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PERS
of MISSISSIPPI

State of Mississippi Retirement Systems

Experience Investigation for the

Four-Year Period

Ending June 30, 2014

Cavanaugh Macdonald
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The experience and dedication you deserve

May 4, 2015

The Board of Trustees
Public Employees' Retirement System of Mississippi
429 Mississippi Street
Jackson, MS 39201

Members of the Board:

We are pleased to submit the results of an investigation of the economic and demographic experience for the Public Employees' Retirement System (PERS), the Highway Safety Patrol Retirement System (HSPRS), the Supplemental Legislative Retirement Plan (SLRP) and the Municipal Retirement Systems (MRS). The purpose of the investigation was to assess the reasonability of the PERS economic assumptions and demographic actuarial assumptions for each Retirement System. This experience investigation covers the four-year period from July 1, 2010 to June 30, 2014. As a result of the investigation, it is recommended that revised demographic tables be adopted by the Board for future use.

The investigation of the demographic experience of members of each System includes all active and retired members as well as beneficiaries of deceased members. The experience was investigated separately for males and females since different tables are used for each of these groups.

The number of members expected to separate from active service and the expected number of post-retirement deaths was obtained by use of the rates determined in the last experience investigation and adopted by the Board of Trustees. The results of the investigation indicate that 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 Retirement System. As a result of the investigation, new withdrawal, salary, disability, retirement 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 for each system are shown in the attached tables in Appendix D of this report. In the actuary's judgment, the rates recommended are suitable for use until further experience indicates that modifications are desirable.

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 systems. The undersigned meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

Edward A. Macdonald, ASA, FCA, MAAA
President

Edward J. Koebel, EA, FCA, MAAA
Principal and Consulting Actuary

Jonathan T. Craven, ASA, EA, FCA, MAAA
Senior Actuary

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Section I
Executive Summary

The following summarizes the findings and recommendations with regard to the economic and demographic assumptions utilized for the State of Mississippi Retirement Systems. Detailed explanations for the recommendations are found in the sections that follow.

Economic Assumption Changes

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

Item	Current	Proposed
Price Inflation	3.50%	3.00%
Investment Return*	8.00%	7.75%
Wage Inflation	4.25%	3.75%

* net of investment expenses.

Recommended Demographic Assumption Changes

The table below lists, for each System, the demographic assumptions that should be changed based on the experience of the last four years.

System	Assumption Changes
PERS	Withdrawal, Pre-Retirement Mortality, Disability Retirement, Service Retirement, Post-Retirement Mortality, Salary Scale
HSPRS	Pre-Retirement Mortality, Service Retirement, Post-Retirement Mortality, Salary Scale
SLRP	Withdrawal, Pre-Retirement Mortality, Service Retirement, Post-Retirement Mortality, Salary Scale
MRS	Post-Retirement Mortality

Financial Impact

The following table highlights the impact of the recommended changes on the unfunded accrued liabilities (UAL), funding ratios and amortization period for each System.

Change in 2014 Valuation Unfunded Accrued Liability
($ in Thousands)

System	Before All Changes	After Demographic Changes Only	After All Changes
PERS	$ 14,445,348	$15,148,788	$15,899,084
HSPRS	150,524	150,002	160,576
SLRP	5,341	5,150	5,549
MRS	182,415	185,913	192,559

Change in 2014 Valuation Funding Ratio

System	Before All Changes	After Demographic Changes Only	After All Changes
PERS	61.0%	59.8%	58.7%
HSPRS	66.2%	66.3%	64.8%
SLRP	73.6%	74.3%	72.9%
MRS	46.4%	45.9%	45.1%

Change in 2014 Valuation UAL Amortization Period*

System	Before All Changes	After Demographic Changes Only	After All Changes
PERS	29.2	31.6	34.3
HSPRS	36.5	33.2	42.8
SLRP	25.0	21.5	25.1

* Statutory contribution rates kept constant.

Change in Projected Funding Ratio in 2042

System	Before All Changes	After Demographic Changes Only	After All Changes
PERS	109.7%	120.0%	104.1%
HSPRS	94.5%	101.2%	87.4%
SLRP	135.9%	157.9%	140.2%

Section II
Economic Assumptions

There are three economic assumptions used in the actuarial valuations performed for PERS. The same assumptions are used in all four valuations. They are:

- Price Inflation
- Investment Return
- Wage Inflation

Actuarial Standard of Practice (ASOP) No. 27, *"Selection of Economic Assumptions for Measuring Pension Obligations"* provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans. ASOP No. 27 was revised in September, 2013 and no longer includes the concept of a "best estimate range". Instead, the revised standard now requires that each economic assumption selected by the actuary should be reasonable which means it has the following characteristics:

- It is appropriate for the purpose of the measurement;
- It reflects the actuary's professional judgment;
- It takes into account historical and current economic data that is relevant as of the measurement date;
- It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
- It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed, or when alternative assumptions are used for the assessment of risk.

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 recommended in this report have been developed in accordance with ASOP No. 27, as revised in September, 2013. The following table shows our recommendation followed by detailed discussions of each assumption.

Item	Current	Proposed
Price Inflation	3.50%	3.00%
Real Rate of Return*	<u>4.50</u>	<u>4.75</u>
Investment Return	8.00%	7.75%
Price Inflation	3.50%	3.00%
Real Wage Growth	<u>0.75</u>	<u>0.75</u>
Wage Inflation	4.25%	3.75%

* net of investment expenses.

Price Inflation

Background: As can be seen from the table above, assumed price inflation is used as the basis for both the investment return assumption and the wage inflation assumption. These latter two assumptions will be discussed in detail in the following sections.

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. 67 and 68.

The current price inflation assumption is 3.50% 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 June 30th.

Period	Number of Years	Annualized Rate of Inflation	Annual Standard Deviation
1926 – 2014	88	2.98%	4.15%
1954 – 2014	60	3.70	2.88
1964 – 2014	50	4.16	2.90
1974 – 2014	40	4.03	2.99
1984 – 2014	30	2.81	1.39
1994 – 2014	20	2.41	1.37
2004 - 2014	10	2.31	1.81

The following graph illustrates the historical levels of price inflation measured as of June 30th of each of the last 50 years and compared to the current 3.50% annual rate currently assumed.

Annual Rate of CPI (U) Increases
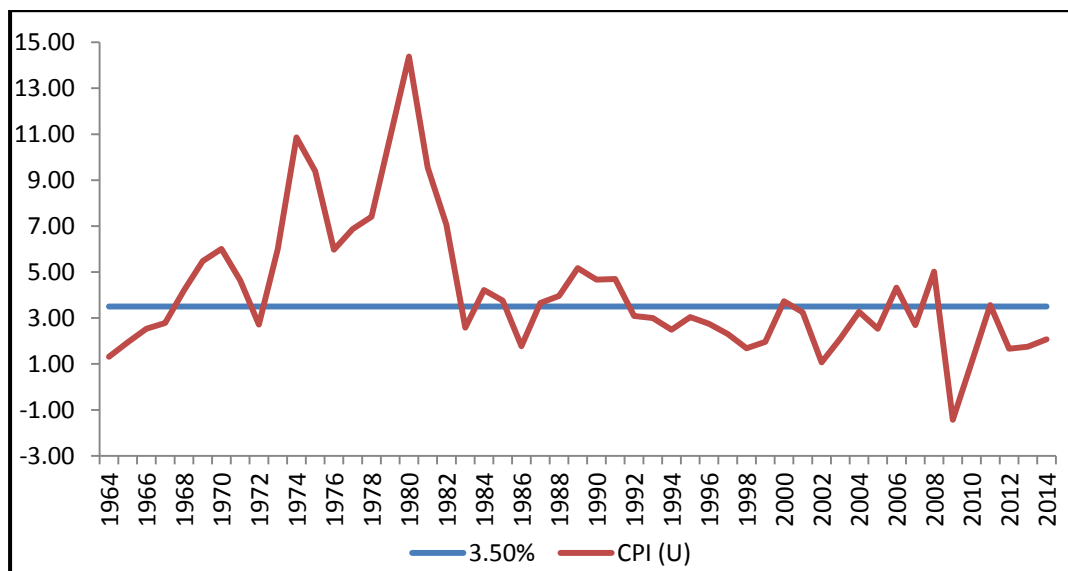
Over shorter historical periods, the average annual rate of increase in the CPI-U has been below 3.00%. The period of high inflation from 1973 to 1982 has a significant impact on the averages over periods which include these rates. Further, the average rate of 2.98% over the entire 88 year period is close to the average rate of 2.81% for the prior 30 years (1984 to 2014) 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. The severe recession of 2008-2009 resulted in a short period of deflation followed by low levels of inflation. The Federal Reserve has combated this weak environment with zero interest rates and quantitative easing. Although the quantitative easing program has ended, the Federal Reserve has disclosed an inflation target of at least 2.0% annually and will keep interest rates very low until they see progress toward the target.

Additional information to consider in formulating this assumption is obtained from measuring the spread on Treasury Inflation Protected Securities (TIPS) and from the prevailing economic forecasts. The spread between the nominal yield on treasury securities (bonds) and the inflation indexed yield on TIPS of the same maturity is referred to as the "breakeven rate of inflation" and represents the bond market's expectation of inflation over the period to maturity. The table below provides the calculation of the breakeven rate of inflation as of June 30, 2014.

Years to Maturity	Nominal Bond Yield	TIPS Yield	Breakeven Rate of Inflation
10	2.53%	0.27%	2.26%
20	3.08	0.74	2.34
30	**3.34**	**0.99**	**2.35**

The bond market's expectation for the rate of inflation over the next 30 years is 2.35%, which is lower than the long term historical average rate. Additionally, based upon information contained in the "Survey of Professional Forecasters" for the second quarter of 2014 as published by the Philadelphia Federal Reserve Bank, the median expected annual rate of inflation for the ten years beginning July 1, 2014 is 2.25%. Although 10 years of future expectation is too short of a period for the basis of our inflation assumption, the information does provide additional evidence that the consensus expectations of these experts are for significantly lower rates of inflation than the historical average for the near term future.

