Cavanaugh Macdonald
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City of Chattanooga General Pension Plan

Experience Investigation for the

Four-Year Period Ending

December 31, 2012

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

January 7, 2014

General Pension Board of Trustees
City of Chattanooga
101 East 11th Street
Suite 201, City Hall
Chattanooga, TN 37402

Members of the Board:

We are pleased to submit the results of an investigation of the economic and demographic experience for the City of Chattanooga General Pension Plan (the Plan). The purpose of the investigation was to assess the reasonability of the actuarial assumptions for the Plan. This investigation covers the four-year period from January 1, 2009 to December 31, 2012. As a result of the investigation, it is recommended that revised valuation assumptions be adopted by the Board for future use.

The investigation of the experience of members of the Plan includes all active and retired members as well as beneficiaries of deceased members.

The results of the investigation indicate the assumed rates of separation from active service due to withdrawal, disability, death and retirement, and rates of salary increase and post-retirement mortality do not accurately reflect the actual and anticipated experience of the Plan. As a result of the investigation, new withdrawal, disability, retirement, salary increase and mortality tables have been developed which reflect more closely the actual experience of the membership.

This report shows a comparison of the actual and expected cases of separation from active service, actual and expected number of deaths, and actual and expected salary increases. These tables are shown based on current assumed expected rates and based on new proposed expected rates. A comparison between the rates of separation and mortality presently in use and the recommended revised rates are also shown in this report.

All rates of separation, mortality and salary increase at each age are shown in the attached tables of Appendix C of this report. In the actuary's judgment, the rates recommended are suitable for use until further experience indicates that modifications are desirable.

General Pension Board of Trustees
January 7, 2014
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The experience investigation was performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement Plans. The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

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EJK:jcj

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Section I
Executive Summary

The following summarizes the findings and recommendations with regard to the economic and demographic actuarial valuation assumptions utilized by the City of Chattanooga General Pension Plan. Detailed explanations for the recommendations are found in the sections that follow.

Recommended Economic Assumption Changes

The table below lists the two economic assumptions used in the actuarial valuations with their current and proposed rates.

Item	Current	Proposed
Price Inflation	3.00%	3.00%
Investment Return*	7.75%	7.75%

* current assumption is net of investment and administrative expenses and proposed assumption
  is net of investment expenses only.

Recommended Demographic Assumption Changes

The table below lists the demographic assumptions that we recommend changing based on the experience of the last four years. The chart on the next page lists the present and proposed demographic assumptions at select age and service bands.

Assumption	Proposed
Withdrawal	Change rates to match experience.
Disability Retirement	Change rates to match experience.
Service Retirement	Change rates to match experience.
Mortality	Change rates to match experience and update to more recent published mortality table.
Salary Scale	Lower salary scale by 0.50% at all years of service.

CITY OF CHATTANOOGA GENERAL PENSION PLAN - PRESENT AND PROPOSED DEMOGRAPHIC ACTUARIAL ASSUMPTIONS
EFFECTIVE JANUARY 1, 2014

AGE	RATES OF STANDARD SERVICE RETIREMENT		RATES OF RULE OF 80 SERVICE RETIREMENT		RATES OF DISABILITY RETIREMENT		RATES OF MORTALITY AFTER SERVICE RETIREMENT				RATES OF MORTALITY AFTER DISABILITY RETIREMENT			
	PRESENT	PROPOSED	PRESENT	PROPOSED	PRESENT	PROPOSED	PRESENT		PROPOSED		PRESENT		PROPOSED	
							MALES	FEMALES	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES
30					0.0006	0.00120	0.0607%	0.0342%	0.0619%	0.0286%	3.6200%	2.3700%	1.9418%	0.5106%
35					0.0008	0.00160	0.0860%	0.0476%	0.0901%	0.0399%	2.7800%	2.1400%	1.7118%	0.5106%
40					0.0012	0.00234	0.1238%	0.0665%	0.1114%	0.0584%	2.8200%	2.0900%	1.7642%	0.6753%
45				0.1100	0.0019	0.00285	0.2183%	0.1010%	0.1402%	0.0842%	3.2200%	2.2400%	1.9829%	1.2054%
50			0.1200	0.1100	0.0026	0.00377	0.3909%	0.1647%	0.1978%	0.1419%	3.8300%	2.5700%	2.6281%	1.8322%
55	0.0240	0.0400	0.1200	0.1100	0.0033	0.00413	0.6131%	0.2541%	0.3775%	0.3068%	4.8200%	2.9500%	3.2746%	2.3467%
60	0.0240	0.0600	0.1200	0.1100	0.0040	0.00500	0.9158%	0.4241%	0.7731%	0.5873%	6.0300%	3.3100%	4.0004%	3.1173%
61	0.0600	0.1200	0.3000	0.2800		0.00518	1.0064%	0.4703%	0.8729%	0.6747%	6.2400%	3.3900%	4.1905%	3.3202%
62	0.3000	0.3000				0.00000	1.1133%	0.5210%	1.0129%	0.7604%	6.4300%	3.4700%	4.2891%	3.4533%
63	0.1500	0.2000					1.2391%	0.5769%	1.1300%	0.8563%	6.5700%	3.5500%	4.5123%	3.6866%
64	0.1500	0.2000					1.3868%	0.6386%	1.2562%	0.9664%	6.6800%	3.6200%	4.7566%	3.8397%
65	0.1500	0.2000					1.5592%	0.7064%	1.4277%	1.0730%	6.9225%	3.7269%	5.0230%	4.1020%
70	1.0000	0.2000					2.7530%	1.2385%	2.3233%	1.7778%	8.3676%	4.5940%	7.2202%	5.6874%
75	1.0000	1.0000					4.4597%	2.3992%	4.0720%	2.8612%	10.7674%	5.9506%	10.4994%	7.8688%
80							7.4070%	4.2945%	7.9594%	4.7227%	14.4521%	8.0894%	14.3084%	12.1495%
85							11.4836%	6.9918%	13.9616%	8.7152%	19.1069%	11.5456%	21.6754%	17.3875%
90							16.6307%	11.1750%	22.6791%	14.6213%	25.0003%	16.0006%	30.7507%	22.5671%
95							23.4086%	18.2419%	31.4087%	20.9923%	32.7799%	21.6596%	100.0000%	27.9055%
100							31.9185%	29.5187%	39.2003%	25.4498%	44.0098%	29.0090%	100.0000%	35.1544%

AGE	PRESENT RATES OF WITHDRAWAL			
	YEARS OF SERVICE			
	< 2	2 TO 4	5 TO 9	10 +
20-34	25.0%	15.0%	10.0%	4.0%
35+	13.0%	8.0%	5.0%	1.0%

AGE	PROPOSED RATES OF WITHDRAWAL				
	YEARS OF SERVICE				
	< 2	2 TO 4	5 TO 9	10 TO 14	15 +
20-29	25.0%	15.0%	10.0%	4.0%	1.5%
30-39	17.0%	12.0%	8.0%	4.0%	1.5%
40+	13.0%	8.5%	3.0%	2.5%	1.5%

YEARS OF SERVICE	RATES OF SALARY INCREASE	
	PRESENT	PROPOSED
< 1	5.50%	5.00%
1-5	5.50%	5.00%
6-10	5.00%	4.50%
11-14	4.50%	4.00%
15+	4.50%	4.00%

Recommended Other Assumption Changes

The table below lists the other assumptions that we reviewed in this experience investigation for the Plan.

Assumption	Proposed
Amortization Method	Change from an open amortization basis to a closed amortization basis
Asset Method	No Change
Option Factors	Change for New Post-Retirement Mortality Table
Valuation Cost Method	No Change
Percent Married	No Change
Spouse Age Differential	No Change

Financial Impact

The following table highlights the impact of the proposed changes on the unfunded actuarial accrued liabilities (UAAL), City contribution rate and funding ratio for the Plan. The results are provided using the January 1, 2013 valuation as a basis. The results in the last two columns are based on our proposed demographic assumptions. The impact of our recommendation is provided in the last column but we have also provided another assumption scenario for the Board to consider.

Results

	January 1, 2013 Valuation Demographic Assumptions	Proposed Demographic Assumptions	
Investment Return Assumption	7.75%	7.50%	7.75%
Inflation Assumption	3.00%	3.00%	3.00%
			CMC Recommendation
Actuarial Accrued Liability (AAL)	$287,753,658	$282,516,092	$275,080,518
Actuarial Value of Assets (AVA)	$253,442,165	$253,442,165	$253,442,165
Unfunded Actuarial Accrued Liability (UAAL)	$34,311,493	$29,073,927	$21,638,353
Annual Required Contributions (ARC)			
Normal	8.62%	8.84% *	8.31% *
Accrued Liability	5.10%	4.24%	3.23%
Total	13.72%	13.08%	11.54%
Funding Ratio	88.1%	89.7%	92.1%

* Estimated budgeted administrative expenses of 0.35% are included in the normal cost of the annual required contribution rates.

The following table highlights the incremental changes in the employer Annual Required Contribution (ARC) rates due to the proposed actuarial assumptions. The graph on the next page shows the estimated 10-year projected ARC rates with the different assumption scenarios.

1/1/2013 ARC before Experience Study:	13.72%
Increases:	
Include Administrative Expense Load in Normal Cost Rate:	0.35%
Decreases:	
Change in Mortality Table from 1983 GAM to RP 2000 Table:	(1.24)%
Lower Salary Scale by 0.50% at all service levels:	(0.93)%
Change Withdrawal decrements to match experience:	(0.26)%
Change Retirement decrements to match experience:	(0.06)%
Change Disability decrements to match experience:	(0.04)%
Estimated 1/1/2013 ARC after Experience Study at 7.75%:	11.54%
Change in Investment Rate of Return Assumption:	1.54%
Estimated 1/1/2013 ARC after Experience Study at 7.50%:	13.08%

Projected Total Employer Contribution Rates
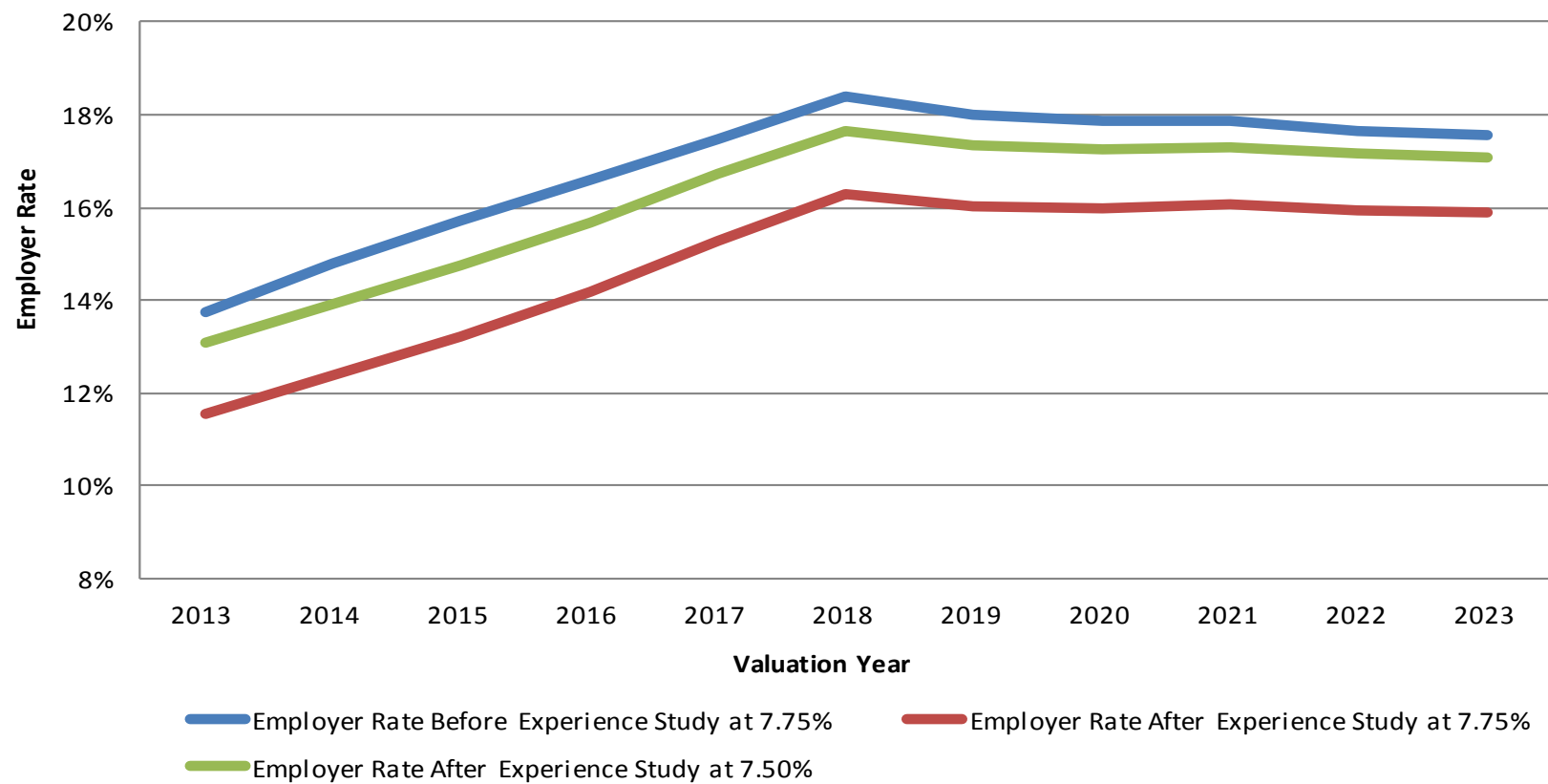
Section II
Economic Assumptions

