

5. Joint and Survivor Marriage Percentage

A. Current Assumptions

All Municipal and Police and Fire Employees

For pensioners under 50% J&S annuity with return of contributions option, 60% are assumed to be married. This assumption was analyzed for the 2009 valuation based upon data provided by the City as well as an improved understanding that many unmarried retirees elect this payment option,

B. Experience

All Municipal and Police and Fire Employees

The 33.7% of the deceased retirees that elected the 50% Joint and Survivor with return of had spouses upon their death. Assuming that slightly more than 50% of these deaths had spouses that deceased before the retiree, we are assuming that 60% of the retirees with this form of payment are married.

C. Alternative

All Municipal and Police and Fire Employees

There is no suggested alternative assumption.

APPENDIX A
SALARY INCREASE ANALYSIS

Appendix A contains additional tables to support the salary increase assumption with the 5 year analysis.

Municipal Division

	2005 - 2006				2006 - 2007			
Age	Exposed	Prior year Salary	Current year Salary	% Increase	Exposed	Prior year Salary	Current year Salary	% Increase
<20	34	$655,567	$746,731	13.91%	64	$730,769	$969,917	32.73%
20-24	539	$17,081,870	$19,308,912	13.04%	565	$17,932,807	$20,136,030	12.29%
25-29	1,175	$44,412,830	$48,616,267	9.46%	1,284	$50,893,831	$55,142,668	8.35%
30-34	1,754	$72,592,135	$77,875,733	7.28%	1,575	$67,382,843	$71,601,209	6.26%
35-39	2,167	$90,783,713	$96,502,718	6.30%	2,195	$96,378,670	$101,883,265	5.71%
40-44	2,979	$126,043,407	$133,019,077	5.53%	2,901	$127,816,342	$133,778,913	4.66%
45-49	3,623	$161,544,042	$170,161,626	5.33%	3,538	$164,713,087	$170,785,271	3.69%
50-54	3,225	$146,541,041	$153,968,183	5.07%	3,287	$155,259,431	$160,147,364	3.15%
55-59	1,399	$58,710,659	$61,569,296	4.87%	1,595	$69,940,777	$72,234,192	3.28%
60-64	404	$16,022,541	$16,702,732	4.25%	452	$19,153,891	$19,739,093	3.06%
65+	239	$6,851,801	$7,165,165	4.57%	252	$8,136,302	$8,446,973	3.82%
<Total>	17,538	$741,239,606	$785,636,438	5.99%	17,708	$778,338,752	$814,864,895	4.69%

	2007 - 2008				2008 - 2009			
Age	Exposed	Prior year Salary	Current year Salary	% Increase	Exposed	Prior year Salary	Current year Salary	% Increase
<20	44	$757,745	$1,039,172	37.14%	52	$1,344,969	$1,493,359	11.03%
20-24	625	$19,290,730	$22,974,359	19.10%	709	$23,492,115	$25,524,391	8.65%
25-29	1,400	$56,011,445	$62,960,805	12.41%	1,578	$65,630,799	$68,816,208	4.85%
30-34	1,537	$66,546,013	$73,217,401	10.03%	1,682	$78,259,155	$79,838,912	2.02%
35-39	2,164	$98,049,081	$106,300,947	8.42%	2,197	$105,599,089	$107,051,474	1.38%
40-44	2,814	$126,757,458	$137,363,237	8.37%	2,752	$131,995,919	$132,874,159	0.67%
45-49	3,514	$164,911,545	$175,684,151	6.53%	3,483	$170,624,880	$171,126,139	0.29%
50-54	3,405	$164,112,027	$174,556,649	6.36%	3,477	$175,611,226	$175,432,979	-0.10%
55-59	1,713	$75,814,278	$80,841,351	6.63%	1,796	$84,425,446	$84,752,138	0.39%
60-64	531	$22,324,639	$23,446,588	5.03%	642	$27,859,232	$28,000,873	0.51%
65+	249	$8,343,629	$8,956,892	7.35%	269	$9,961,833	$9,850,239	-1.12%
<Total>	17,996	$802,918,590	$867,341,552	8.02%	18,637	$874,804,663	$884,760,871	1.14%