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 PERS' 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 2014 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75 year cost projections on an intermediate inflation assumption of 2.7% with a range of 1.7% to 3.7%. We consider that range reasonable and recommend that PERS lower the current price inflation assumption of 3.50% to 3.00%.

Price Inflation Assumption	
Current	3.50%
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 used to discount the expected benefit payments for all active, inactive and retired members. 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 8.00%, consisting of a price inflation assumption of 3.50% and a real rate of return assumption of 4.50%.

Administrative and Investment Expenses: The current investment return is assumed to be net of investment expenses. All returns provided by the investment consultants shown below are net of investment expenses. Administrative expenses are being recognized by an additional 0.23% of payroll amount added to the normal cost contribution rate for all divisions and funds.

Past Experience: The assets for PERS are valued using a widely accepted asset-smoothing methodology that fully recognizes the expected investment income and also recognizes 20% of each year's investment gain or loss (the difference between actual and expected investment income). The recent experience over the last five years is shown in the table below.

Year Ending 6/30	Actuarial Value	Market Value
2010	0.20%	14.43%
2011	3.71	25.17
2012	1.60	0.23
2013	5.88	13.18
2014	13.88	18.31
Average	4.95%	13.96%

The impact of the asset smoothing method can be observed in the table. Very poor asset returns during 2008 and 2009 are reflected in the actuarial value returns through 2013. While important to review and analyze, historical returns over such a short time period are not credible for the purpose of setting the long-term assumed future rate of return.

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 as provided by the Board's investment consultant and the target asset allocation as provided by PERS staff are shown in Appendix B. The geometric real rates of return are net of investment expenses. We further assumed that investment returns approximately follow a lognormal distribution with no correlation between years. The results below provide an expected range of real rates of return over a 50 year time horizon. Looking at one year results produces an expected real return of 6.08% 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	6.08%	15.94%	-17.96%	-5.16%	4.90%	16.02%	34.13%
5	5.13%	7.03%	-6.02%	0.27%	4.90%	9.73%	17.09%
10	5.01%	4.97%	-2.95%	1.61%	4.90%	8.29%	13.38%
20	4.96%	3.51%	-0.71%	2.56%	4.90%	7.29%	10.82%
30	4.94%	2.86%	0.29%	2.98%	4.90%	6.85%	9.71%
40	4.93%	2.48%	0.90%	3.24%	4.90%	6.58%	9.05%
50	4.92%	2.22%	1.31%	3.41%	4.90%	6.40%	8.61%

Based on this analysis, there is 50% likelihood that the average real rate of return over a 50-year period will be 4.90%. It can also be inferred that for the 10 year time span, 5% of the resulting real rates of return will be below -2.95% and 95% will be above that. As the time span increases, the results begin to merge. Over a 50 year time span, the results indicate there will be a 25% chance that real returns will be below 3.41% and a 25% chance they will be above 6.40%. In other words, there is a 50% chance the real returns will be between 3.41% and 6.40%.

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 real returns over the 50 year time span plus the recommended inflation assumption. The following table details the range.

Item	25th Percentile	50th Percentile	75th Percentile
Real Rate of Return	3.41%	4.90%	6.40%
Inflation	3.00	3.00	3.00
Net Investment Return	6.41	7.90%	9.40%

Review of the FYE 2013 *Public Fund Survey* finds that 7.90% is now the median rate for this assumption. From the table above, a 7.90% average annual return over the 50 year period ranks at 49th percentile. In other words, there is approximately 51% likelihood that the long term average rate of return will be at least 7.90%. However, review of the latest survey results with historical results shows a clear shift in this assumption to lower assumed rates of return since the fiscal year 2001 survey as shown in the chart below:

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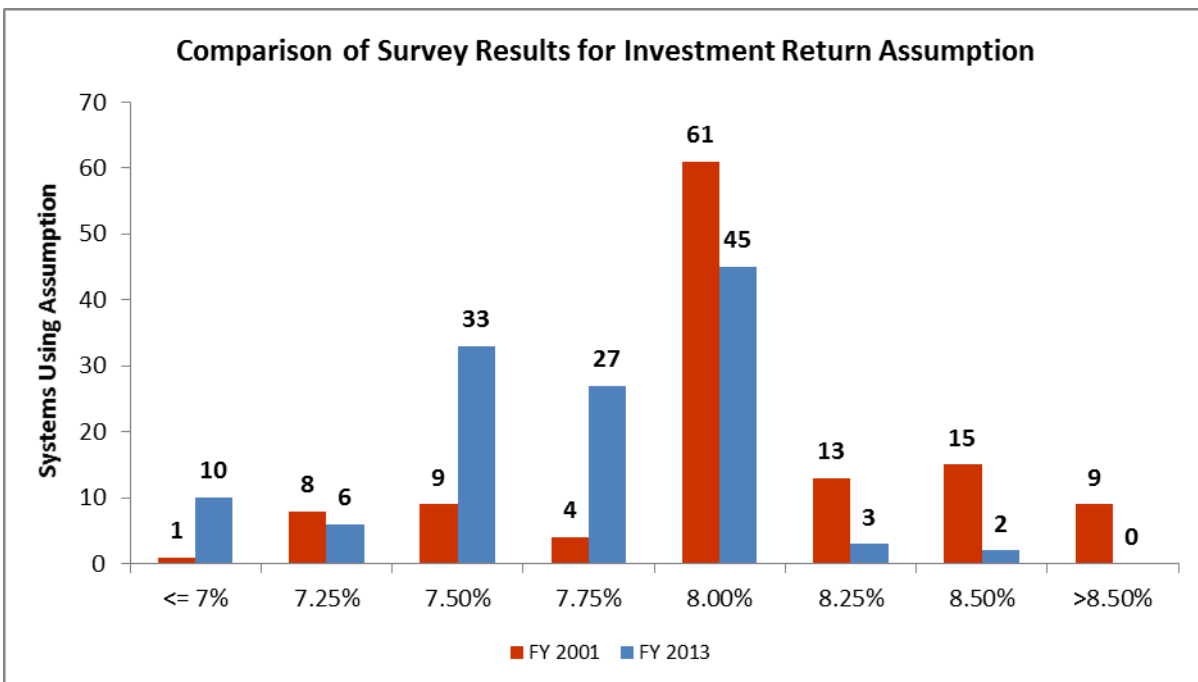
After review of past experience for PERS and future expectation analysis, we are recommending the real rate of return assumption can be increased from 4.50% to 4.75%. Combining this with our recommendation to lower the price inflation assumption, we recommend the long-term investment return assumption be reduced from 8.00% to 7.75%.

Investment Return Assumption		
	Current	**Recommended**
Real Rate of Return*	4.50%	4.75%
Inflation	3.50	3.00
Net Investment Return	8.00%	7.75%

* net of investment expenses.

Wage Inflation

Background: The assumed future increases in salaries consist of an inflation component and a component for promotion and longevity, often called merit increases. The latter are generally age and or service related, and will be dealt with in the demographic assumption section of the report. Wage inflation normally is greater than price inflation as a reflection of the overall return on labor in the economy. The rate of wage inflation above inflation is called the real rate of wage inflation and is the focus of our analysis.

The current wage inflation assumption is 4.25%, and is composed of a 3.50% rate of inflation assumption and a 0.75% real rate of wage inflation.

Past Experience: The Social Security Administration publishes data on wage growth in the United States. Appendix C shows the last 50 calendar years' data. As with our analysis of inflation, we provide below wage inflation and a comparison with price inflation over various time periods. Currently, this wage data is only available through calendar year 2013. We remove the rate of price inflation for each year from the data to result in the historical real rate of wage inflation.

Period	Wage Inflation	Price Inflation	Real Wage Growth
2003-2013	2.80%	2.37%	0.43%
1993-2003	3.95%	2.37%	1.58%
1983-1993	4.26%	3.71%	0.55%
1973-1983	7.23%	8.17%	(0.94)%
1963-1973	5.60%	4.10%	1.50%
1993-2013	3.37%	2.37%	1.00%
1983-2013	3.67%	2.82%	0.85%
1973-2013	4.55%	4.13%	0.42%
1963-2013	4.76%	4.12%	0.64%

Thus over the last 50 years, annual real wage growth has averaged 0.64%.

Annual Real Rates of Wage Growth
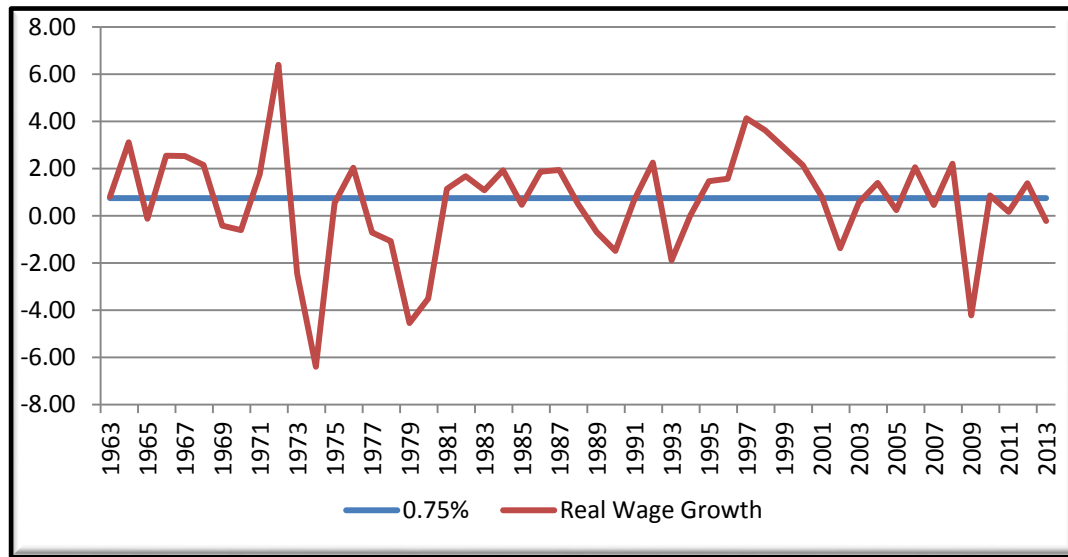
As the analysis of the national wage growth data shows, the shorter-term historical average real rate (0.43% for latest 10 year period) is lower than the longer-term average real rates. The rate of real wage inflation over the prior 20 and 30 year periods is 1.00% and 0.85% respectively. Over the longer term, 50 years, the rate is 0.64%.