There are two economic assumptions used in the actuarial valuations performed for the City of Chattanooga General Pension Plan. They are:

- Price Inflation
- Investment Return

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 27, *"Selection of Economic Assumptions for Measuring Pension Obligations"*, which provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans. As noted in ASOP No. 27, because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes based on a mixture of past experience and future expectations. These estimates therefore are best stated as a range utilizing the actuary's professional judgment. In setting the range and the single point within that range to use, the actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

In our opinion, the economic assumptions proposed in this report have been developed in accordance with ASOP No. 27. The following table shows our recommendations followed by detailed discussions of each assumption.

Item	Current	Proposed*
Price Inflation	3.00%	3.00%
Real Rate of Return	<u>4.75</u>	<u>4.75</u>
Investment Return	7.75%	7.75%

* Based on the Plan's current investment consultants capital market assumptions.

Price Inflation

Background: As can be seen from the table on the previous page, the assumed price inflation is used as the basis for the investment return assumption.

It is important that the price inflation assumption be consistently applied throughout the economic assumptions utilized in an actuarial valuation. This is called for in ASOP No. 27 and is also required to meet the parameters for determining pension liabilities and expense under Governmental Accounting Standards Board (GASB) Statements No. 25 and 27.

The current price inflation assumption is 3.00% per year.

Past Experience: The Consumer Price Index, US City Average, All Urban Consumers, CPI (U), has been used as the basis for reviewing historical levels of price inflation. The table below provides historical annualized rates and annual standard deviation of the CPI-U over periods ending December 31st.

Period	Number of Years	Annualized Rate of Inflation	Annual Standard Deviation
1926 – 2012	86	3.06%	4.13%
1952 - 2012	60	3.69	2.92
1962 – 2012	50	4.17	2.94
1972 - 2012	40	4.35	3.17
1982 – 2012	30	2.90	1.23
1992 - 2012	20	2.44	0.91
2002 - 2012	10	2.42	1.15

The graph below shows the annual increases in the CPI (U) over the entire 50 year period.

Annual CPI (U) Increases
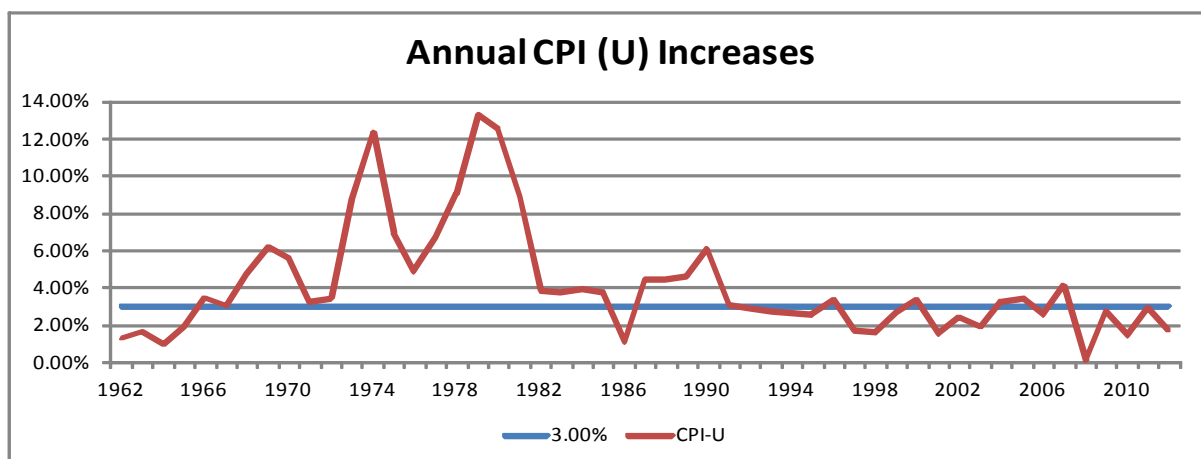
Over shorter historical periods, the average annual rate of increase in the CPI-U has been at or near 2.50%. The period of high inflation from 1973 to 1982 has a significant impact on the averages over periods which include these rates. Further, the average rate of 3.06% over the entire 86 year period is close to the average rate of 2.90% for the prior 30 years (1982 to 2012) but the volatility of the annual rates in the more recent years has been markedly lower as indicated by the significantly lower annual standard deviations. Many experts attribute the lower average annual rates and lower volatility to the increased efforts of the Federal Reserve since the early 1980's to stabilize price inflation. As the Fed's efforts to promote stability in price inflation are expected to continue, we give greater weight to the 30-year historical period in our analysis.

Recommendation: It is difficult to accurately predict inflation. Inflation's short-term volatility is illustrated by comparing its average rate over the last 10, 30 and 50 years. The validity of the Plan's assumption is, therefore, dependent upon the emphasis one assigns to the short and long-terms. Current economic forecasts and the bond market suggest lower inflation over the next ten to thirty years which is a shorter time period than appropriate for our purposes. In the 2012 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75 year cost projections on an intermediate inflation assumption of 2.8% with a range of 1.8% to 3.8%. We concur in general with a range of 2.0% - 4.0%, however we recognize the likely inflation pressures that are built into the economy at the current time and recommend that the Plan keep their price inflation assumption at 3.00%.

Price Inflation Assumption	
Current	3.00%
Reasonable Range	2.00% - 4.00%
Recommended	3.00%

Investment Return

Background: The assumed investment return is one of the most significant assumptions in the annual actuarial valuation process as it is a basis for the rate used to discount the expected benefit payments for all active, inactive and retired members of the Plan. Minor changes in this assumption can have a major impact on valuation results. The investment return assumption should reflect the asset allocation target for the funds set by the Board of Trustees.

The current assumption is 7.75%, consisting of a price inflation assumption of 3.00% and a real rate of return assumption of 4.75%.

Administrative and Investment Expenses: The current investment return is assumed to be net of administrative and investment expenses. Recent Governmental Accounting Standards Board changes in accounting and reporting will require the use of an investment assumption that is net of investment expenses only.   We therefore recommend changing the investment return assumption to be net of investment expenses only, with administrative expenses being recognized by an additional amount added to the normal cost contribution rate. That amount is estimated as 0.35% of payroll.

Past Experience: The assets for the Plan are valued using an asset-smoothing methodology that fully recognizes the expected investment income and also recognizes 10% of each year's investment gain or loss (the difference between actual and expected investment income). The recent experience over the last four years is shown in the table below.

Year Ending 12/31	Actuarial Value	Market Value
2009	11.00%	20.46%
2010	4.80	13.52
2011	4.76	1.23
2012	4.96	12.48
Average	6.35%	11.71%

While the last four years has shown above average returns in the market, historical returns over such a short time period are not credible for the purpose of setting the long-term assumed future rate of return. In determining the reasonable range for this assumption, we first look at long-term historical returns of broad market indices. We focus on the returns of stocks and high-quality bonds because they are two major asset classes of typical allocations and have significant amounts of associated historical data.

Historical Analysis: Utilizing the historical real rates of return of the S&P 500 and the Intermediate Government Bond Index for the last 85 years and as contained in the latest data from Ibbotson, we determine the historical compound average annual rate of return of common asset allocations of large retirement funds (40% stocks/60% bonds to 70% stocks/30% bonds). On this basis the initial reasonable range for expected real rates of return is from 4.55% to 5.77%.   We then add the historical inflation rate of 3.00% to the reasonable range of real returns. This yields an initial reasonable range for the long-term investment rate of return assumption of 7.55% to 8.77% based upon historical returns of the broad market indices under common allocations of stocks and bonds.

We next include in our analysis information concerning the future expectation for this assumption. In assessing the future expectation of investment returns, we prefer to analyze the capital market assumptions of the investment professionals assisting the Board in determining its investment policies and asset allocations. This approach is referred to as the building block method in ASOP No. 27.

Future Expectation Analysis: The current capital market assumptions and target asset allocation as provided by the Board's investment consultant are shown in Appendix B. We further assumed that investment returns approximately follow a lognormal distribution with no correlation between years. The results below provide an expected range of rates of real return over a 50 year time horizon. Looking at one year results produces an expected real return of 5.81% but also has a high standard deviation or measurement of volatility. By expanding the time horizon, the average return does not change much but the volatility declines significantly. The following table provides a summary of results.

Time Span In Years	Mean Real Return	Standard Deviation	Real Returns by Percentile				
			5th	25th	50th	75th	95th
1	5.81%	12.96%	-14.08%	-3.27%	5.03%	14.04%	28.38%
5	5.18	5.75	-3.99	1.23	5.03	8.96	14.89
10	5.10	4.06	-1.43	2.33	5.03	7.80	11.91
20	5.07	2.87	0.42	3.11	5.03	6.98	9.85
30	5.05	2.34	1.25	3.46	5.03	6.62	8.95
40	5.05	2.03	1.74	3.67	5.03	6.40	8.41
50	5.04	1.81	2.09	3.81	5.03	6.26	8.05

Based on this analysis, there is 50% likelihood that the average real rate of return over a 50-year period will be 5.03%. It can also be inferred that for the 10 year time span, 5% of the resulting real rates of return were below -1.43% and 95% were above that. As the time span increases, the results begin to merge. Over a 50 year time span, the results indicate that there is a 25% chance that returns will be below 3.81% and a 25% chance they will be above 6.26%. In other words, there is a 50% chance the real returns will be between 3.81% and 6.26%.

Recommendation: Using the building block approach of ASOP No. 27 and the projection results outlined above, we are recommending a range for the investment return assumption of the 25th to 75th percentile returns over the 50 year time. The following table details the range.

Item	25th Percentile	50th Percentile	75th Percentile
Real Rate of Return	3.81%	5.03%	6.26%
Inflation	3.00	3.00	3.00
Net Investment Return	6.81%	8.03%	9.26%

Review of the *Public Fund Survey* finds that as of the October 2013, 7.90% is the median rate for this assumption. From the table above, a 7.75% average annual return over the 50 year period ranks at 45th percentile. In other words, there is approximately 55% likelihood that the long term average rate of return will be at least 7.75%. Based on the latest survey results, 8.00% remains the most common investment return assumption, however, there has been a clear shift in this assumption to lower assumed rates of return over the past few years.