	All years (2005 - 2009)			
Age	Exposed	Prior year Salary	Current year Salary	% Increase
<20	194	$3,489,050	$4,249,179	21.79%
20-24	2,438	$77,797,522	$87,943,692	13.04%
25-29	5,437	$216,948,905	$235,535,948	8.57%
30-34	6,548	$284,780,146	$302,533,255	6.23%
35-39	8,723	$390,810,553	$411,738,404	5.35%
40-44	11,446	$512,613,126	$537,035,386	4.76%
45-49	14,158	$661,793,554	$687,757,187	3.92%
50-54	13,394	$641,523,725	$664,105,175	3.52%
55-59	6,503	$288,891,160	$299,396,977	3.64%
60-64	2,029	$85,360,303	$87,889,286	2.96%
65+	1,009	$33,293,565	$34,419,269	3.38%
<Total>	71,879	$3,197,301,611	$3,352,603,756	4.86%

CHEIRON

APPENDIX A
SALARY INCREASE ANALYSIS

Police and Fire Divisions

	2005 - 2006				2006 - 2007			
Age	Exposed	Prior year Salary	Current year Salary	% Increase	Exposed	Prior year Salary	Current year Salary	% Increase
<20	-	$0	$0	0.00%	6	$230,885	$261,876	13.42%
20-24	265	$12,166,986	$13,386,146	10.02%	290	$13,130,255	$14,267,475	8.66%
25-29	889	$44,069,603	$47,179,080	7.06%	860	$44,030,378	$45,664,679	3.71%
30-34	1,464	$76,831,571	$80,904,794	5.30%	1,346	$73,009,881	$74,296,426	1.76%
35-39	1,574	$85,438,562	$89,489,357	4.74%	1,690	$94,858,015	$95,794,111	0.99%
40-44	1,380	$77,369,406	$80,894,277	4.56%	1,393	$80,815,853	$81,333,320	0.64%
45-49	1,128	$64,509,172	$67,344,620	4.40%	1,183	$70,283,236	$70,686,254	0.57%
50-54	719	$42,863,106	$45,045,040	5.09%	784	$48,538,031	$48,652,583	0.24%
55-59	170	$10,252,142	$10,773,580	5.09%	212	$13,309,959	$13,358,464	0.36%
60-64	12	$855,691	$910,573	6.41%	12	$858,309	$849,431	-1.03%
65+	2	$133,639	$141,604	5.96%	3	$196,486	$196,846	0.18%
<Total>	7,603	$414,489,878	$436,069,069	5.21%	7,779	$439,261,288	$445,361,466	1.39%

	2007 - 2008				2008 - 2009			
Age	Exposed	Prior year Salary	Current year Salary	% Increase	Exposed	PY Salary	CY Salary	Increase %
<20	25	$964,696	$1,132,210	17.36%	13	$525,817	$623,391	18.56%
20-24	469	$19,967,212	$22,658,780	13.48%	488	$22,201,551	$25,178,829	13.41%
25-29	947	$47,452,599	$51,338,593	8.19%	964	$49,797,720	$54,423,433	9.29%
30-34	1,330	$71,123,101	$75,615,843	6.32%	1,285	$71,453,565	$76,464,850	7.01%
35-39	1,760	$98,308,540	$103,688,658	5.47%	1,747	$101,639,586	$107,960,242	6.22%
40-44	1,378	$79,779,982	$83,558,231	4.74%	1,451	$87,280,590	$92,269,110	5.72%
45-49	1,207	$71,844,881	$75,076,731	4.50%	1,180	$73,165,415	$77,146,654	5.44%
50-54	812	$49,538,281	$51,757,492	4.48%	830	$52,784,350	$55,619,940	5.37%
55-59	272	$17,462,186	$18,263,182	4.59%	288	$19,004,532	$20,069,138	5.60%
60-64	20	$1,324,351	$1,389,091	4.89%	21	$1,317,476	$1,386,465	5.24%
65+	3	$196,846	$204,985	4.13%	4	$293,508	$308,335	5.05%
<Total>	8,223	$457,962,674	$484,683,796	5.83%	8,271	$479,464,111	$511,450,388	6.67%