Recommendation: As with price inflation, we again look at the 2014 OASDI Trustees Report. The Chief Actuary for Social Security bases the 75 year cost projections on an ultimate national wage growth assumption 1.12% greater than the price inflation assumption of 2.80%. We concur in general with a range of 0.5% to 1.5%, and recommend continued use of a 0.75% per year rate at the current time for real wage growth.

Wage Inflation Assumption		
	Current	Recommended
Price Inflation	3.50%	3.00%
Real Wage Growth	0.75%	0.75%
Wage Inflation	4.25%	3.75%

Section II
Demographic Assumptions

There are several demographic assumptions used in the actuarial valuations performed for Mississippi. They are:

- Rates of Withdrawal
- Pre-retirement Mortality
- Rates of Disability Retirement
- Rates of Service Retirement
- Post-retirement Mortality
- Rates of Salary Increase

Actuarial Standard of Practice (ASOP) No. 35, *"Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations"* 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 (July 1, 2010, through June 30, 2014) 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.

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

RATES OF WITHDRAWAL

### COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS
FROM ACTIVE SERVICE

| CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
	Withdrawals with more than 2 years of service					
20	153	118	1.297	157	101	1.554
25	1,682	1,354	1.242	2,650	2,152	1.231
30	2,374	2,114	1.123	4,257	3,961	1.075
35	1,937	1,789	1.083	3,672	3,393	1.082
40	1,729	1,602	1.079	3,400	2,969	1.145
45	1,546	1,460	1.059	2,885	2,554	1.130
50	1,423	1,325	1.074	2,738	2,404	1.139
53 & over	2,298	1,906	1.206	3,816	3,071	1.243
TOTAL	**13,142**	**11,668**	**1.126**	**23,575**	**20,605**	**1.144**

The following graphs show a comparison of the present, actual and proposed rates of withdrawal for withdrawals with more than 2 years of service.

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

RATES OF WITHDRAWAL FOR ACTIVE MEMBERS
WITH MORE THAN 2 YEARS OF SERVICE

Withdrawal Rates (Ultimate) Male

Withdrawal Rates (Ultimate) Female
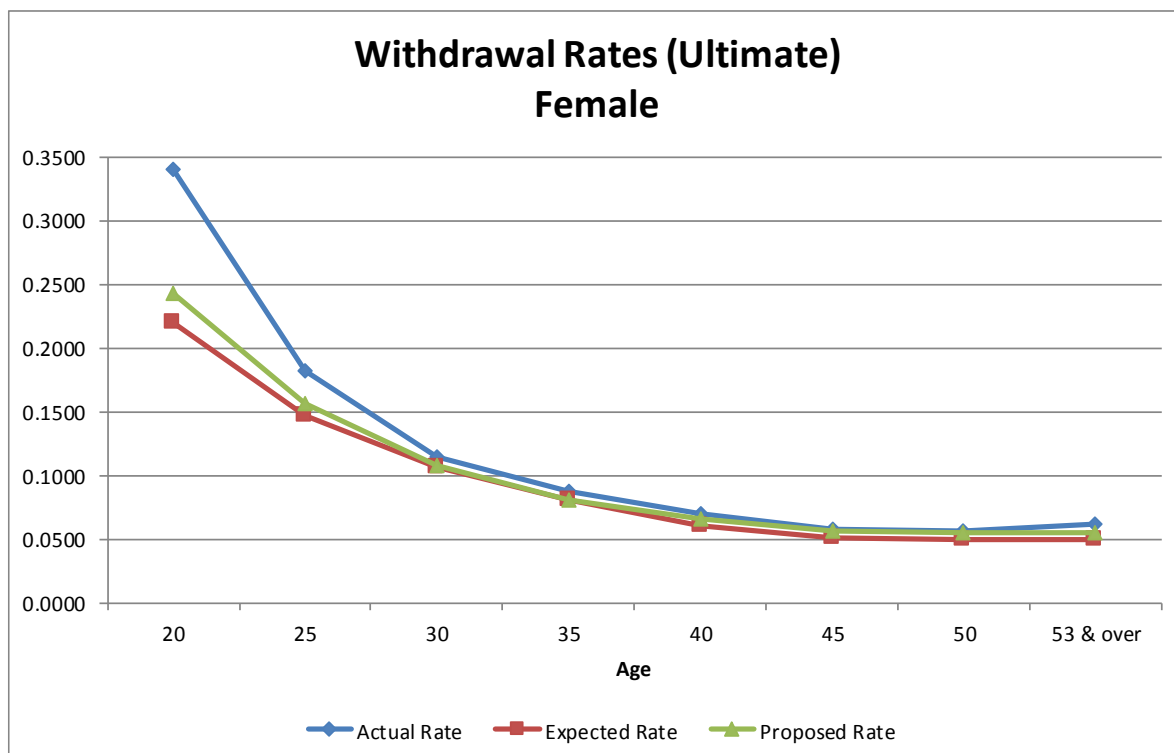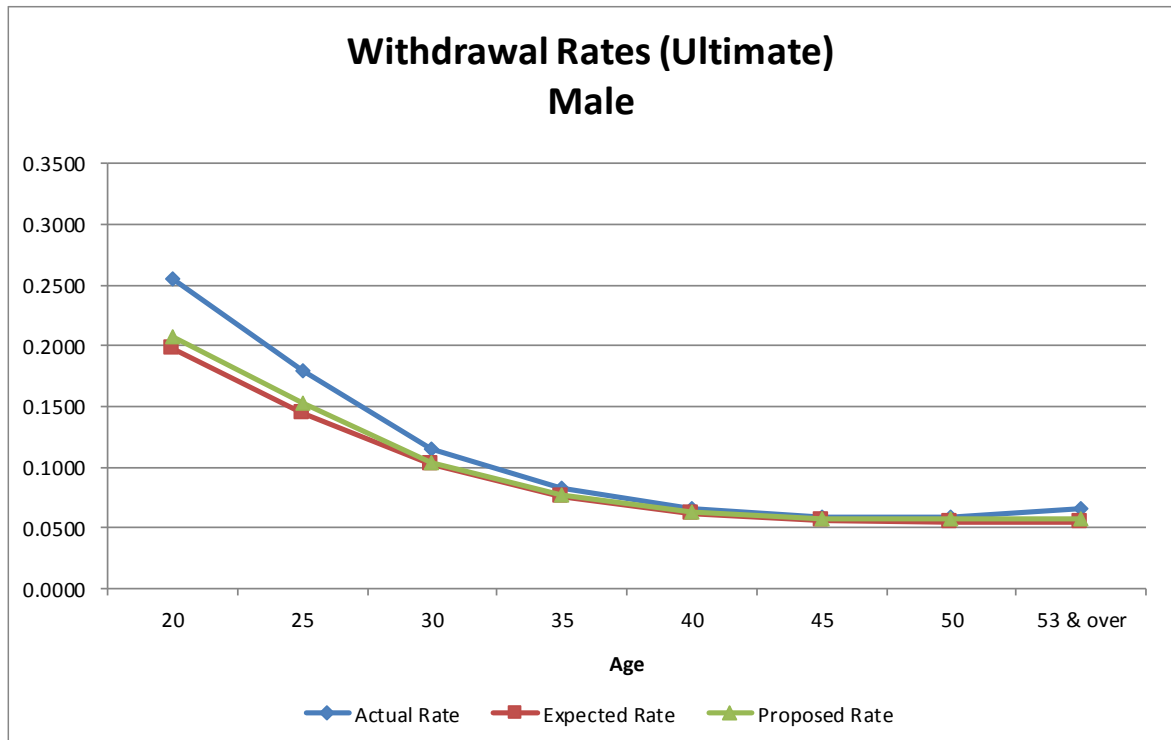
The rates of withdrawal adopted by the Board are used to determine the expected number of separations from active service which will occur as a result of resignation or dismissal. The results of our study indicate that for members with more than 2 years of service, the actual number of withdrawals was more at all age groups than expected over the four year period. The biggest differences occurred at the youngest ages and the oldest ages. Therefore, we recommend increasing the rates at the youngest and oldest ages for both males and females to partially reflect the higher numbers of terminations experience over the last four years.

Furthermore the actual rates of withdrawal during the select period (first 2 years) indicate that both male and female members are withdrawing at a greater rate during the second year of employment than currently expected. We recommend increasing the rate from 22% to 23% during the second year of employment.

The following table shows a comparison between the present withdrawal rates and the proposed withdrawal rates for members with more than 2 years of service.