Median = 7.90%

	>7.0 <7.5	7.50	>7.5 <7.75	7.75	7.90	8.00	>8.0
	8	26	2	17	11	50	5
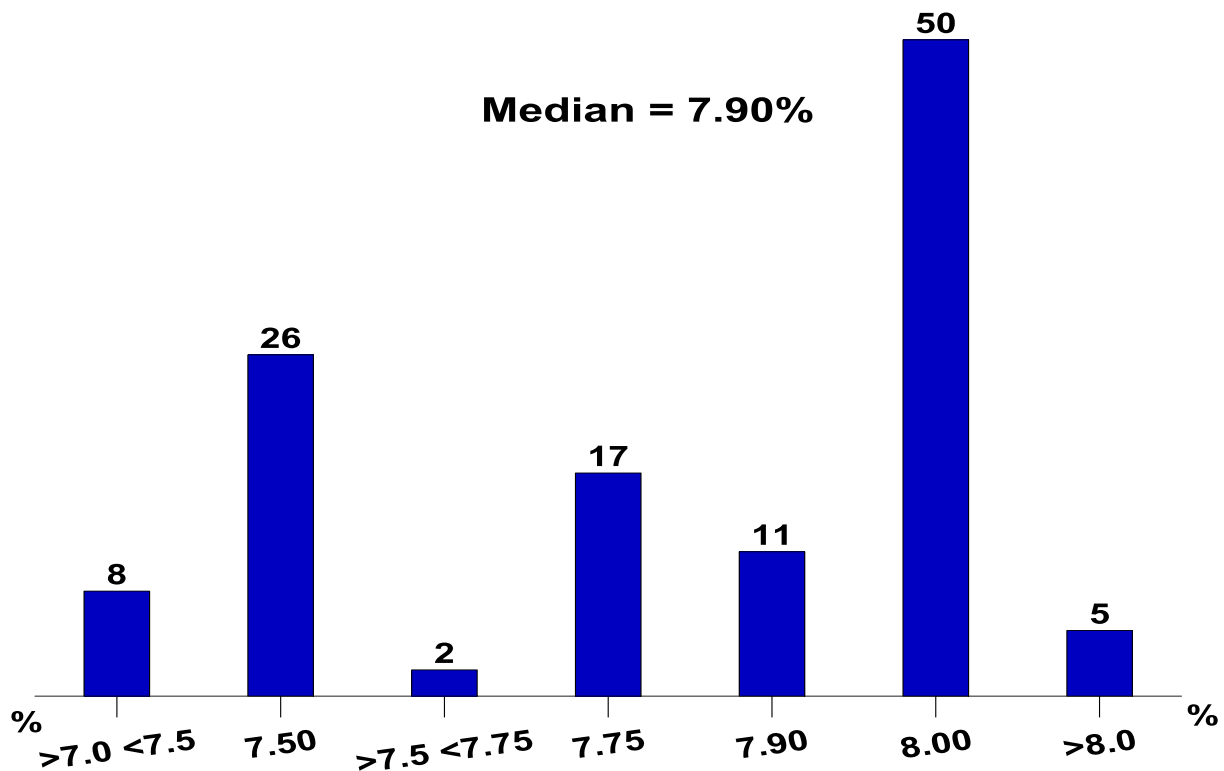
Public Fund Survey
Oct 2013

We are comfortable that the Board can keep the investment return assumption at 7.75% and feel that there is a good probability of meeting that return over a 50-year time horizon. We, therefore, recommend that a long-term net investment return assumption be kept at 7.75%.

Investment Return Assumption		
	Current	**Proposed**
Real Rate of Return*	4.75%	4.75%
Inflation	3.00	3.00
Net Investment Return	7.75%	7.75%

* current assumption is net of investment and administrative expenses and proposed assumption is net of investment expenses only.

Section III
Demographic Assumptions

There are several demographic assumptions used in the actuarial valuations performed for The City of Chattanooga. They are:

- Rates of Withdrawal
- Rates of Disability Retirement
- Rates of Service Retirement
- Rates of Mortality
- Rates of Salary Increase

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 35, *"Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations"*, which provides guidance to actuaries in selecting demographic assumptions for measuring obligations under defined benefit plans. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (January 1, 2009, through December 1, 2012) with what was expected to happen based on the assumptions used in the most recent actuarial valuations.

Detailed tabulations by age, service and/or gender are performed over the entire study period. These tabulations look at all active and retired members during the period as well as separately annotating those who experience a demographic event, also referred to as a decrement. In addition, the tabulation of all members together with the current assumptions permits the calculation of the number of expected decrements during the study period.

If the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements, or rates of decrement, by age, gender, or service does not follow the expected pattern, new assumptions are recommended. Recommended changes usually do not follow the exact actual experience during the observation period. Judgment is required to extrapolate future experience from past trends and current member behavior. In addition non-recurring events, such as early retirement windows, need to be taken into account in determining the weight to give to recent experience.

The remainder of this section presents the results of the demographic study. We have prepared tables that show a comparison of the actual and expected decrements and the overall ratio of actual to expected results (A/E Ratios) under the current assumptions. If a change is being proposed, the revised A/E Ratios are shown as well. Salary adjustments, other than the economic assumption for wage inflation discussed in the previous section, are treated as demographic assumptions.

RATES OF WITHDRAWAL

COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS FROM ACTIVE SERVICE

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with less than 2 years of service		
20-24	10	9	1.111
25-29	21	20	1.050
30-34	17	25	0.680
35-39	11	10	1.100
40-44	12	11	1.091
45-49	14	13	1.077
50-54	13	11	1.182
55+	6	8	0.750
TOTAL	**104**	**107**	**0.972**

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with 2 to 4 years of service		
20-24	3	2	1.500
25-29	15	14	1.071
30-34	16	22	0.727
35-39	19	10	1.900
40-44	11	9	1.222
45-49	10	10	1.000
50-54	18	11	1.636
55+	7	12	0.583
TOTAL	**99**	**90**	**1.100**

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	**Expected**	**Ratio of Actual to Expected**
	Withdrawals with 5 to 9 years of service		
20-24	0	0	0.000
25-29	4	3	1.333
30-34	8	10	0.800
35-39	10	6	1.667
40-44	6	8	0.750
45-49	2	7	0.286
50-54	6	10	0.600
55+	0	0	0.000
TOTAL	**36**	**44**	**0.818**

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	**Expected**	**Ratio of Actual to Expected**
	Withdrawals with 10 to 14 years of service		
20-24	0	0	0.000
25-29	0	0	0.000
30-34	2	2	1.000
35-39	8	1	8.000
40-44	10	2	5.000
45-49	7	2	3.500
50-54	6	2	3.000
55+	0	0	0.000
TOTAL	**33**	**9**	**3.667**

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with 15 or more years of service		
20-24	0	0	0.000
25-29	0	0	0.000
30-34	0	0	0.000
35-39	1	0	0.000
40-44	0	2	0.000
45-49	8	4	2.000
50-54	10	4	2.500
55+	0	0	0.000
TOTAL	19	10	1.900

The rates of withdrawal adopted by the Board are used to determine the expected number of separations from active service which will occur as a result of resignation or dismissal. Overall, the preceding results indicate that the current rates of withdrawal are matching the experience especially for the younger ages. However, for the older age ranges, and the higher service categories, we adjusted the rates of withdrawal to more closely reflect the experience of the Plan.

The following graphs show comparisons of the present, actual and proposed rates of withdrawal for active members.