	All years (2005 - 2009)			
Age	Exposed	Prior year Salary	Current year Salary	% Increase
<20	44	$1,721,398	$2,017,477	17.20%
20-24	1,512	$67,466,004	$75,491,230	11.90%
25-29	3,660	$185,350,300	$198,605,785	7.15%
30-34	5,425	$292,418,118	$307,281,913	5.08%
35-39	6,771	$380,244,703	$396,932,368	4.39%
40-44	5,602	$325,245,831	$338,054,938	3.94%
45-49	4,698	$279,802,704	$290,254,259	3.74%
50-54	3,145	$193,723,768	$201,075,055	3.79%
55-59	942	$60,028,819	$62,464,364	4.06%
60-64	65	$4,355,827	$4,535,560	4.13%
65+	12	$820,479	$851,770	3.81%
<Total>	31,876	$1,791,177,951	$1,877,564,719	4.82%

APPENDIX B
CURRENT ACTUARIAL ASSUMPTIONS

Data Assumptions and Practices

In preparing our data, we relied, without audit, on information supplied by the City of Philadelphia Municipal Retirement System staff. This information includes, but is not limited to, plan provisions, employee data, and financial information.   Our methodology for obtaining the data used for the valuation is based upon the following assumptions and practices:

- We exclude raw active records with dates of hire after the valuation date.

- We include terminated vested records in the valuation data, regardless of whether they have enough service for vesting.

- We delete terminated vested and retired records with values of zero in the benefit field.

- If a participant is found in multiple data files (e.g., both the active and retired data files), based on a match of both employee number and Social Security Number, we first attempt to identify the record with the most recent status change, and keep only that record. If it is not apparent which record is the most recent, we keep the record that generates the highest liability in our valuation system.

- If a participant is found multiple times in the same data file, based on a match of both employee number and Social Security Number, we keep the record that generates the highest liability in our valuation system.

- Valuation pay reflects a load of 4% of pay for police (stress pay) and firefighters (premium pay).

- The date of retirement for a terminated vested participant was set to the valuation date, if the given date was earlier.

- If the payment form field for pensioners is missing, we assume that 1967 Plan members receive a 50% J&S annuity with a return of contributions in excess of payments received upon death of the member, and we assume that Plan 87 members receive a life annuity, also with a return of contributions. However, if the pensioner is a beneficiary or survivor, we assume that they receive a life annuity only.

- For pensioners under the form of payment 50% J&S annuity with return of contributions, 60% are assumed to be married based upon data provided by the City. All other forms of payments are explicitly valued.

- Records with missing dates of birth have their data filled in based on the average for their plan.

- We assumed that all changes in participant data from last year to this year were valid unless indicated otherwise by System staff.

- DROP participants are assumed to begin payments immediately

APPENDIX B
CURRENT ACTUARIAL ASSUMPTIONS

- Service-connected disability benefits are increased by 2.9%

- For Municipal Plan 1967 participants pay was assumed to be below the Social Security Taxable Wage Base for purposes of determining the aggregate member contribution amount.

A. Actuarial Assumptions

1. Investment Return Assumption

8.25% compounded annually, net of expenses.

2. Salary Increase Rate

5.0% per year (2.75% due to inflation, 1.5% due to seniority/merit, and 0.75% due to general productivity).

3. Total Annual Payroll Growth

4.0% per year.

4. Administrative Expenses

Annual expected expenses included in this report are $8,000,000, increasing by 4.0% per year.