COMPARATIVE RATES OF WITHDRAWAL

| AGE | RATES OF WITHDRAWAL | | | |
| | MALES | | FEMALES | |
	Present	Proposed	Present	Proposed
20	22.0%	23.00%	25.0%	28.00%
25	15.0	16.00	15.5	16.50
30	10.0	10.00	10.5	10.50
35	7.5	7.50	8.0	8.00
40	6.0	6.25	6.0	6.50
45	5.5	5.75	5.0	5.50
50	5.5	5.75	5.0	5.50
55	5.5	5.75	5.0	5.50
60	5.5	5.75	5.0	5.50
65	5.5	5.75	5.0	5.50
70	5.5	5.75	5.0	5.50
74	5.5	5.75	5.0	5.50

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

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Withdrawals with more than 2 years of service						
20	153	124	1.234	157	112	1.402
25	1,682	1,430	1.176	2,650	2,277	1.164
30	2,374	2,136	1.111	4,257	4,000	1.064
35	1,937	1,796	1.079	3,672	3,419	1.074
40	1,729	1,660	1.042	3,400	3,185	1.068
45	1,546	1,526	1.013	2,885	2,803	1.029
50	1,423	1,385	1.027	2,738	2,644	1.036
53 & over	2,298	1,993	1.153	3,816	3,378	1.130
TOTAL	**13,142**	**12,050**	**1.091**	**23,575**	**21,818**	**1.081**

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

RATES OF PRE-RETIREMENT MORTALITY

COMPARISON OF ACTUAL AND EXPECTED PRE-RETIREMENT DEATHS

CENTRAL AGE OF GROUP	NUMBER OF DEATHS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
30	7	5	1.400	6	5	1.200
35	17	8	2.125	11	7	1.571
40	20	13	1.538	13	12	1.083
45	22	23	0.957	17	19	0.895
50	38	43	0.884	27	27	1.000
55	56	55	1.018	30	30	1.000
60	57	59	0.966	20	33	0.606
63 & over	63	67	0.940	25	20	1.250
TOTAL	**280**	**273**	**1.026**	**149**	**153**	**0.974**

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

Mortality Rates - Males

Mortality Rates - Females
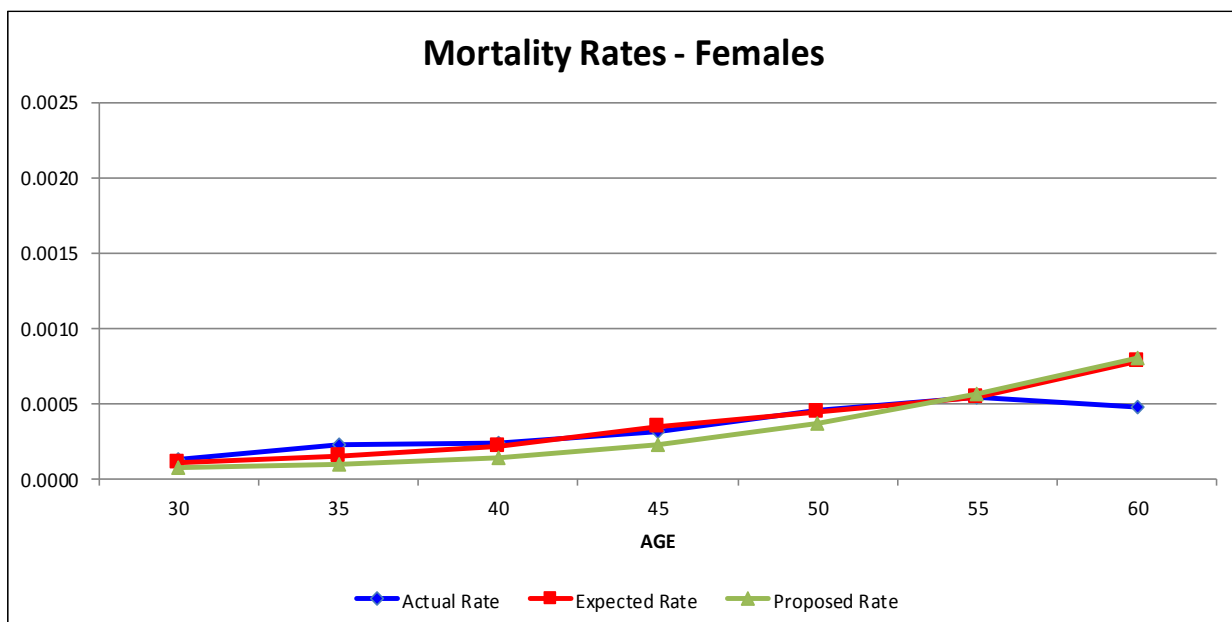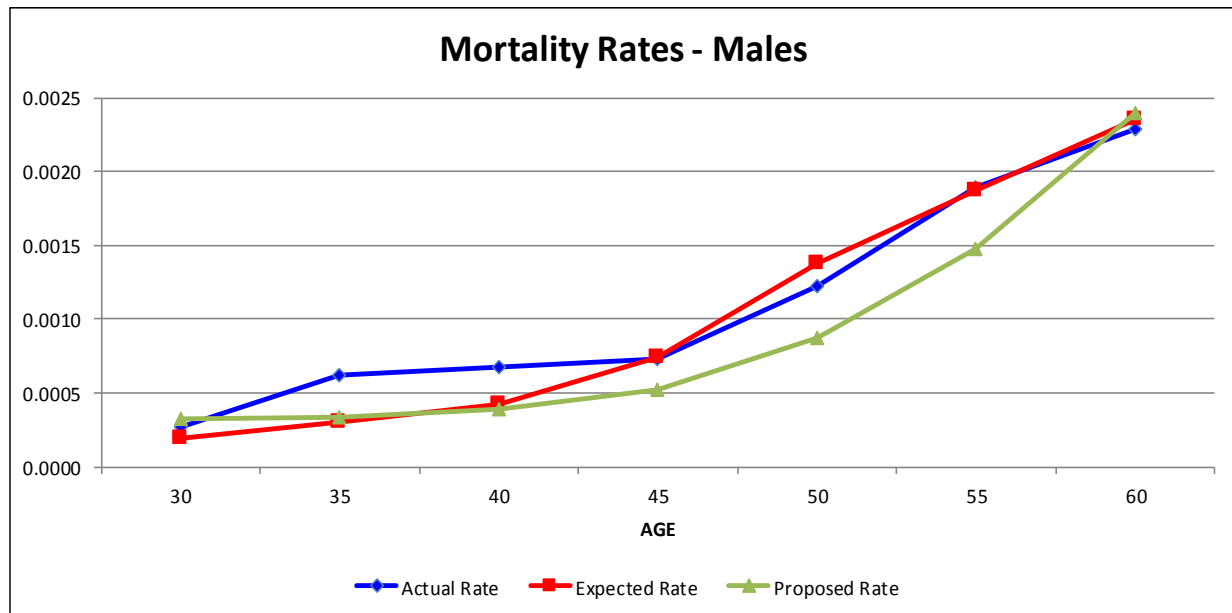
During the period of investigation, the actual rates of pre-retirement deaths were slightly more than expected in total for males. We are recommending updating the mortality assumption to 55% of the RP-2014 employee mortality table projected with Scale BB to 2016 for males with ages set back 3 years. For females, actual rates of pre-retirement death were slightly less than expected in total. We are recommending updating the mortality assumption to 30% of the RP-2014 employee mortality table projected with Scale BB to 2016 for females.

The RP-2014 mortality tables are the most recent mortality tables developed by the Society of Actuaries and are being recommended for inactive lives as well. The following table shows a comparison between the present pre-retirement mortality rates and the proposed rates. The proposed rates allow for some improved mortality in the future.

COMPARATIVE RATES OF PRE-RETIREMENT MORTALITY

AGE	RATES OF DEATH			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
20	0.0100%	0.0159%	0.0080%	0.0054%
25	0.0100	0.0346	0.0080	0.0058
30	0.0200	0.0318	0.0100	0.0073
35	0.0300	0.0337	0.0150	0.0096
40	0.0400	0.0390	0.0200	0.0132
45	0.0700	0.0513	0.0350	0.0220
50	0.1400	0.0859	0.0450	0.0369
55	0.1900	0.1466	0.0520	0.0557
60	0.2200	0.2391	0.0800	0.0805
65	0.4000	0.4076	0.1000	0.1214

COMPARISON OF ACTUAL AND EXPECTED PRE-RETIREMENT DEATHS BASED ON PROPOSED RATES

| CENTRAL AGE OF GROUP	NUMBER OF DEATHS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
30	7	8	0.875	6	3	2.000
35	17	9	1.889	11	5	2.200
40	20	12	1.667	13	7	1.857
45	22	16	1.375	17	12	1.417
50	38	27	1.407	27	22	1.227
55	56	44	1.273	30	31	0.968
60	57	60	0.950	20	34	0.588
63 & over	63	89	0.708	25	28	0.893
TOTAL	**280**	**265**	**1.057**	**149**	**142**	**1.049**

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

RATES OF DISABILITY RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED DISABILITY RETIREMENTS

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Below 38	15	23	0.652	24	27	0.889
40	34	36	0.944	46	49	0.939
45	75	66	1.136	92	84	1.095
50	105	103	1.019	144	144	1.000
55	150	142	1.056	214	207	1.034
58 & over	165	124	1.331	213	169	1.260
TOTAL	**544**	**494**	**1.101**	**733**	**680**	**1.078**

The following graphs show a comparison of the present, actual, and proposed rates of disability retirements.