WITHDRAWAL RATES: < 2 YEARS OF SERVICE

WITHDRAWAL RATES: 2 TO 4 YEARS OF SERVICE

18

WITHDRAWAL RATES: 5 TO 9 YEARS OF SERVICE

WITHDRAWAL RATES: 10 TO 14 YEARS OF SERVICE

19

WITHDRAWAL RATES: 15+ YEARS OF SERVICE
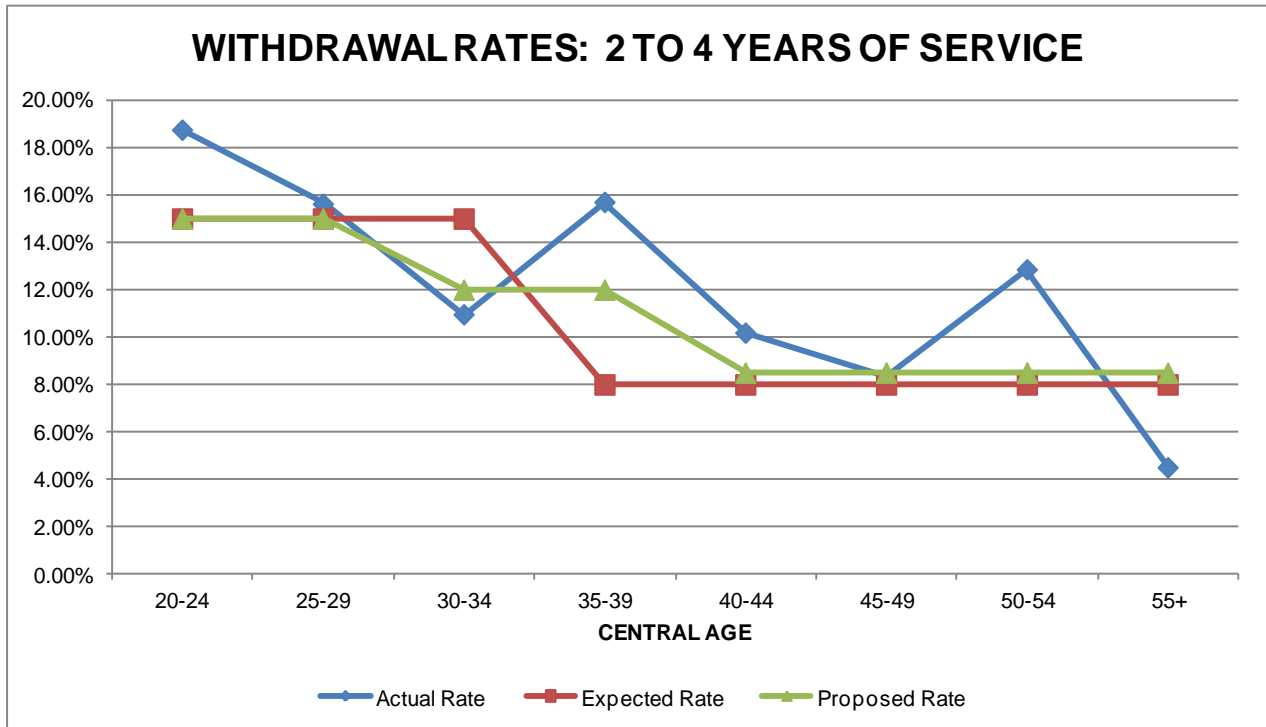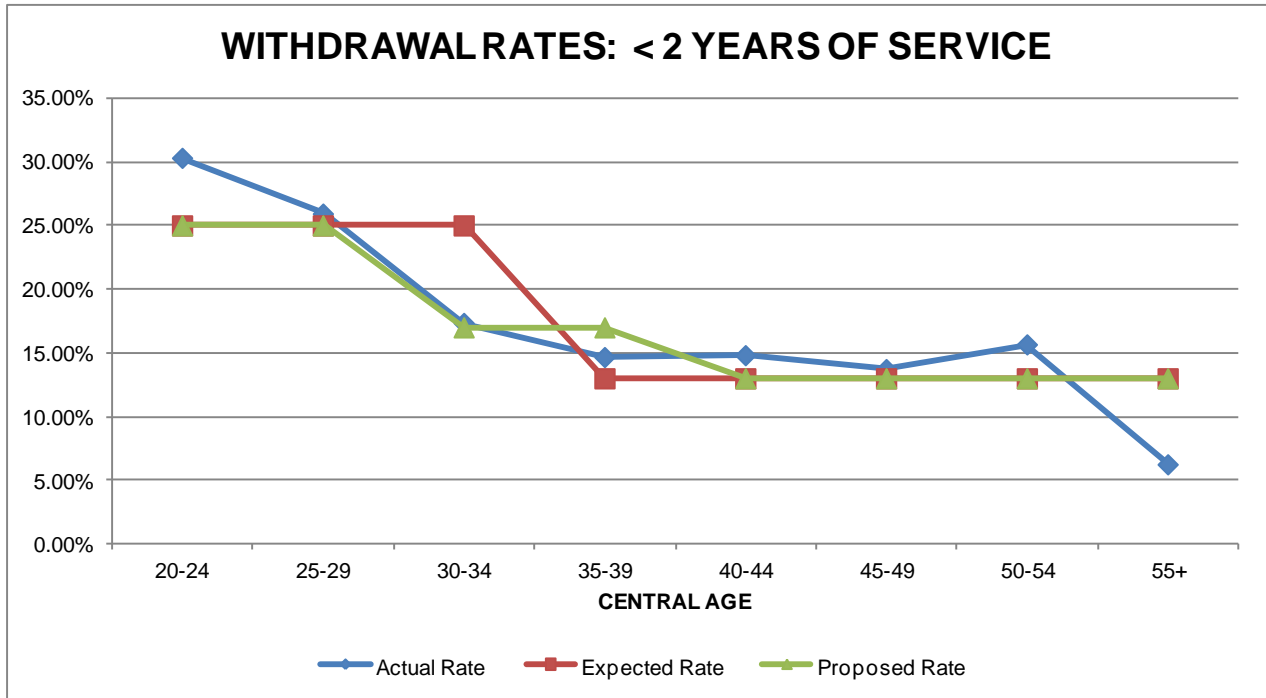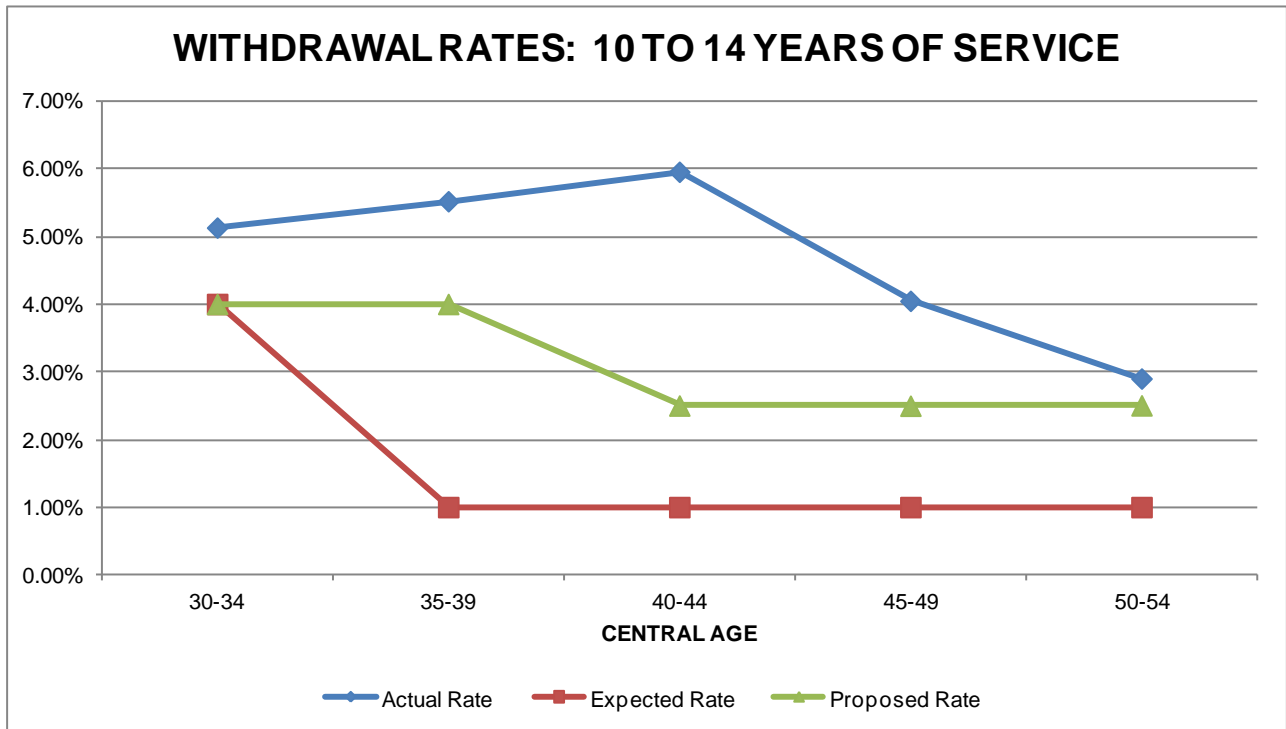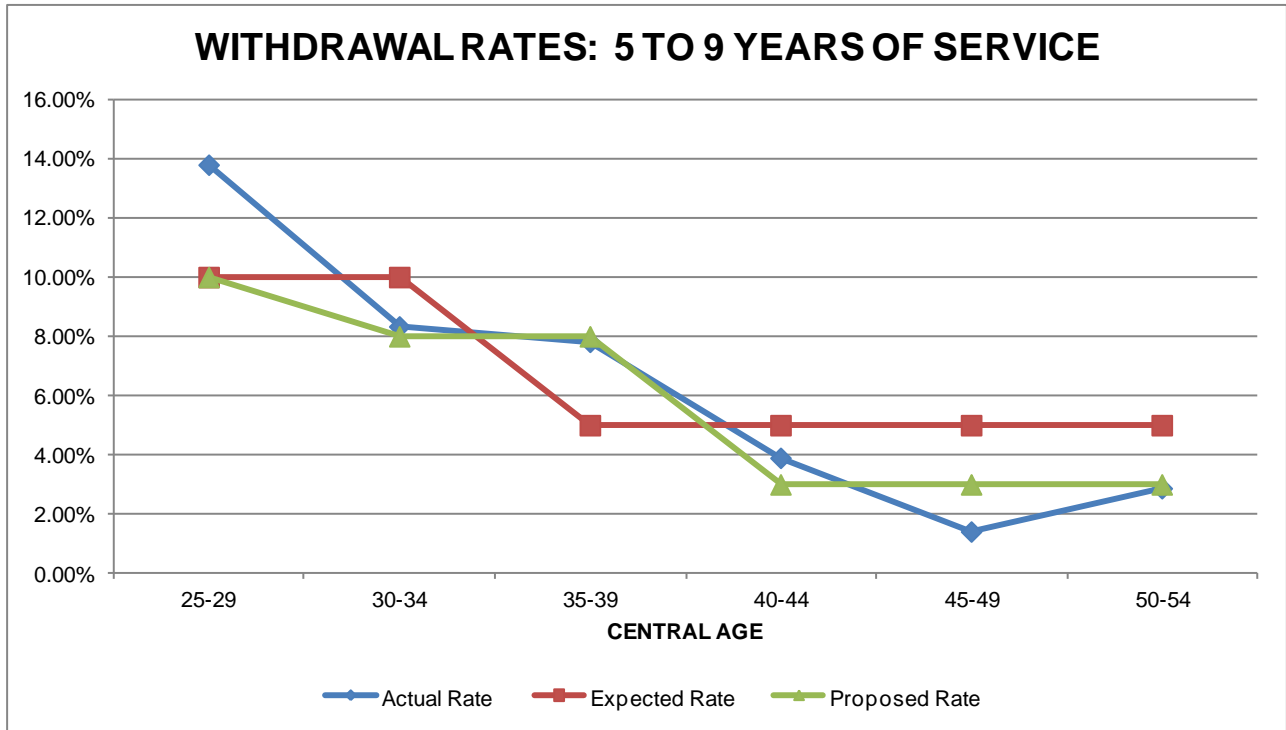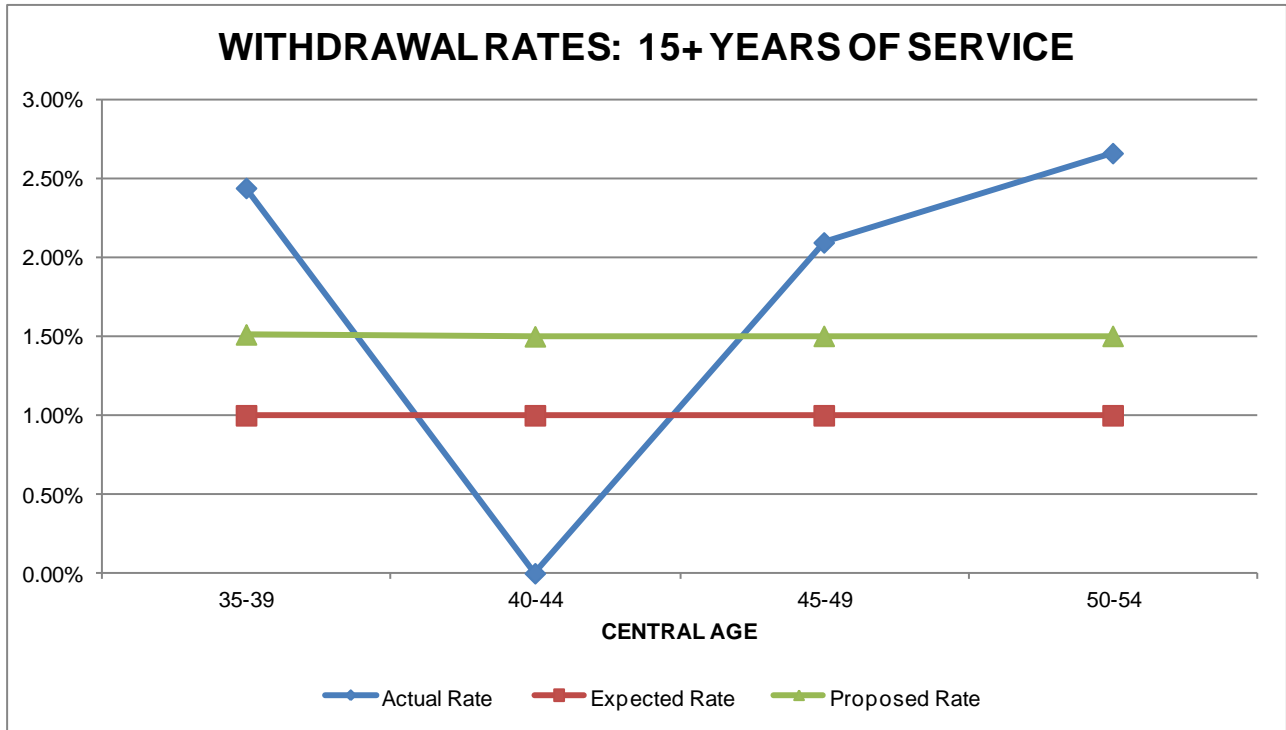
The following tables show a comparison between the present withdrawal rates and the proposed withdrawal rates.

COMPARATIVE RATES OF WITHDRAWAL

CENTRAL AGE OF GROUP	RATES OF WITHDRAWAL Present Years of Service			
	Less than 2	2 to 4	5 to 9	10 & Over
20-24	25.0%	15.0%	10.0%	4.0%
25-29	25.0%	15.0%	10.0%	4.0%
30-34	25.0%	15.0%	10.0%	4.0%
35-39	13.0%	8.0%	5.0%	1.0%
40 & Over	13.0%	8.0%	5.0%	1.0%

CENTRAL AGE OF GROUP	RATES OF WITHDRAWAL Proposed Years of Service				
	Less than 2	2 to 4	5 to 9	10 to 14	15 & Over
20-24	25.0%	15.0%	10.0%	4.0%	1.5%
25-29	25.0%	15.0%	10.0%	4.0%	1.5%
30-34	17.0%	12.0%	8.0%	4.0%	1.5%
35-39	17.0%	12.0%	8.0%	4.0%	1.5%
40 & Over	13.0%	8.5%	3.0%	2.5%	1.5%

COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS FROM ACTIVE SERVICE BASED ON PROPOSED RATES

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with less than 2 years of service		
20-24	10	8	1.250
25-29	21	20	1.050
30-34	17	17	1.000
35-39	11	13	0.846
40-44	12	11	1.091
45-49	14	13	1.077
50-54	13	11	1.182
55+	6	8	0.750
TOTAL	**104**	**101**	**1.030**

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with 2 to 4 years of service		
20-24	3	2	1.500
25-29	15	14	1.071
30-34	16	18	0.889
35-39	19	15	1.267
40-44	11	9	1.222
45-49	10	10	1.000
50-54	18	12	1.500
55+	7	12	0.583
TOTAL	**99**	**92**	**1.076**

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with 5 to 9 years of service		
20-24	0	0	0.000
25-29	4	3	1.333
30-34	8	8	1.000
35-39	10	10	1.000
40-44	6	5	1.200
45-49	2	4	0.500
50-54	6	6	1.000
55+	0	0	0.000
TOTAL	36	36	1.000

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with 10 to 14 years of service		
20-24	0	0	0.000
25-29	0	0	0.000
30-34	2	2	1.000
35-39	8	6	1.333
40-44	10	4	2.500
45-49	7	4	1.750
50-54	6	5	1.200
55+	0	0	0.000
TOTAL	33	21	1.571

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with 15 or more years of service		
20-24	0	0	0.000
25-29	0	0	0.000
30-34	0	0	0.000
35-39	1	1	1.000
40-44	0	3	0.000
45-49	8	6	1.333
50-54	10	6	1.667
55+	0	0	0.000
TOTAL	19	16	1.188