5. Rates of Termination

| | 1967 Plan | | | Plan 87 | |
| | **Municipal** | | **Uniformed** | **Municipal and Elected Officials** | **Uniformed** |
Age	Male	Female	Unisex	Unisex	Unisex
20	0.100000	0.105319	0.022050	0.260000	0.030000
25	0.086000	0.096000	0.021148	0.150000	0.037800
30	0.072000	0.071562	0.019148	0.105000	0.029900
35	0.045000	0.056170	0.016148	0.090000	0.025200
40	0.035000	0.039379	0.012148	0.090000	0.015400
45	0.030000	0.035597	0.000000	0.075000	0.010000
50	0.020000	0.022400	0.000000	0.065000	0.000000
55	0.000000	0.000000	0.000000	0.050000	0.000000

We assume that a vested employee who terminates will elect a pension deferred to service retirement age as long as their age plus years of service at termination are greater than or equal to 55 (45 for Police and Fire employees in the 1967 Plan). Otherwise we assume they elect a refund of member contributions.

APPENDIX B
CURRENT ACTUARIAL ASSUMPTIONS

6. Rates of Disability

| Age | Municipal and Elected Officials | | Uniformed |
	Male	Female	Unisex
20	0.000025	0.000043	0.000795
25	0.000070	0.000061	0.000870
30	0.000557	0.000263	0.001418
35	0.001514	0.000620	0.001918
40	0.001800	0.001314	0.001934
45	0.003840	0.002359	0.002334
50	0.007600	0.004285	0.002654
55	0.008680	0.007088	0.000000

For municipal and elected members, we assume that 70% of all disabilities are ordinary and 30% are service-connected.   For Police and Fire members, we assume that 50% are ordinary and 50% are service-connected.

7. Rates of Pre-Retirement Mortality (GAM 94)

| Age | All Divisions | |
	Male	Female
20	0.000507	0.000284
25	0.000661	0.000291
30	0.000801	0.000351
35	0.000851	0.000478
40	0.001072	0.000709
45	0.001578	0.000973
50	0.002579	0.001428
55	0.004425	0.002294
60	0.007976	0.004439
65	0.014535	0.008636

For municipal and elected members, we assume that 98.5% of all deaths are ordinary, with 1.5% service-connected. For Police and Fire members, 92% are assumed to be ordinary and 8% service-connected.

APPENDIX B
CURRENT ACTUARIAL ASSUMPTIONS

8. Rates of Post-Retirement Mortality

We assume that mortality for healthy inactive lives will follow 150% of the GAM 94 Mortality Table for males and females as appropriate, except that mortality for male municipal members is assumed to follow 140% of the GAM 94 Mortality Table.

9. Rates of Post-Disability Mortality

The rates of mortality for retired disabled lives are assumed to be the same as those for healthy inactive lives, adjusted by application of the following adjustment factors shown below.

Post-Disablement Mortality Adjustment Factors				
Municipal and Elected Officials			**Uniformed**	
Age	**Male**	**Female**	**Age**	**Unisex**
47 and younger	7.3	11.7	42 and younger	2.8
50	6.8	10.5	45	2.0
55	5.6	7.4	50	1.3
60	3.6	4.9	55	1.2
65	2.4	3.4	60 and up	1.0
70	2.1	1.9		
75	1.7	1.3		
80	1.2	1.2		
83 and up	1.0	1.0		

APPENDIX B
CURRENT ACTUARIAL ASSUMPTIONS

Rates of Retirement

Rates of Service Retirement - 1967 Plan

Age	Municipal	Uniformed
45-49	-	0.08
50-53	-	0.12
54	-	0.17
55	0.35	0.20
56	0.20	0.20
57-61	0.12	0.20
62	0.40	0.20
63-69	0.20	0.20
70 and up	1.00	1.00

Rates of Service Retirement - Plan 87

Age	Municipal and Elected Officials		Uniformed	
	First Year Eligible	Subsequent Years	First Year Eligible	Subsequent Years
40-51	-	-	0.300	0.125
52	0.450	0.060	0.300	0.140
53	0.420	0.060	0.300	0.150
54	0.390	0.060	0.300	0.170
55	0.360	0.060	0.300	0.190
56	0.330	0.060	0.300	0.215
57	0.300	0.060	0.300	0.225
58	0.300	0.060	0.300	0.225
59	0.300	0.080	0.300	0.230
60	0.300	0.100	0.300	0.230
61	0.350	0.150	0.300	0.245
62	0.430	0.300	0.300	0.295
63	0.500	0.187	0.300	0.265
64	0.500	0.199	0.300	0.260
65	0.600	0.309	0.300	1.000
66	0.600	0.232	-	-
67	0.600	0.214	-	-
68	0.600	0.214	-	-
69	0.600	0.238	-	-
70	0.600	1.000	-	-

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APPENDIX B
CURRENT ACTUARIAL ASSUMPTIONS

10. Family Composition Assumptions

70% of active members and 60% of non-active members are assumed to be married for retirees with the 50% J&S with return on contribution form of payment only. Male spouses are assumed to be four years older than female spouses.