Disability Rates - Males

Disability Rates - Females
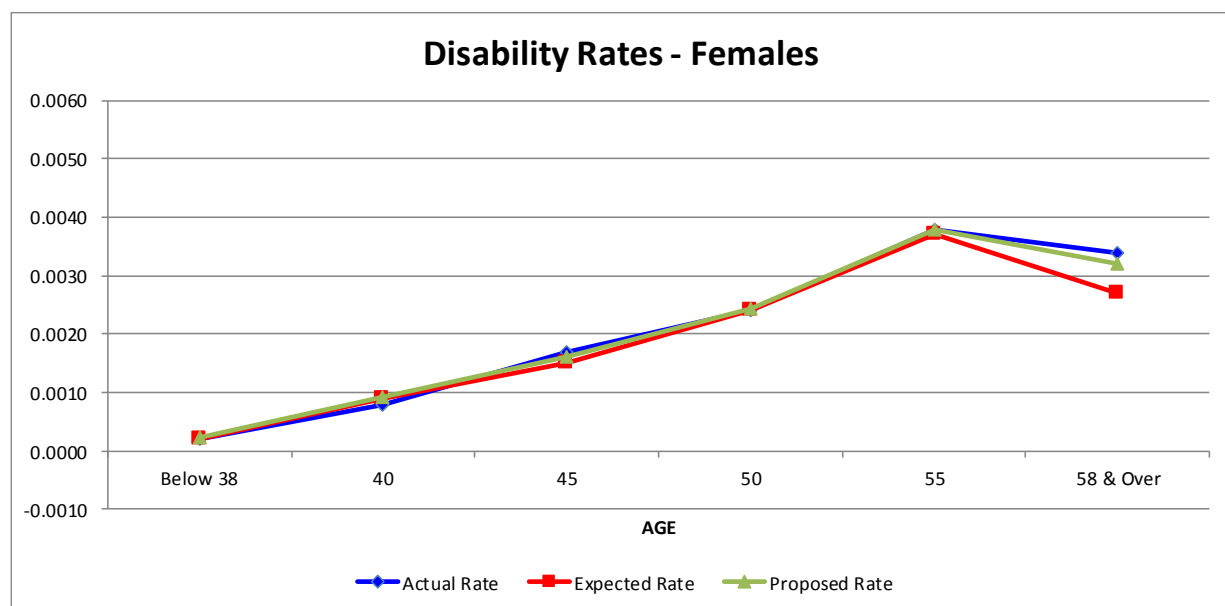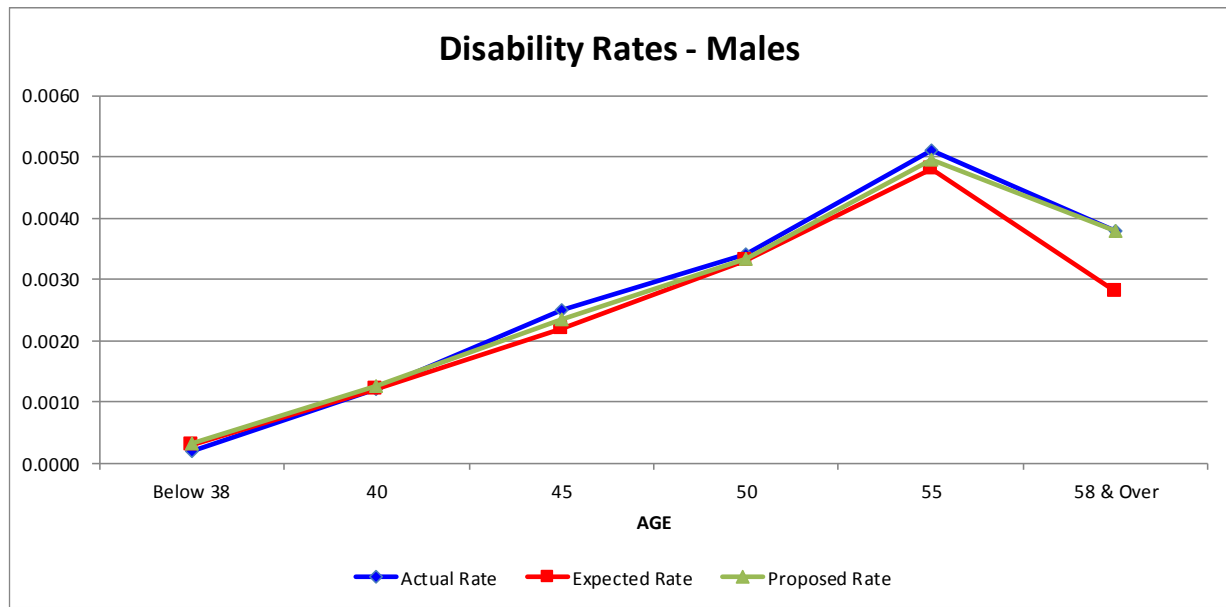
As can be seen from the table on the previous page, the actual rates of disability retirement are more than expected, mostly for those members at or over age 58. The current rates of disability retirement stop before age 65. However, it appears from the data that some members are not eligible for service retirement at age 65 and are instead retiring as disabled. Therefore, we recommend extending the disability rates beyond age 65. We also recommend a slight increase in the rates of disability retirement at a few central ages.

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			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
20	0.012%	0.012%	0.011%	0.011%
25	0.017	0.017	0.014	0.014
30	0.020	0.020	0.018	0.018
35	0.044	0.044	0.022	0.022
40	0.120	0.120	0.090	0.090
45	0.220	0.240	0.150	0.160
50	0.320	0.320	0.230	0.230
55	0.520	0.520	0.400	0.400
60	0.380	0.520	0.320	0.400
65	0.000	0.200	0.000	0.150

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

CENTRAL AGE OF GROUP	NUMBER OF DISABILITY RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Below 38	15	23	0.652	24	27	0.889
40	34	37	0.919	46	50	0.920
45	75	71	1.056	92	89	1.034
50	105	103	1.019	144	144	1.000
55	150	147	1.020	214	213	1.005
58 & over	165	147	1.122	213	184	1.158
TOTAL	**544**	**528**	**1.030**	**733**	**707**	**1.037**

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

RATES OF RETIREMENT

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

Retirements with less than 25 years of service

AGE OF GROUP	NUMBER OF RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
60	298	309	0.964	778	712	1.093
61	274	286	0.958	546	506	1.079
62	548	500	1.096	784	737	1.064
63	389	363	1.072	590	564	1.046
64	271	272	0.996	470	464	1.013
65	358	326	1.098	583	554	1.052
66	236	239	0.987	367	343	1.070
67	171	158	1.082	216	191	1.131
68	114	111	1.027	130	136	0.956
69	127	114	1.114	107	106	1.009
70	93	97	0.959	120	100	1.200
71	80	78	1.026	75	77	0.974
72	73	64	1.141	55	58	0.948
73	47	52	0.904	46	46	1.000
74	59	52	1.135	30	30	1.000
Subtotal	**3,138**	**3,021**	**1.039**	**4,897**	**4,624**	**1.059**
75 & Over	236	1,059	0.223	135	578	0.234
GRAND TOTAL	**3,374**	**4,080**	**0.827**	**5,032**	**5,202**	**0.967**

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

Retirements with 25 or more years of service

AGE OF GROUP	NUMBER OF RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Below 48	182	140	1.300	154	118	1.305
48-51	466	393	1.186	686	590	1.163
52	161	138	1.167	273	245	1.114
53	129	128	1.008	337	280	1.204
54	163	155	1.052	329	304	1.082
55	206	188	1.096	429	378	1.135
56	217	186	1.167	394	367	1.074
57	159	172	0.924	397	390	1.018
58	150	156	0.962	399	394	1.013
59	168	157	1.070	456	422	1.081
60	197	202	0.975	449	414	1.085
61	183	204	0.897	430	418	1.029
62	270	271	0.996	570	530	1.075
63	161	164	0.982	357	333	1.072
64	131	144	0.910	299	274	1.091
65	155	146	1.062	300	286	1.049
66	105	105	1.000	163	167	0.976
67	54	60	0.900	111	117	0.949
68	48	49	0.980	53	57	0.930
69	42	42	1.000	45	45	1.000
70	31	34	0.912	33	29	1.138
71	18	25	0.720	36	30	1.200
72	23	19	1.211	22	21	1.048
73	13	12	1.083	16	20	0.800
74	13	14	0.929	15	17	0.882
Subtotal	**3,445**	**3,304**	**1.043**	**6,753**	**6,246**	**1.081**
75 & Over	71	315	0.225	73	238	0.307
GRAND TOTAL	**3,516**	**3,619**	**0.972**	**6,826**	**6,484**	**1.053**