RATES OF DISABILITY RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
35	1	0	N/A
40	6	1	6.000
45	3	2	1.500
50	6	3	2.000
55	3	4	0.750
60	4	3	1.333
TOTAL	23	13	1.769

The following graph shows a comparison of the present, actual and proposed rates of disability retirements.
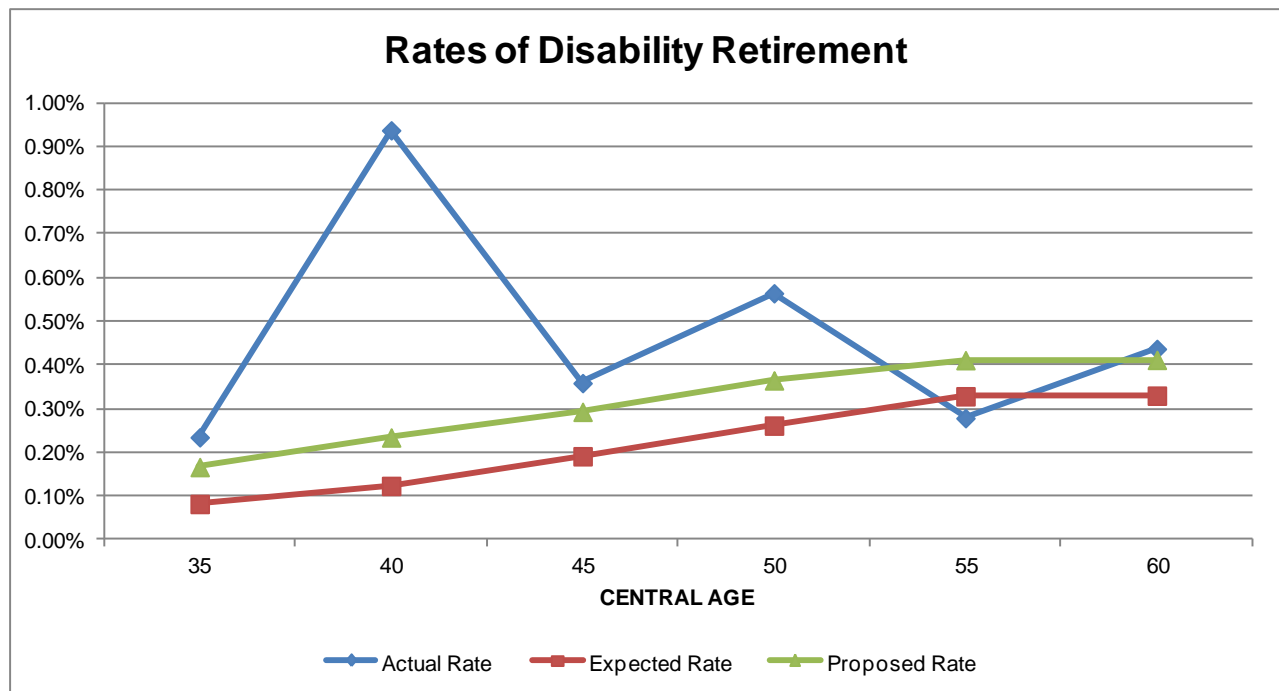
During the period under investigation, the actual rates of disability retirement were more than expected at most ages. Therefore, we recommend the rates of disability retirement be slightly increased to more closely reflect the experience of the Plan.

The following table shows a comparison between the present disability retirement rates and the proposed rates.

COMPARATIVE RATES OF DISABILITY RETIREMENT

AGE	RATES OF DISABILITY RETIREMENT	
	Present	Proposed
35	0.08%	0.17%
40	0.12%	0.23%
45	0.19%	0.29%
50	0.26%	0.37%
55	0.33%	0.41%
60	0.40%	0.41%

COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS BASED ON PROPOSED RATES

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
35	1	1	1.000
40	6	2	3.000
45	3	2	1.500
50	6	4	1.500
55	3	4	0.750
60	4	4	1.000
TOTAL	23	17	1.353

RATES OF SERVICE RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

Service retirements for members retiring subject to the Rule of 80 were examined separately from those members retiring at 62 (or retiring at age 55 with a reduced benefit).

Standard Retirement

AGE	NUMBER OF SERVICE RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
55	9	3	3.000
56	6	3	2.000
57	8	3	2.667
58	7	3	2.333
59	3	2	1.500
60	8	2	4.000
61	10	4	2.500
62	40	44	0.909
63	20	16	1.250
64	19	12	1.583
65	11	9	1.222
66	13	6	2.167
67	3	4	0.750
68	6	4	1.500
69	7	3	2.333
SUBTOTAL	170	118	1.441
70 & Over	7	68	0.103
TOTAL	177	186	0.952

Rule of 80 Retirement

AGE	NUMBER OF SERVICE RETIREMENTS		
	Actual	**Expected**	**Ratio of Actual to Expected**
50	1	1	1.000
51	1	1	1.000
52	0	3	0.000
53	4	4	1.000
54	2	4	0.500
55	3	4	0.750
56	2	4	0.500
57	4	5	0.800
58	2	7	0.286
59	11	9	1.222
60	8	9	0.889
61	19	23	0.826
TOTAL	**57**	**74**	**0.770**

The following graphs show a comparison of the present and actual rates of service retirements.

Service Retirement Rates - Standard Retirement

Service Retirement Rates - Rule of 80 Retirement
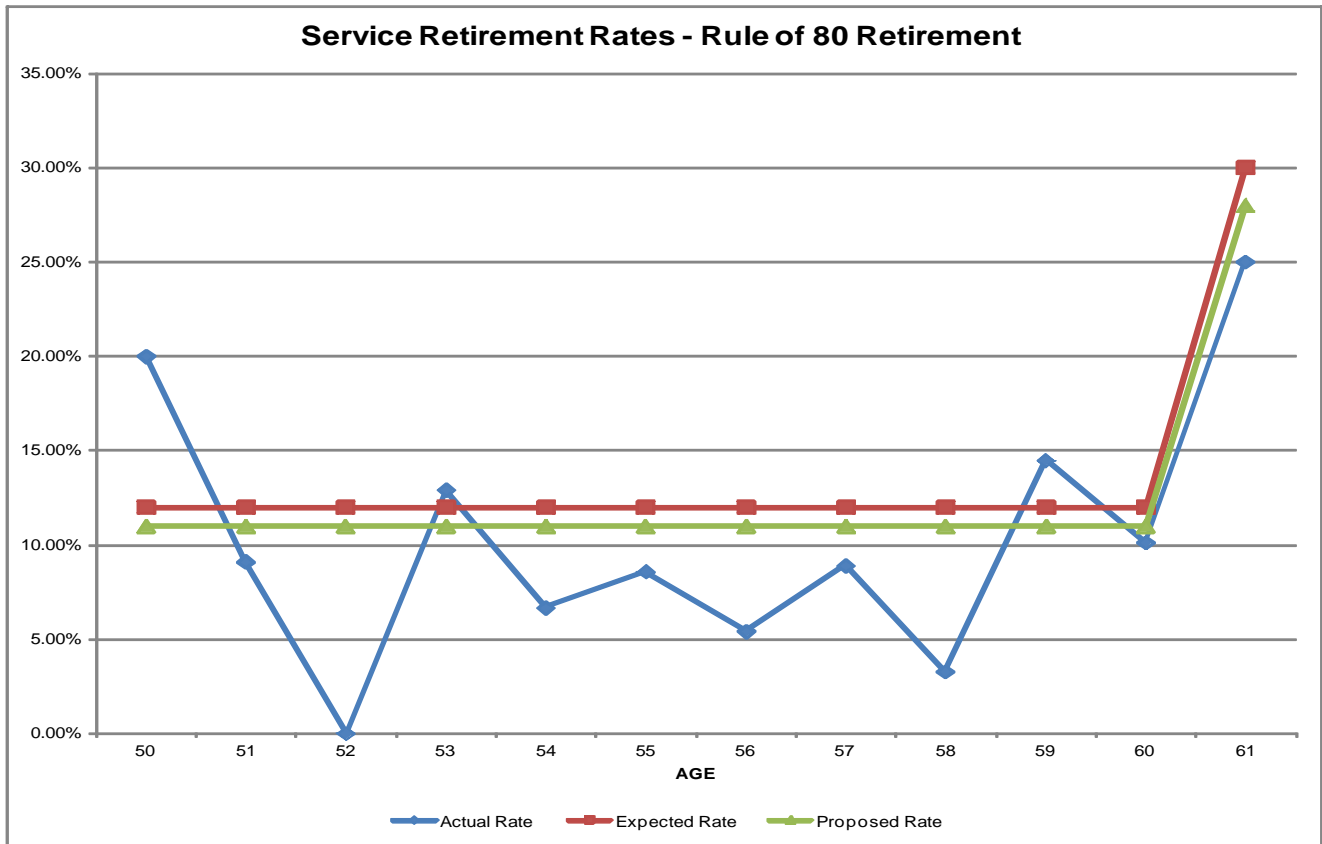
For members retiring under standard retirement, the actual rates of service retirement were higher than expected at most ages. In addition, there are members who are extending retirement beyond age 70. Therefore, we recommend revising the rates of service retirement to more closely reflect the experience of the Plan and extending the fixed retirement age to age 75. For members retiring under the Rule of 80, the actual rates of service retirement were lower than expected for most ages. Therefore, we recommend revising the rates of service retirement to more closely reflect the experience of the Plan.

The following table shows a comparison between the present retirement rates and the proposed rates.

COMPARATIVE RATES OF SERVICE RETIREMENT

Standard Rates

AGE	RATES OF STANDARD SERVICE RETIREMENT	
	Present	Proposed
55	2.4%	4.0%
56	2.4%	4.0%
57	2.4%	4.0%
58	2.4%	4.0%
59	2.4%	4.0%
60	2.4%	6.0%
61	6.0%	12.0%
62	30.0%	30.0%
63	15.0%	20.0%
64	15.0%	20.0%
65	15.0%	20.0%
66	15.0%	20.0%
67	15.0%	20.0%
68	15.0%	20.0%
69	15.0%	20.0%
70-74	100.0%	20.0%
75	100.0%	100.0%

Rule of 80 Rates

AGE	RATES OF RULE OF 80 SERVICE RETIREMENT	
	Present	Proposed
50	12.0%	11.0%
51	12.0%	11.0%
52	12.0%	11.0%
53	12.0%	11.0%
54	12.0%	11.0%
55	12.0%	11.0%
56	12.0%	11.0%
57	12.0%	11.0%
58	12.0%	11.0%
59	12.0%	11.0%
60	12.0%	11.0%
61	30.0%	28.0%

**COMPARISON OF ACTUAL AND EXPECTED SERVICE RETIREMENTS
BASED ON PROPOSED RATES**

Standard Retirements

AGE	NUMBER OF SERVICE RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
55	9	6	1.500
56	6	5	1.200
57	8	5	1.600
58	7	5	1.400
59	3	4	0.750
60	8	5	1.600
61	10	8	1.250
62	40	44	0.909
63	20	21	0.952
64	19	16	1.188
65	11	12	0.917
66	13	9	1.444
67	3	6	0.500
68	6	6	1.000
69	7	5	1.400
SUBTOTAL	**170**	**157**	**1.083**
70 & Over	7	30	0.236
TOTAL	**177**	**187**	**0.949**

Rule of 80 Retirements

AGE	NUMBER OF SERVICE RETIREMENTS		
	Actual	Expected	Ratio of Actual to Expected
50	1	1	1.000
51	1	1	1.000
52	0	2	0.000
53	4	3	1.333
54	2	3	0.667
55	3	4	0.750
56	2	4	0.500
57	4	5	0.800
58	2	7	0.286
59	11	8	1.375
60	8	9	0.889
61	19	21	0.905
TOTAL	**57**	**68**	**0.838**

RATES OF MORTALITY

COMPARISON OF ACTUAL AND EXPECTED CASES OF
POST-RETIREMENT DEATHS

CENTRAL AGE OF GROUP	NUMBER OF POST-RETIREMENT DEATHS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
SERVICE RETIREMENTS AND BENEFICIARIES						
50	1	0	N/A	0	0	N/A
55	1	1	1.000	0	0	N/A
60	2	3	0.667	3	1	3.000
65	9	6	1.500	6	2	3.000
70	9	8	1.125	1	4	0.250
75	13	11	1.182	6	4	1.500
80	15	13	1.154	11	9	1.222
85	10	9	1.111	14	10	1.400
90	5	5	1.000	12	8	1.500
95+	5	3	1.667	9	8	1.125
TOTAL	**70**	**59**	**1.186**	**62**	**46**	**1.348**
DISABILITY RETIREMENTS						
45	1	1	1.000	0	0	N/A
50	0	1	0.000	0	0	N/A
55	0	1	0.000	1	0	N/A
60	1	3	0.333	0	0	N/A
65	2	3	0.667	0	0	N/A
70	4	2	2.000	0	0	N/A
75	2	2	1.000	1	0	N/A
TOTAL	**10**	**13**	**0.769**	**2**	**0**	**N/A**

The following graphs show a comparison of the present, actual and, proposed rates of post-retirement deaths.