APPENDIX B
CURRENT ACTUARIAL ASSUMPTIONS

B. Actuarial Methods

1. Actuarial Funding Method

The Entry Age Normal actuarial funding method was used for active employees, whereby the normal cost is computed as the level annual percentage of pay required to fund the retirement benefits between each member's date of hire and assumed retirement. The actuarial liability is the difference between the present value of future benefits and the present value of future normal cost. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets.

2. Funding Methods

City's Funding Policy:
The initial July 1, 1985 UAL is amortized over 34 years ending June 30, 2019, with payments increasing at 4% per year, the assumed payroll growth. Other changes in the actuarial liability are amortized in level-dollar payments and in accordance with Act 205 provisions for defining the MMO as follows:

- Actuarial gains and losses – 20 years beginning July 1, 2009. Prior to July 1, 2009, gains and losses were amortized over 15 years
- Assumption changes – 20 years
- Plan changes for active members – 20 years
- Plan changes for inactive members – 10 years

MMO:
For the purposes of the MMO under Act 205 reflecting the fresh start amortization schedule, the July 1, 2009 UAL is "fresh started" to be amortized over 30 years ending June 30, 2039. This is a level dollar amortization of the UAL. All future amortization periods will follow the City's Funding Policy as outlined above. Possible contribution deferrals for FY 2010 permitted under Act 44 were not reflected within this report.

3. Asset Valuation Method

The actuarial value of assets (AVA) is determined using an adjusted market value. Under this method, a preliminary AVA is determined as the market value of assets on the valuation date, minus the existing balance of the Pension Adjustment Fund (PAF) rolled forward at the current year's market rate of return, minus a decreasing fraction (4/5, 3/5, 2/5, 1/5) of the investment gain or loss in each of the preceding four years for gains and losses prior to July 1, 2009. Beginning July 1, 2009, investment gains and losses are recognized over a ten year period prospectively, creating the decreasing faction to be (9/10, 8/10, 7/10, etc). The gain or loss for a given year is the difference between the actual investment return (on a market-to-market basis) and the assumed investment return based on the market value of assets at the beginning of the year and actual cash flow. The AVA is adjusted, if necessary, to remain between 80% and 120% of the market value net of the PAF. The final AVA is determined by subtracting the additional transfer amount (if any) to the PAF.

APPENDIX C
PROPOSED ACTUARIAL ASSUMPTIONS

1. Investment Return Assumption

8.15% compounded annually, net of expenses.

2. Salary Increase Rate

Age	Salary Increase Rate
<20	21.00%
20-24	12.50%
25-29	7.75%
30-34	5.50%
35-39	4.75%
40-44	4.50%
45-49	3.75%
50-54	3.75%
55-59	3.75%
60-64	3.75%
65+	3.75%

3. Total Annual Payroll Growth

3.50% per year.

4. Administration Expense

Annual expected expenses included in this report are $8,000,000, increasing by 4.0% per year.