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

**RATES OF RETIREMENT FOR ACTIVE MEMBERS
WITH LESS THAN 25 YEARS OF SERVICE**
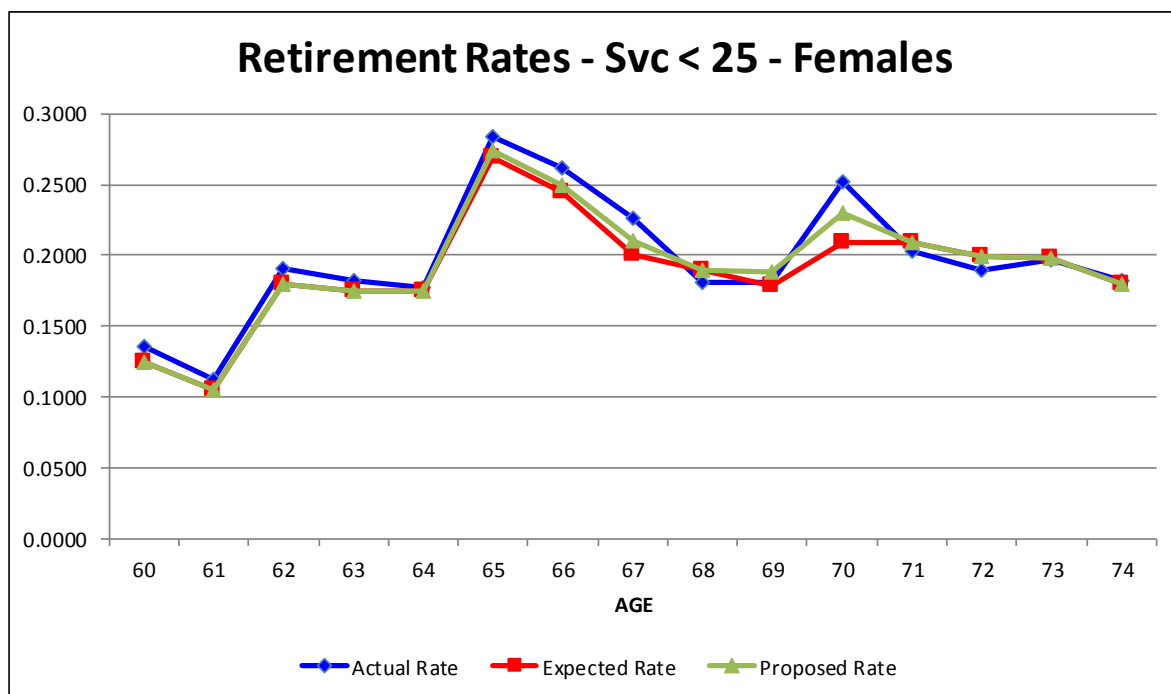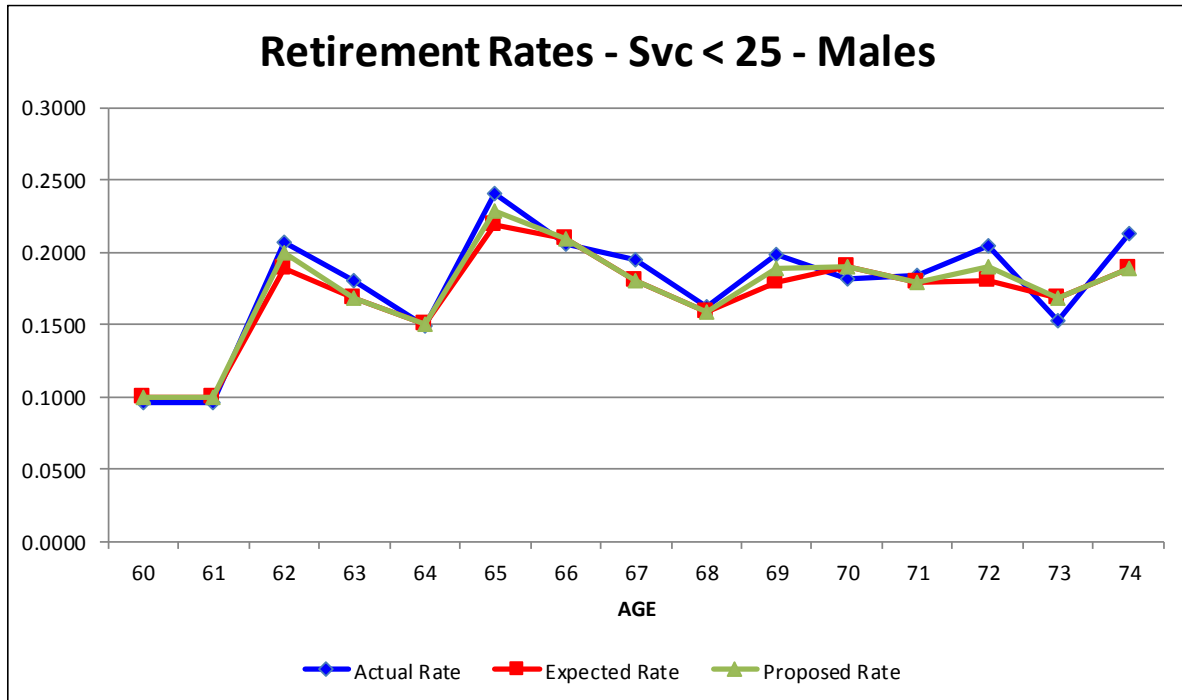
RATES OF RETIREMENT FOR ACTIVE MEMBERS
WITH 25 OR MORE YEARS OF SERVICE

Retirement Rates - Svc >= 25 - Males

Retirement Rates - Svc >= 25 - Females
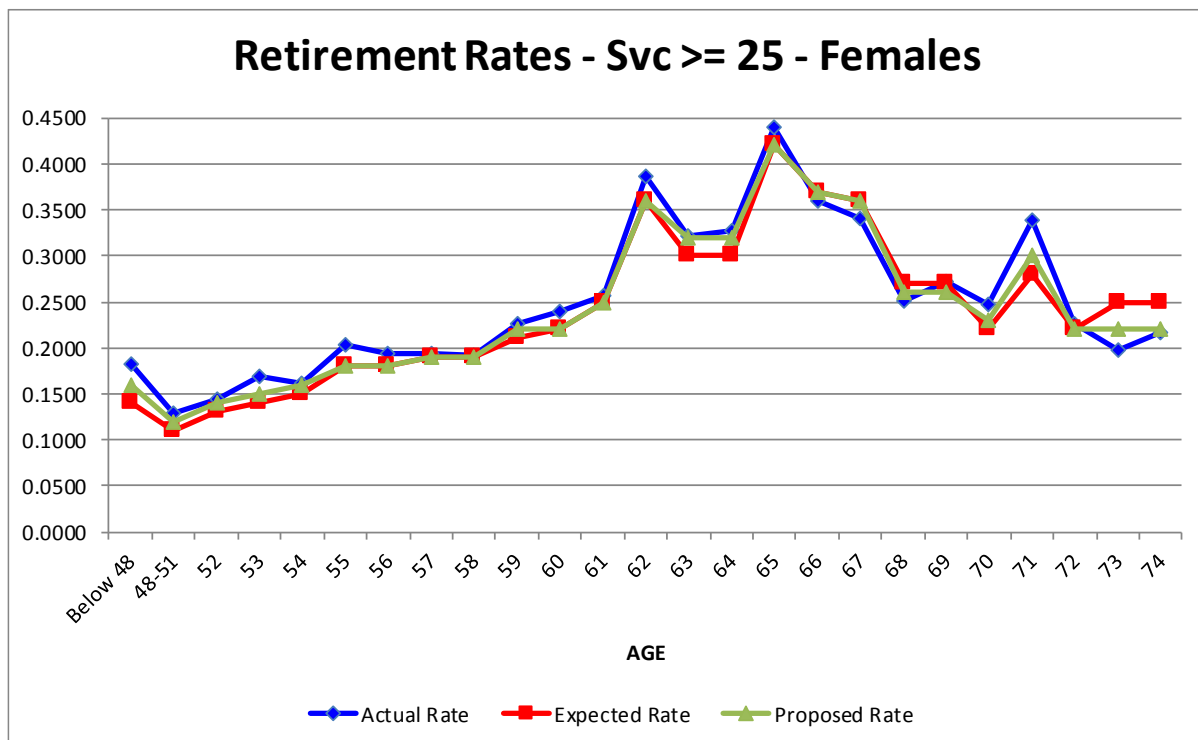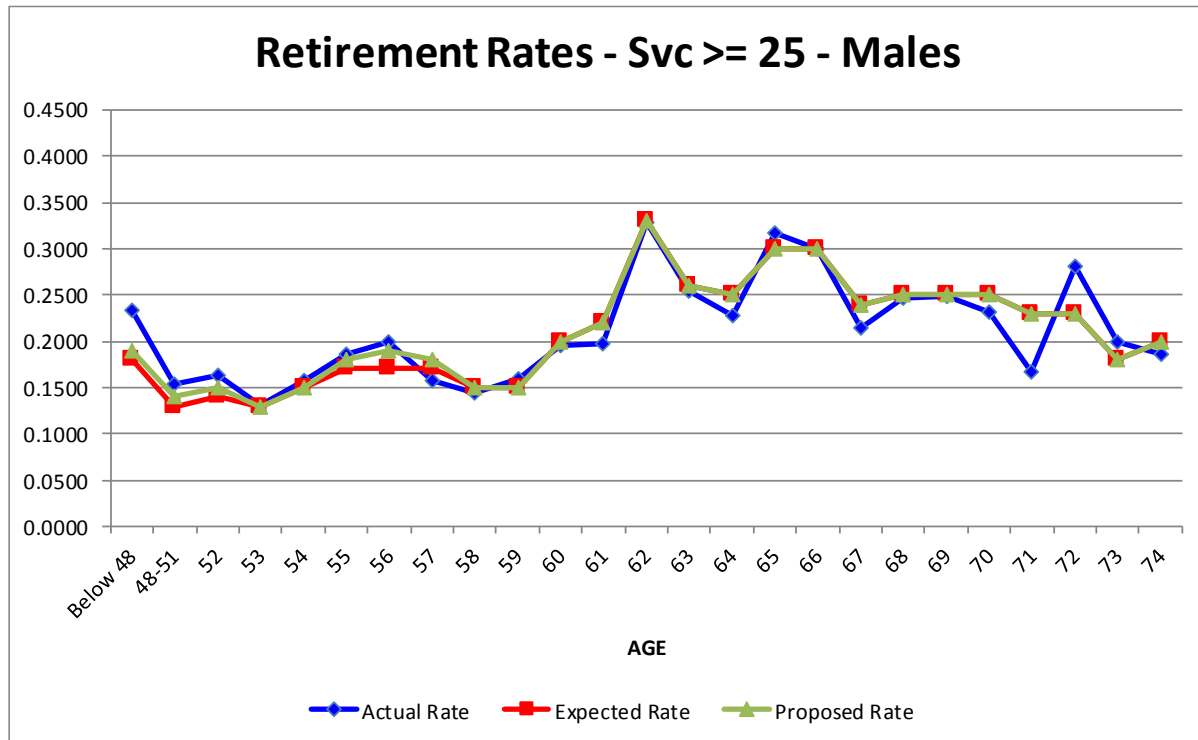
As can be seen from the previous 4 pages, the actual rates of service retirement, for both under 25 years and over 25 years are extremely close to expected at almost all ages. However, we recommend some very small increases at some ages to better reflect experience of the System.