Non-Disability Retirement Mortality Rates - Males

Legend: Actual Rate, Expected Rate, Proposed Rate
X-axis: CENTRAL AGE

Non-Disability Retirement Mortality Rates - Females

Legend: Actual Rate, Expected Rate, Proposed Rate
X-axis: CENTRAL AGE

Disability Retirement Mortality Rates - Males

Disability Retirement Mortality Rates - Females
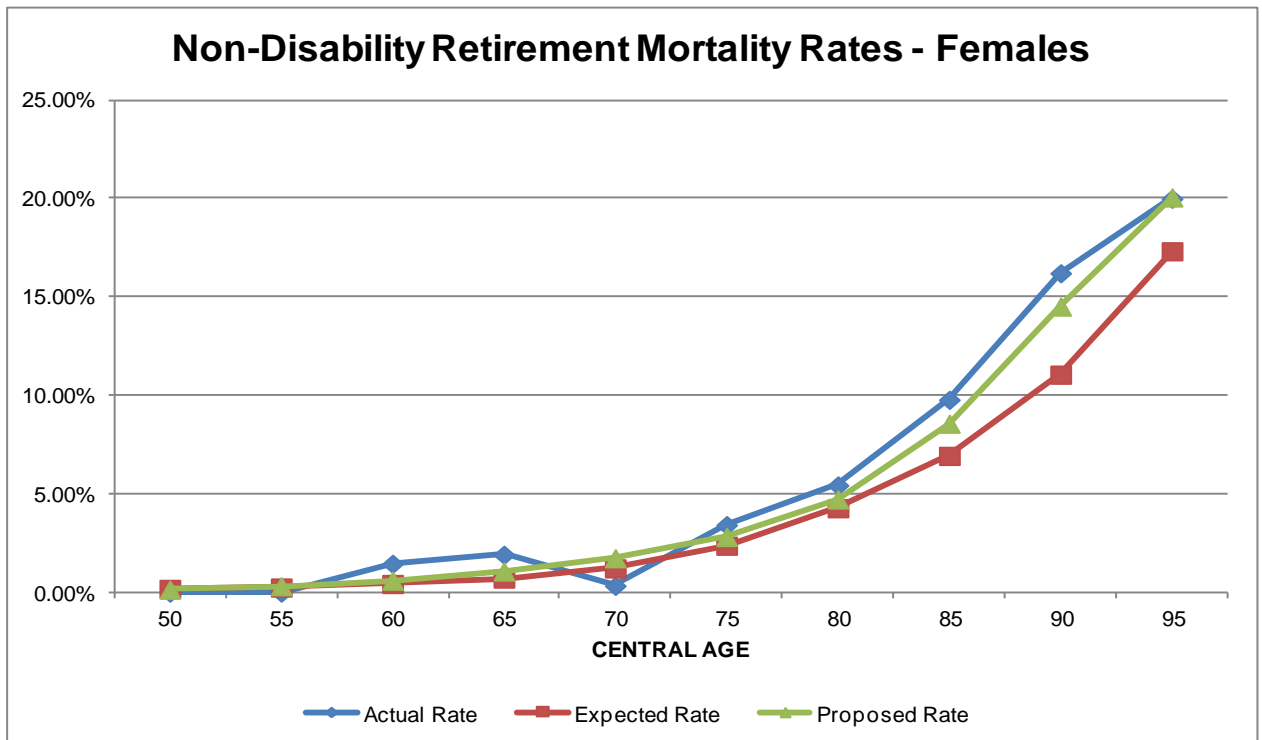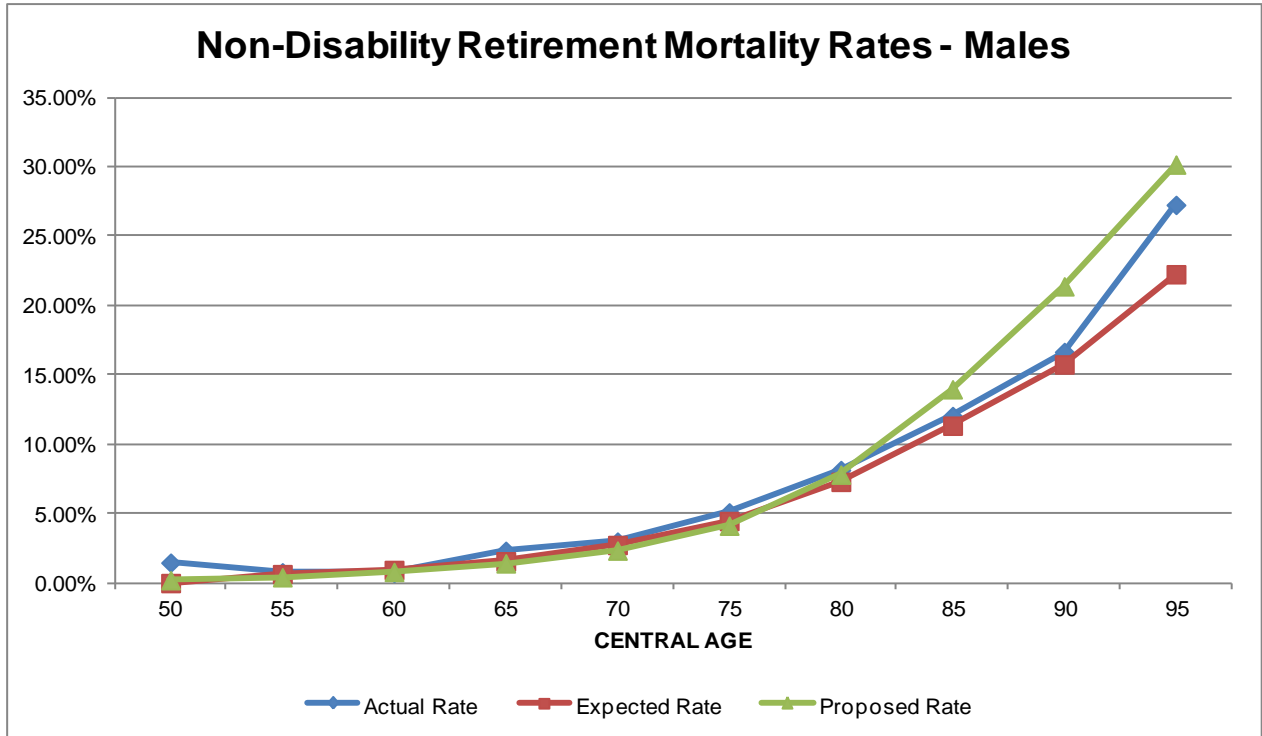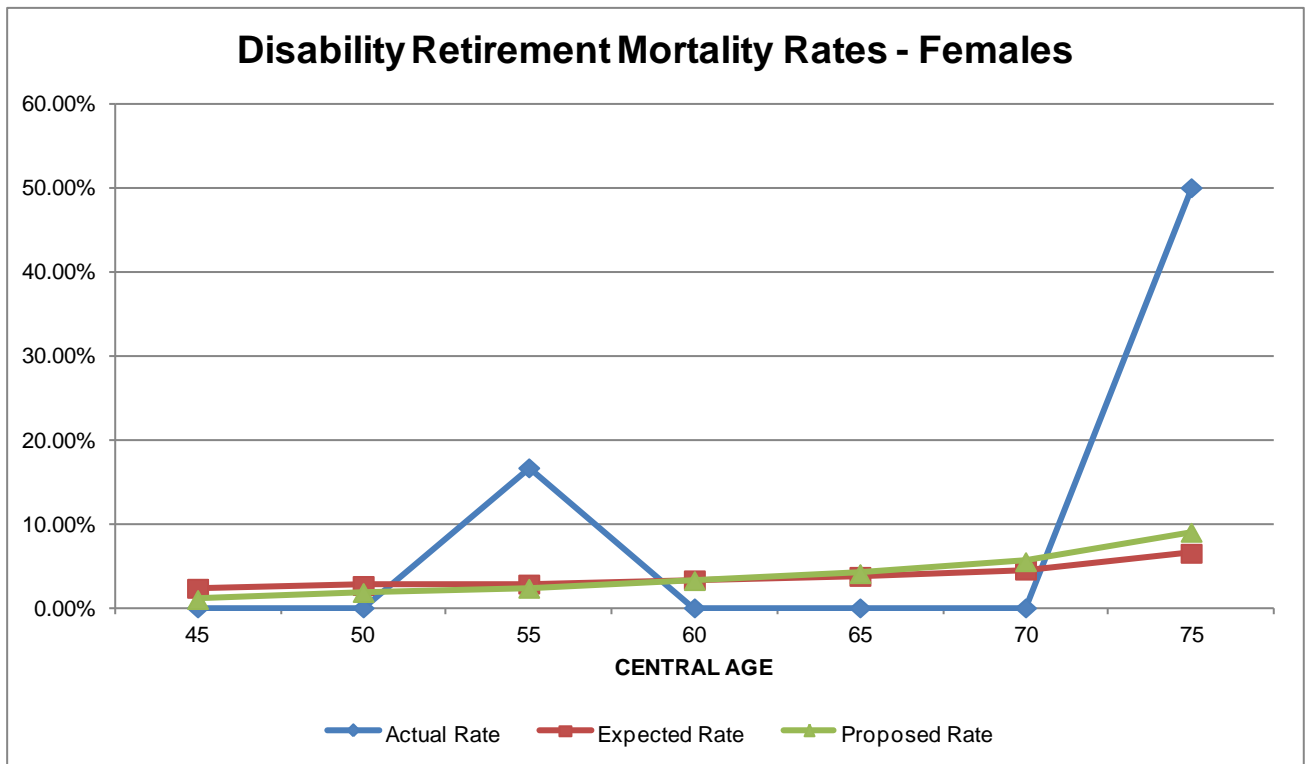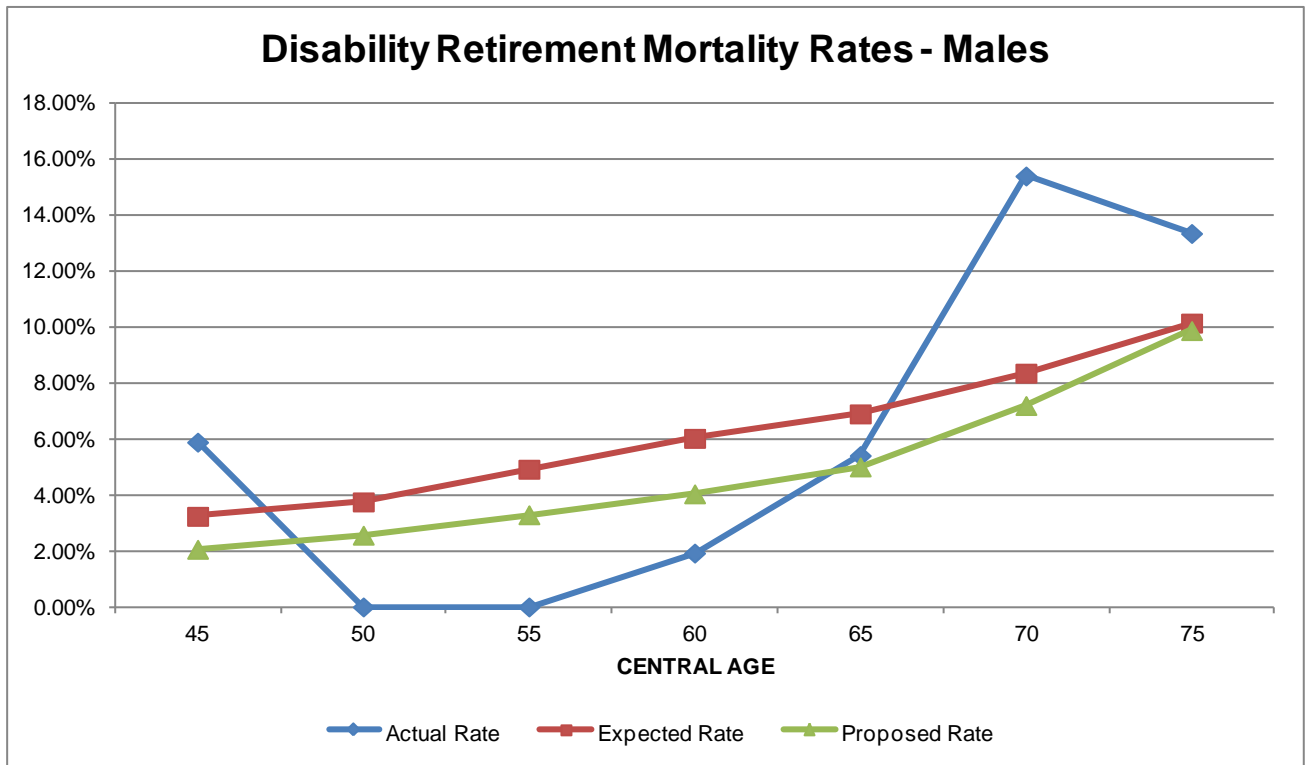
The preceding results indicate that the actual number of post-retirement deaths of service retirements for males and females was actually higher than expected. For disability retirements, the actual mortality rates were less than expected for males and females overall.