APPENDIX C
PROPOSED ACTUARIAL ASSUMPTIONS

5. Rates of Termination

| | 1967 Plan | | | Plan 87 | |
| | Municipal | | Uniformed | Municipal and Elected Officials | Uniformed |
Age	Male	Female	Unisex	Unisex	Unisex
20	0.100000	0.105319	0.030000	0.260000	0.030000
25	0.086000	0.096000	0.037800	0.150000	0.037800
30	0.072000	0.071562	0.029900	0.105000	0.029900
35	0.045000	0.056170	0.025200	0.090000	0.025200
40	0.035000	0.039379	0.015400	0.090000	0.015400
45	0.030000	0.035597	0.010000	0.075000	0.010000
50	0.020000	0.022400	0.001600	0.065000	0.001600
55	0.000000	0.000000	0.001600	0.050000	0.001600

6. Rates of Disability

| | Municipal and Elected Officials | | Uniformed |
Age	Male	Female	Unisex
20	0.000025	0.000043	0.000795
25	0.000070	0.000061	0.000870
30	0.000557	0.000263	0.001668
35	0.001514	0.000620	0.002918
40	0.001800	0.001314	0.003184
45	0.003840	0.002359	0.003334
50	0.007600	0.004285	0.002654
55	0.008680	0.007088	0.000000

APPENDIX C
PROPOSED ACTUARIAL ASSUMPTIONS

7. Rates of Pre-Retirement Mortality (RP 2000 with 5 year set back for Municipal females, 3 year set forward for Police and Fire females, no adjustment for males)

| Age | Municipal and Elected Officials | | Uniformed | |
	Male	Female	Male	Female
20	0.000345	0.000170	0.000345	0.000197
25	0.000376	0.000191	0.000376	0.000235
30	0.000444	0.000207	0.000444	0.000394
35	0.000773	0.000264	0.000773	0.000598
40	0.001079	0.000475	0.001079	0.000937
45	0.001508	0.000706	0.001508	0.001434
50	0.002138	0.001124	0.002138	0.002207
55	0.003624	0.001676	0.003624	0.003923
60	0.006747	0.002717	0.006747	0.007648
65	0.012737	0.005055	0.012737	0.013445

8. Rates of Post-Retirement Mortality

For Police and Fire, we assume that mortality for healthy inactive lives will follow RP 2000 with a 1 year set forward for males and a 2 year set forward for females. For Municipal and Elected officials, we assume that mortality for healthy inactive lives will follow RP 2000 with a 2 year set forward for both males and females.

9. Rates of Post-Disability Mortality

For Police and Fire, we assume that mortality for disabled retirees follows RP 2000 Healthy mortality with a 30% upwards adjustment. For Municipal and Elected officials, we assume that mortality for disabled retirees follows RP 2000 Disabled mortality with a 5% downward adjustment.

APPENDIX C
PROPOSED ACTUARIAL ASSUMPTIONS

10. Rates of Retirement

	Municipal		Uniformed
Age			
45-49	-		0.07
50-53	-		0.07
54	-		0.07
55	0.40		0.20
56	0.21		0.20
57-59	0.16		0.20
60	0.20		0.20
61	0.20		0.25
62	0.35		0.25
63-69	0.20		0.25
70 and up	1.00		1.00

Rates of Service Retirement - 1967 Plan

APPENDIX C
PROPOSED ACTUARIAL ASSUMPTIONS

	Rates of Service Retirement - Plan 87			
	Municipal and Elected Officials		**Uniformed**	
Age	**First Year Eligible**	**Subsequent Years**	**First Year Eligible**	**Subsequent Years**
40-51	-	-	0.200	0.075
52	0.450	0.060	0.200	0.090
53	0.420	0.060	0.200	0.100
54	0.390	0.060	0.200	0.120
55	0.360	0.060	0.200	0.140
56	0.330	0.060	0.200	0.165
57	0.300	0.060	0.200	0.175
58	0.300	0.060	0.200	0.175
59	0.300	0.080	0.200	0.180
60	0.300	0.100	0.200	0.180
61	0.350	0.150	0.200	0.195
62	0.430	0.300	0.200	0.245
63	0.500	0.187	0.200	0.215
64	0.500	0.199	0.200	0.210
65	0.600	0.309	0.200	1.000
66	0.600	0.232	-	-
67	0.600	0.214	-	-
68	0.600	0.214	-	-
69	0.600	0.238	-	-
70	0.600	1.000	-	-

12. Family Composition

70% of active members and 60% of non-active members are assumed to be married for retirees with the 50% J&S with return on contribution form of payment only. Male spouses are assumed to be four years older than female spouses.