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

COMPARATIVE RATES OF RETIREMENT

AGE	RATES OF SERVICE RETIREMENT*							
	MALES				FEMALES			
	Under 25 Years of Service		25 Years of Service and Over		Under 25 Years of Service		25 Years of Service and Over	
	Present	Proposed	Present	Proposed	Present	Proposed	Present	Proposed
45			18.0%	19.0%			14.0%	16.0%
50			13.0	14.0			11.0	12.0
55			17.0	18.0			18.0	18.0
60	10.0%	10.0%	20.0	20.0	12.5%	12.5%	22.0	22.0
62	19.0	20.0	33.0	33.0	18.0	18.0	36.0	36.0
65	22.0	23.0	30.0	30.0	27.0	27.5	42.0	42.0
70	19.0	19.0	25.0	25.0	21.0	23.0	22.0	23.0
75	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* The proposed changes shown above are used for Tier 4 service retirements as well, except the 25 years of service is 30 years of service for these members.

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS BASED ON PROPOSED RATES

Retirements with less than 25 years of service

AGE OF GROUP	NUMBER OF RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
60	298	309	0.964	778	712	1.093
61	274	286	0.958	546	506	1.079
62	548	526	1.042	784	737	1.064
63	389	363	1.072	590	564	1.046
64	271	272	0.996	470	464	1.013
65	358	341	1.050	583	564	1.034
66	236	239	0.987	367	350	1.049
67	171	158	1.082	216	201	1.075
68	114	111	1.027	130	136	0.956
69	127	121	1.050	107	112	0.955
70	93	97	0.959	120	109	1.101
71	80	78	1.026	75	77	0.974
72	73	68	1.074	55	58	0.948
73	47	52	0.904	46	46	1.000
74	59	52	1.135	30	30	1.000
Subtotal	**3,138**	**3,073**	**1.021**	**4,897**	**4,666**	**1.050**
75 & Over	236	1,059	0.223	135	578	0.234
GRAND TOTAL	**3,374**	**4,132**	**0.817**	**5,032**	**5,244**	**0.960**

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS BASED ON PROPOSED RATES

Retirements with 25 or more years of service

AGE OF GROUP	NUMBER OF RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Below 48	182	148	1.230	154	135	1.141
48-51	466	423	1.102	686	643	1.067
52	161	148	1.088	273	263	1.038
53	129	128	1.008	337	300	1.123
54	163	155	1.052	329	324	1.015
55	206	199	1.035	429	378	1.135
56	217	208	1.043	394	367	1.074
57	159	182	0.874	397	390	1.018
58	150	156	0.962	399	394	1.013
59	168	157	1.070	456	442	1.032
60	197	202	0.975	449	414	1.085
61	183	204	0.897	430	418	1.029
62	270	271	0.996	570	530	1.075
63	161	164	0.982	357	355	1.006
64	131	144	0.910	299	292	1.024
65	155	146	1.062	300	286	1.049
66	105	105	1.000	163	167	0.976
67	54	60	0.900	111	117	0.949
68	48	49	0.980	53	55	0.964
69	42	42	1.000	45	43	1.047
70	31	34	0.912	33	31	1.065
71	18	25	0.720	36	32	1.125
72	23	19	1.211	22	21	1.048
73	13	12	1.083	16	18	0.889
74	13	14	0.929	15	15	1.000
Subtotal	**3,445**	**3,395**	**1.015**	**6,753**	**6,430**	**1.050**
75 & Over	71	315	0.225	73	238	0.307
GRAND TOTAL	**3,516**	**3,710**	**0.948**	**6,826**	**6,668**	**1.024**

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

RATES OF POST-RETIREMENT 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						
Below 53	21	6	3.500	21	6	3.500
55	38	21	1.810	36	29	1.241
60	124	79	1.570	143	131	1.092
65	344	278	1.237	342	387	0.884
70	490	415	1.181	487	547	0.890
75	649	563	1.153	639	647	0.988
80	728	747	0.975	938	840	1.117
85	693	786	0.882	1,113	1,044	1.066
90	463	516	0.897	1,023	935	1.094
95	172	180	0.956	585	489	1.196
98 & over	36	41	0.878	189	148	1.277
TOTAL	**3,758**	**3,632**	**1.035**	**5,516**	**5,203**	**1.060**
DISABILITY RETIREMENTS						
Below 48	17	19	0.895	23	9	2.556
50	23	27	0.852	25	19	1.316
55	52	53	0.981	53	41	1.293
60	82	87	0.943	75	69	1.087
65	71	88	0.807	63	80	0.788
70	72	57	1.263	52	61	0.852
75	51	42	1.214	27	54	0.500
80	27	21	1.286	34	34	1.000
85	24	12	2.000	13	18	0.722
88 & over	4	4	1.000	17	18	0.944
TOTAL	**423**	**410**	**1.032**	**382**	**403**	**0.948**

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

POST-RETIREMENT DEATHS
SERVICE RETIREMENTS AND BENEFICIARIES
**OF DECEASED MEMBERS**

Non-Disabled Mortality Rates - Males

Non-Disabled Mortality Rates - Females
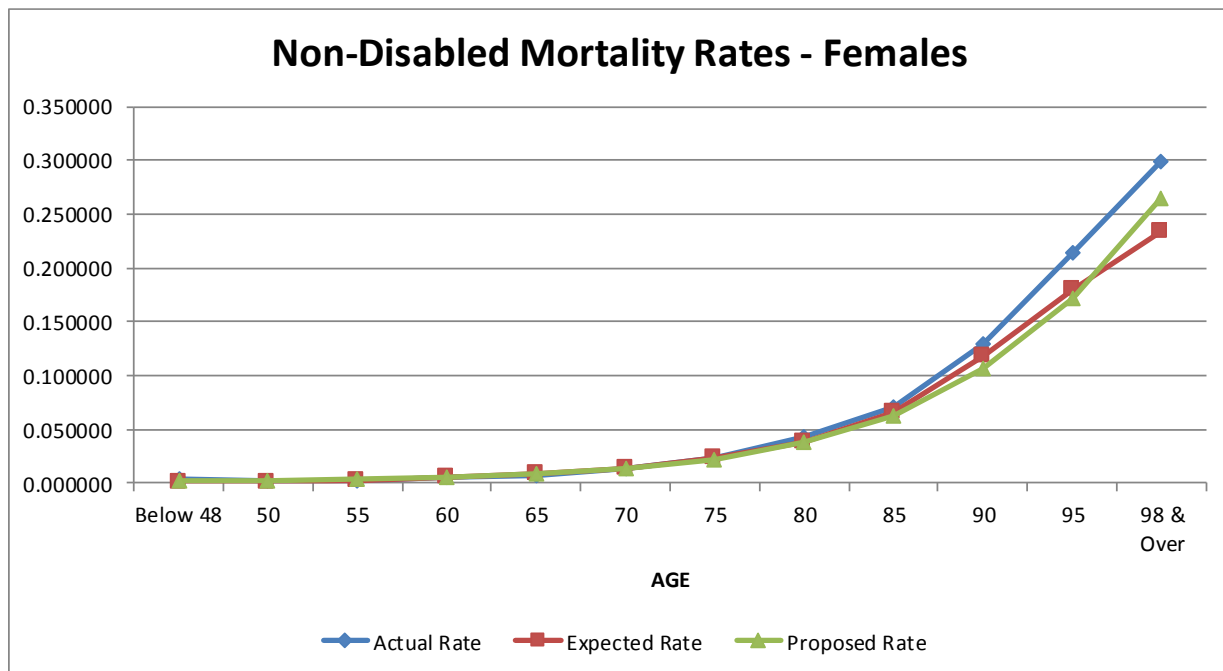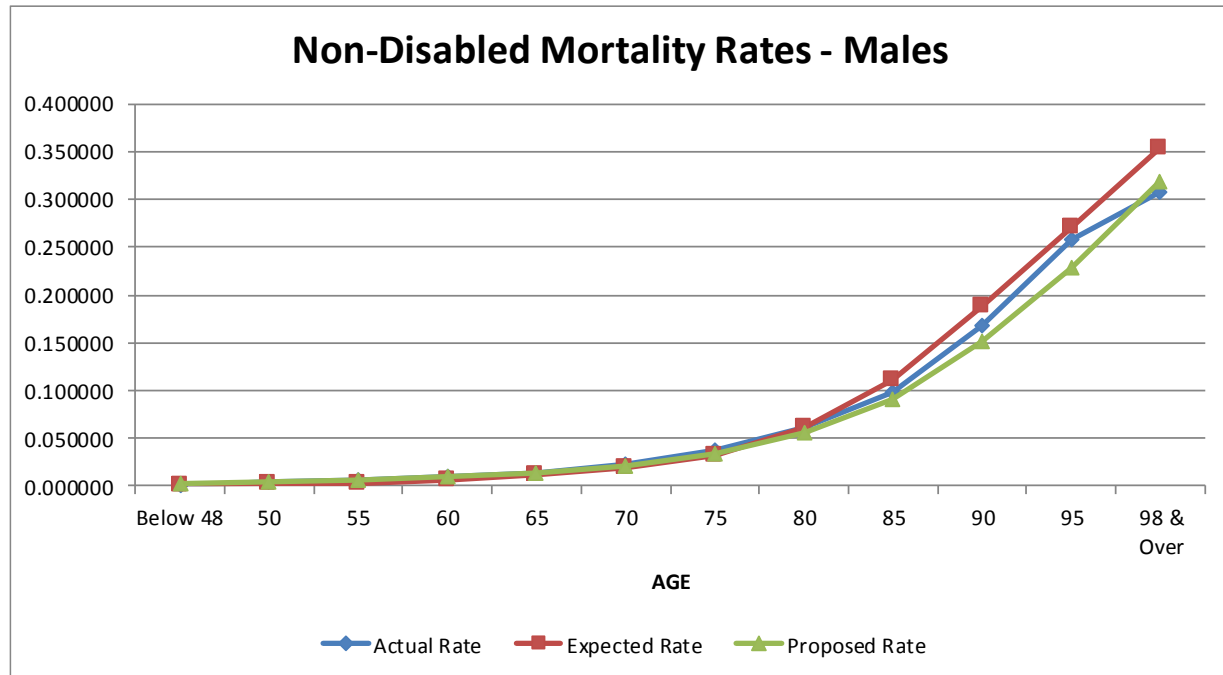
POST-RETIREMENT DEATHS
DISABILITY RETIREMENTS