We recommend that the rates of mortality after service retirement and for dependents of deceased pensioners be revised to the RP-2000 Combined Mortality Table set forward four years for males and set forward two years for females and using a Scale AA projection to 2025. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2000 Disabled Mortality Table set forward 8 years for males and set forward 9 years for females and using a Scale AA projection to 2025. These revised mortality tables provide for a more reasonable margin for improved mortality experience in the future.

Because there were considerably fewer active member deaths over the study period, it was much more difficult to reliably establish a pattern of rates of mortality. Therefore, it is recommended that the rates of mortality while in active service be set to the same rates as after service retirements.

The following table shows a comparison between the present and proposed rates of mortality.

COMPARATIVE RATES OF POST-RETIREMENT SERVICE RETIREMENTS AND BENEFICIARIES OF DECEASED MEMBERS

AGE	RATES OF POST-RETIREMENT DEATH			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
	SERVICE RETIREMENTS AND BENEFICIARIES			
35	0.0860%	0.0901%	0.0476%	0.0399%
40	0.1238%	0.1114%	0.0665%	0.0584%
45	0.2183%	0.1402%	0.1010%	0.0842%
50	0.3909%	0.1978%	0.1647%	0.1419%
55	0.6131%	0.3775%	0.2541%	0.3068%
60	0.9158%	0.7731%	0.4241%	0.5873%
65	1.5592%	1.4277%	0.7064%	1.0730%
70	2.7530%	2.3233%	1.2385%	1.7778%
75	4.4597%	4.0720%	2.3992%	2.8612%
80	7.4070%	7.9594%	4.2945%	4.7227%
85	11.4836%	13.9616%	6.9918%	8.7152%
90	16.6307%	22.6791%	11.1750%	14.6213%
95	23.4086%	31.4087%	18.2419%	20.9923%
100	31.9185%	39.2003%	29.5187%	25.4498%

COMPARATIVE RATES OF POST-RETIREMENT DISABILITY MORTALITY

AGE	RATES OF POST-RETIREMENT DEATH			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
	DISABILITY RETIREMENTS			
35	2.7800%	1.7118%	2.1400%	0.5106%
40	2.8200%	1.7642%	2.0900%	0.6753%
45	3.2200%	1.9829%	2.2400%	1.2054%
50	3.8300%	2.6281%	2.5700%	1.8322%
55	4.8200%	3.2746%	2.9500%	2.3467%
60	6.0300%	4.0004%	3.3100%	3.1173%
65	6.9225%	5.0230%	3.7269%	4.1020%
70	8.3676%	7.2202%	4.5940%	5.6874%
75	10.7674%	10.4994%	5.9506%	7.8688%
80	14.4521%	14.3084%	8.0894%	12.1495%
85	19.1069%	21.6754%	11.5456%	17.3875%
90	25.0003%	30.7507%	16.0006%	22.5671%

The following shows a comparison of the actual and expected post-retirement deaths based on new revised rates of mortality.

COMPARISON OF ACTUAL AND EXPECTED CASES OF
POST-RETIREMENT DEATHS BASED ON REVISED MORTALITY RATES

CENTRAL AGE OF GROUP	NUMBER OF POST-RETIREMENT DEATHS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
SERVICE RETIREMENTS AND BENEFICIARIES						
50	1	0	N/A	0	0	N/A
55	1	1	1.000	0	0	N/A
60	2	2	1.000	3	1	3.000
65	9	5	1.800	6	3	2.000
70	9	7	1.286	1	5	0.200
75	13	11	1.182	6	5	1.200
80	15	14	1.071	11	10	1.100
85	10	12	0.833	14	12	1.167
90	5	6	0.833	12	11	1.091
95+	5	4	1.250	9	8	1.125
TOTAL	**70**	**62**	**1.129**	**62**	**55**	**1.127**
DISABILITY RETIREMENTS						
45	1	0	N/A	0	0	N/A
50	0	0	N/A	0	0	N/A
55	0	1	0.000	1	0	N/A
60	1	2	0.500	0	0	N/A
65	2	2	1.000	0	0	N/A
70	4	2	2.000	0	0	N/A
75	2	1	2.000	1	0	N/A
TOTAL	**10**	**8**	**1.250**	**2**	**0**	**N/A**

RATES OF SALARY INCREASE

COMPARISON OF ACTUAL AND EXPECTED SALARIES
OF ACTIVE MEMBERS

YEARS OF SERVICE	SALARIES AT END OF YEAR		
	Actual	Expected	Ratio of Actual to Expected
Less than 1	$ 6,211,320	$ 6,404,797	0.970
1-5	47,277,311	48,283,374	0.979
6-10	32,785,735	33,623,776	0.975
11-15	32,873,640	33,648,331	0.977
16-20	30,546,692	31,410,790	0.972
21-25	24,268,272	24,867,056	0.976
26-30	13,547,864	13,969,347	0.970
31-35	8,359,937	8,601,263	0.972
36 & Over	4,115,729	4,220,727	0.975
TOTAL	**$ 199,986,500**	**$205,029,461**	**0.975**

The following graph shows a comparison of the present, actual and proposed rates of salary increases.

Rates of Salary Increases
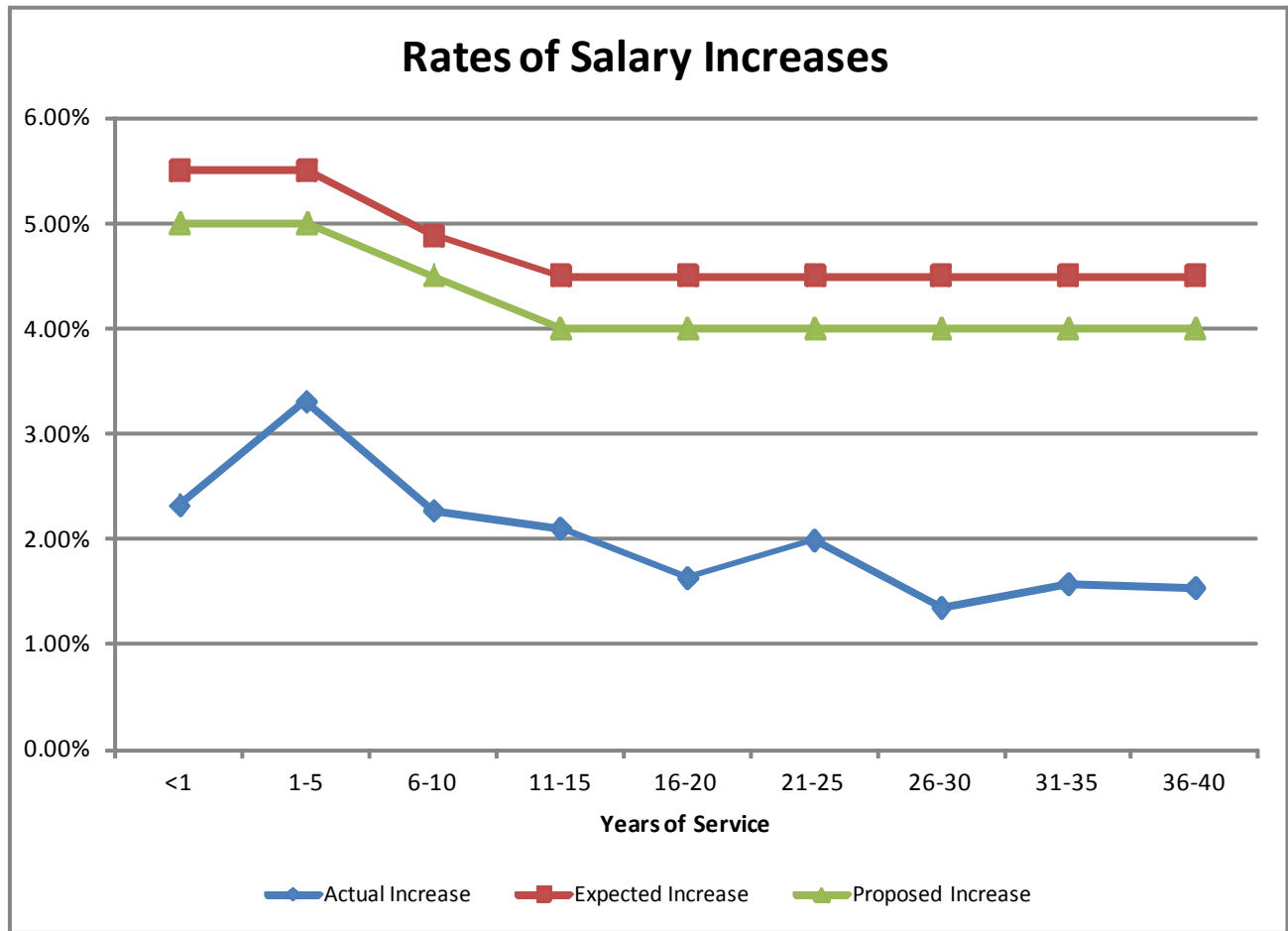
Overall, the current assumed rates of salary increase were significantly greater than the actual rates of increase averaged over the study period. However, in order to maintain a level of conservatism, we recommend only lowering the rates of salary increase by 0.50% for all service groups.

The following table shows the proposed rates of salary increase.

PROPOSED RATES OF SALARY INCREASES

YEARS OF SERVICE	SALARY INCREASE RATES	
	Present	Proposed
Less than 1	5.50%	5.00%
1-5	5.50%	5.00%
6-10	5.00%	4.50%
11-15	4.50%	4.00%
16-20	4.50%	4.00%
21-25	4.50%	4.00%
26 & Over	4.50%	4.00%

The following shows a comparison of the actual and expected salaries based on new revised rates of salary increases.

YEARS OF SERVICE	SALARIES AT END OF YEAR ($1,000's)		
	Actual	Expected	Ratio of Actual to Expected
Less than 1	$ 6,211,320	$ 6,374,454	0.974
1-5	47,277,311	48,054,630	0.984
6-10	32,785,735	33,502,818	0.979
11-15	32,873,640	33,487,437	0.982
16-20	30,546,692	31,260,595	0.977
21-25	24,268,272	24,748,151	0.981
26-30	13,547,864	13,902,550	0.974
31-35	8,359,937	8,560,135	0.977
36 & Over	4,115,729	4,200,545	0.980
TOTAL	**$199,986,500**	**$204,091,315**	**0.980**

OTHER ASSUMPTIONS

AMORTIZATION METHOD: Currently, the unfunded accrued liability is amortized using the open level dollar amortization method. We recommend changing to a closed level dollar amortization method beginning with 30 years as of January 1, 2013.

ASSETS: Currently, the actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market value of assets, based on the assumed valuation rate of return. The amount recognized each year is 10% of the difference between market value and expected market value. We recommend no change to the current method.

OPTION FACTORS: The option factors, currently in use by the Plan, are based on the mortality table and investment rate of return (discount rate) used in the valuation. We recommend that the factors be revised to be based on the mortality table proposed for the valuation.

VALUATION COST METHOD: Currently, the valuation uses the Entry Age Normal (EAN) Cost Method. The EAN cost method is the most widely used cost method of public sector plans and has demonstrated the highest degree of contribution stability as compared to alternative methods. Actuarial gains and losses under EAN are reflected in the unfunded actuarial accrued liability. In addition, the EAN method is the only method allowed under the new GASB 67/68 standards. Therefore, we recommend no change to the valuation cost method.

PERCENT MARRIED: Currently, 85% of all active members are assumed to be married. We have reviewed this assumption and recommend no change at this time.

SPOUSE AGE DIFFERENCE: Currently, for married members, it is assumed a male is four years older than his spouse. We have reviewed this assumption and recommend no change at this time.

Appendix A

Historical December CPI (U) Index

Year	CPI (U)	Year	CPI (U)
1962	30.4	1988	120.5
1963	30.9	1989	126.1
1964	31.2	1990	133.8
1965	31.8	1991	137.9
1966	32.9	1992	141.9
1967	33.9	1993	145.8
1968	35.5	1994	149.7
1969	37.7	1995	153.5
1970	39.8	1996	158.6
1971	41.1	1997	161.3
1972	42.5	1998	163.9
1973	46.2	1999	168.3
1974	51.9	2000	174.0
1975	55.5	2001	176.7
1976	58.2	2002	180.9
1977	62.1	2003	184.3
1978	67.7	2004	190.3
1979	76.7	2005	196.8
1980	86.3	2006	201.8
1981	94.0	2007	210.036
1982	97.6	2008	210.228
1983	101.3	2009	215.949
1984	105.3	2010	219.179
1985	109.3	2011	225.672
1986	110.5	2012	229.601
1987	115.4		

Appendix B

Capital Market Assumptions and Asset Allocation

Geometric Rates of Return and Standard Deviations by Asset Class

Asset Class	Expected Return
US Large Cap Equity	8.5%
US Small Cap Equity	8.2
International Equity	8.3
US Core Fixed Income	1.0
US High Yield Fixed Income	4.8
International Fixed Developed	1.7
Equity Hedge Funds	7.5
Diversified Hedge Funds	7.0
Private Equity	15.0
Private Real Estate	8.0

Long Term Asset Allocation Targets

Asset Class	Asset Allocation
US Large Cap Equity	38.0%
US Small Cap Equity	7.0
International Equity	15.0
US Core Fixed Income	10.0
US High Yield Fixed Income	5.0
International Fixed Developed	5.0
Equity Hedge Funds	7.0
Diversified Hedge Funds	7.0
Private Equity	3.0
Private Real Estate	3.0

RATES OF WITHDRAWAL FROM ACTIVE SERVICE
(For Both Males and Females)

AGE	WITHDRAWAL				
	YEARS OF SERVICE				
	< 2	2 TO 4	5 TO 9	10 TO 14	15 +
20-29	25.0%	15.0%	10.0%	4.0%	1.5%
30-39	17.0%	12.0%	8.0%	4.0%	1.5%
40+	13.0%	8.5%	3.0%	2.5%	1.5%

TABLE 2
RATES OF DISABILITY RETIREMENT
(For Both Males and Females)

AGE	DISABILITY
26	0.00024
27	0.00048
28	0.00072
29	0.00096
30	0.00120
31	0.00128
32	0.00136
33	0.00144
34	0.00152
35	0.00160
36	0.00176
37	0.00192
38	0.00208
39	0.00224
40	0.00234
41	0.00248
42	0.00259
43	0.00267
44	0.00273
45	0.00285
46	0.00306
47	0.00327
48	0.00348
49	0.00369
50	0.00377
51	0.00370
52	0.00360
53	0.00378
54	0.00395
55	0.00413
56	0.00430
57	0.00448
58	0.00465
59	0.00483
60	0.00500
61	0.00518
62	0.00000

TABLE 3

RATES OF SERVICE RETIREMENT FROM ACTIVE SERVICE

AGE	STANDARD RATE	RULE OF 80 RATE
45	0.0000	0.1100
46	0.0000	0.1100
47	0.0000	0.1100
48	0.0000	0.1100
49	0.0000	0.1100
50	0.0000	0.1100
51	0.0000	0.1100
52	0.0000	0.1100
53	0.0000	0.1100
54	0.0000	0.1100
55	0.0400	0.1100
56	0.0400	0.1100
57	0.0400	0.1100
58	0.0400	0.1100
59	0.0400	0.1100
60	0.0600	0.1100
61	0.1200	0.2800
62	0.3000	
63	0.2000	
64	0.2000	
65	0.2000	
66	0.2000	
67	0.2000	
68	0.2000	
69	0.2000	
70	0.2000	
71	0.2000	
72	0.2000	
73	0.2000	
74	0.2000	
75	1.0000	

TABLE 4
RATES OF MORTALITY FOR ACTIVE MEMBERS, SERVICE RETIREMENTS
AND BENEFICIARIES OF DECEASED MEMBERS

AGE	MALES	FEMALES	AGE	MALES	FEMALES
20	0.0239%	0.0126%	68	1.9177%	1.4770%
21	0.0245%	0.0132%	69	2.0825%	1.5984%
22	0.0259%	0.0138%	70	2.3233%	1.7778%
23	0.0275%	0.0146%	71	2.5929%	1.9270%
24	0.0306%	0.0158%	72	2.8900%	2.1358%
25	0.0354%	0.0165%	73	3.2147%	2.2993%
26	0.0392%	0.0174%	74	3.6640%	2.5332%
27	0.0440%	0.0183%	75	4.0720%	2.8612%
28	0.0496%	0.0205%	76	4.6409%	3.1540%
29	0.0557%	0.0251%	77	5.3273%	3.4821%
30	0.0619%	0.0286%	78	6.1042%	3.8490%
31	0.0682%	0.0314%	79	6.9785%	4.2601%
32	0.0742%	0.0338%	80	7.9594%	4.7227%
33	0.0798%	0.0360%	81	9.0607%	5.2439%
34	0.0850%	0.0380%	82	10.0457%	5.8321%
35	0.0901%	0.0399%	83	11.4132%	6.6628%
36	0.0952%	0.0420%	84	12.6336%	7.6203%
37	0.0982%	0.0444%	85	13.9616%	8.7152%
38	0.1019%	0.0484%	86	15.7789%	9.7072%
39	0.1063%	0.0530%	87	17.6240%	11.0532%
40	0.1114%	0.0584%	88	19.1093%	12.2153%
41	0.1173%	0.0642%	89	21.1384%	13.4140%
42	0.1226%	0.0705%	90	22.6791%	14.6213%
43	0.1282%	0.0751%	91	24.8135%	16.2113%
44	0.1341%	0.0797%	92	26.3361%	17.3875%
45	0.1402%	0.0842%	93	27.8154%	18.5013%
46	0.1465%	0.0911%	94	29.9904%	19.5353%
47	0.1636%	0.0984%	95	31.4087%	20.9923%
48	0.1737%	0.1092%	96	32.7735%	21.8415%
49	0.1852%	0.1237%	97	34.9769%	22.5671%
50	0.1978%	0.1419%	98	36.2504%	23.1601%
51	0.2187%	0.1632%	99	37.3578%	24.4834%
52	0.2535%	0.1885%	100	39.2003%	25.4498%
53	0.2832%	0.2223%	101	39.7886%	26.6044%
54	0.3264%	0.2658%	102	40.0000%	27.9055%
55	0.3775%	0.3068%	103	40.0000%	29.3116%
56	0.4395%	0.3461%	104	40.0000%	30.7811%
57	0.5129%	0.3918%	105	40.0000%	32.2725%
58	0.5851%	0.4460%	106	40.0000%	33.7441%
59	0.6690%	0.5129%	107	40.0000%	35.1544%
60	0.7731%	0.5873%	108	40.0000%	36.4617%
61	0.8729%	0.6747%	109	40.0000%	37.6246%
62	1.0129%	0.7604%	110	40.0000%	38.6015%
63	1.1300%	0.8563%	111	40.0000%	39.3507%
64	1.2562%	0.9664%	112	40.0000%	39.8308%
65	1.4277%	1.0730%	113	40.0000%	40.0000%
66	1.6010%	1.1861%	114	40.0000%	40.0000%
67	1.7271%	1.3110%	115	40.0000%	40.0000%

TABLE 5
RATES OF MORTALITY FOR DISABILITY RETIREMENTS

AGE	MALES	FEMALES	AGE	MALES	FEMALES
20	1.9913%	0.5509%	68	6.1122%	4.9955%
21	1.9913%	0.5795%	69	6.6438%	5.3310%
22	1.9913%	0.6095%	70	7.2202%	5.6874%
23	1.9913%	0.6095%	71	7.8414%	6.0665%
24	1.9913%	0.5943%	72	8.5072%	6.4712%
25	1.9913%	0.5795%	73	9.2170%	6.9043%
26	1.9913%	0.5650%	74	9.9704%	7.3691%
27	1.9913%	0.5509%	75	10.4994%	7.8688%
28	1.9913%	0.5371%	76	11.3192%	8.6207%
29	1.9913%	0.5237%	77	11.8797%	9.4485%
30	1.9418%	0.5106%	78	12.4477%	10.3594%
31	1.8936%	0.5106%	79	13.3552%	11.0788%
32	1.8465%	0.5106%	80	14.3084%	12.1495%
33	1.8005%	0.5106%	81	14.9301%	12.9915%
34	1.7556%	0.5106%	82	16.5921%	13.8866%
35	1.7118%	0.5106%	83	18.0722%	14.8352%
36	1.6691%	0.4978%	84	20.0931%	16.2113%
37	1.6273%	0.5331%	85	21.6754%	17.3875%
38	1.6763%	0.5689%	86	23.2553%	18.5013%
39	1.7218%	0.6207%	87	25.4433%	19.5353%
40	1.7642%	0.6753%	88	27.0045%	20.9923%
41	1.8035%	0.7514%	89	28.5214%	21.8415%
42	1.8400%	0.8337%	90	30.7507%	22.5671%
43	1.8737%	0.9459%	91	32.2050%	23.1601%
44	1.9047%	1.0697%	92	97.5298%	24.4834%
45	1.9829%	1.2054%	93	100.0000%	25.4498%
46	2.0610%	1.3534%	94	100.0000%	26.6044%
47	2.1940%	1.5140%	95	100.0000%	27.9055%
48	2.3326%	1.6457%	96	100.0000%	29.3116%
49	2.4770%	1.7389%	97	100.0000%	30.7811%
50	2.6281%	1.8322%	98	100.0000%	32.2725%
51	2.7173%	1.9267%	99	100.0000%	33.7441%
52	2.8091%	2.0235%	100	100.0000%	35.1544%
53	2.9794%	2.1244%	101	100.0000%	36.4617%
54	3.0827%	2.2314%	102	100.0000%	37.6246%
55	3.2746%	2.3467%	103	100.0000%	38.6015%
56	3.3957%	2.4725%	104	100.0000%	39.3507%
57	3.5270%	2.6108%	105	100.0000%	39.8308%
58	3.7645%	2.7636%	106	100.0000%	40.0000%
59	3.9258%	2.9320%	107	100.0000%	40.0000%
60	4.0004%	3.1173%	108	100.0000%	40.0000%
61	4.1905%	3.3202%	109	100.0000%	40.0000%
62	4.2891%	3.4533%	110	100.0000%	40.0000%
63	4.5123%	3.6866%	111	100.0000%	100.0000%
64	4.7566%	3.8397%	112	100.0000%	100.0000%
65	5.0230%	4.1020%	113	100.0000%	100.0000%
66	5.3122%	4.2728%	114	100.0000%	100.0000%
67	5.7689%	4.5630%	115	100.0000%	100.0000%

TABLE 6

RATES OF ANTICIPATED SALARY INCREASES
(For Both Males and Females)

YEARS OF SERVICE	RATES OF INCREASE
< 1	5.00%
1-5	5.00%
6-10	4.50%
11-14	4.00%
15+	4.00%