Disability Mortality Rates - Males

Disability Mortality Rates - Females
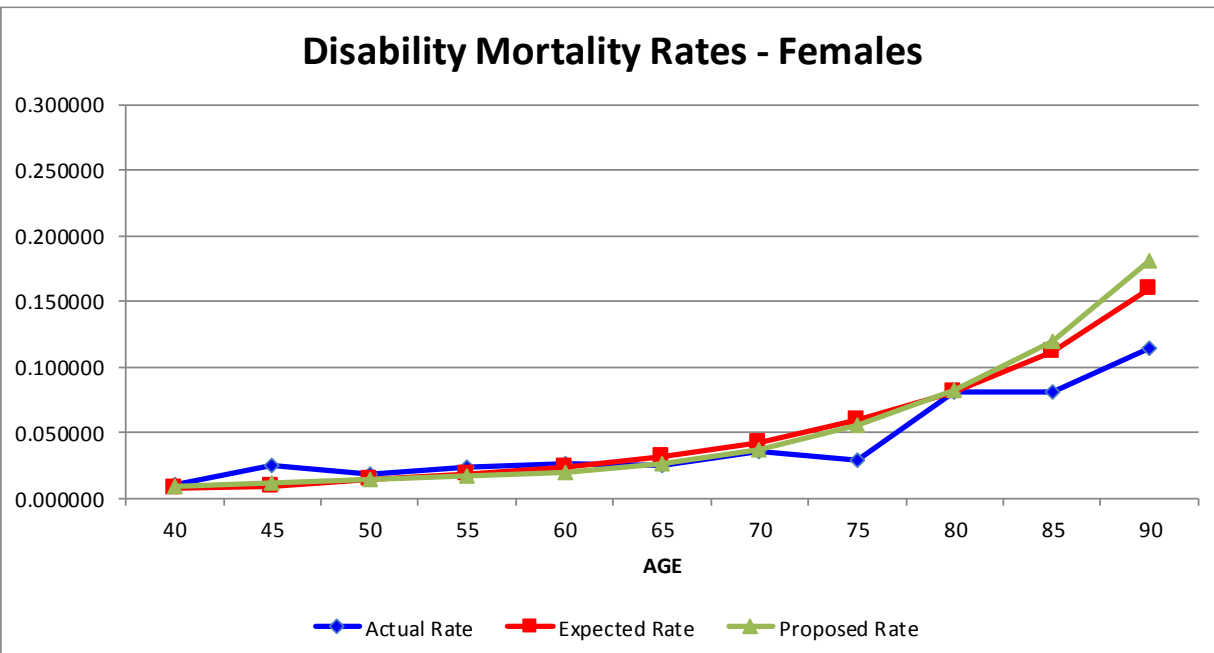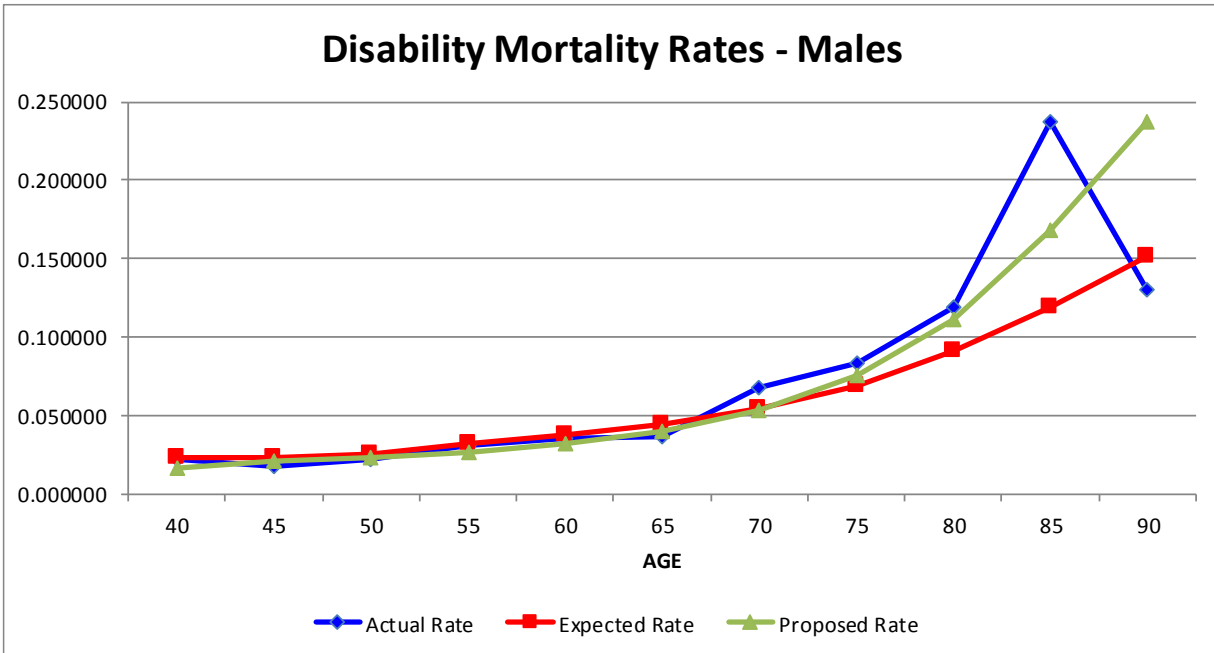
While the current rates of post-retirement mortality match the actual experience of the System over the period fairy close, we recommend a change to a more recent published mortality table. The Society of Actuaries recently published the RP-2014 mortality tables and highly recommends adopting them use for in pension valuations. Although the mortality experience used to construct the table did not include any public pension plan data, we found the blue collar version of the table to be an even better fit to the System's experience than the current assumption. The blue collar version of the table was constructed using data from so called hourly plans and union plans. The Society published RP-2014 table versions of both hourly experience (blue collar) and salaried experience (white collar). We recommend adoption of the RP-2014 Healthy Annuitant Blue Collar Table projected with Scale BB to 2016 with male rates set forward one year. We also recommend adoption of the RP-2014 Disabled Retiree table set forward 5 years for males and 4 years for females be used for retirements due to disability. The following table shows a comparison between the present and proposed rates of mortality.

COMPARATIVE RATES OF POST-RETIREMENT MORTALITY

| AGE | RATES OF POST-RETIREMENT DEATH | | | |
| | MALES | | FEMALES | |
	Present	Proposed	Present	Proposed
SERVICE RETIREMENTS & BENEFICIARIES OF DECEASED MEMBERS				
55	0.2905%	0.6396%	0.2223%	0.3985%
60	0.5851	0.8974	0.4460	0.5621
65	1.1300	1.3437	0.8563	0.8517
70	1.8697	2.0935	1.4770	1.3633
75	3.2972	3.3706	2.2993	2.2423
80	6.2604	5.5724	3.8490	3.7254
85	11.4132	9.3496	6.6628	6.3460
90	19.5953	15.8265	12.2153	10.9418
DISABILITY RETIREMENTS				
35	2.2571%	1.0997%	0.7450%	0.5027%
40	2.2571	1.7039	0.7450	0.8112
45	2.2571	2.0395	0.8959	1.1352
50	2.5124	2.3369	1.3456	1.3992
55	3.1563	2.6604	1.8654	1.6447
60	3.8026	3.1685	2.4080	1.9884
65	4.4981	4.0346	3.1325	2.6348
70	5.4450	5.4287	4.2851	3.7962
75	6.9405	7.6616	5.9545	5.6372
80	9.2149	11.3303	8.2298	8.3652
85	12.1877	17.3005	11.4512	12.2939
90	15.5235	24.7169	15.9924	18.1474

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 PROPOSED 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						
Below 53	21	16	1.313	21	14	1.500
55	38	44	0.864	36	49	0.735
60	124	116	1.069	143	159	0.899
65	344	327	1.052	342	384	0.891
70	490	459	1.068	487	513	0.949
75	649	578	1.123	639	623	1.026
80	728	665	1.095	938	813	1.154
85	693	645	1.074	1,113	989	1.125
90	463	418	1.108	1,023	845	1.211
95	172	153	1.124	585	469	1.247
98 & over	36	37	0.973	189	168	1.125
TOTAL	**3,758**	**3,458**	**1.087**	**5,516**	**5,026**	**1.097**
DISABILITY RETIREMENTS						
Below 48	17	16	1.063	23	10	2.300
50	23	25	0.920	25	19	1.316
55	52	45	1.156	53	36	1.472
60	82	73	1.123	75	57	1.316
65	71	79	0.899	63	67	0.940
70	72	56	1.286	52	54	0.963
75	51	46	1.109	27	51	0.529
80	27	25	1.080	34	35	0.971
85	24	17	1.412	13	19	0.684
88 & over	4	6	0.667	17	21	0.810
TOTAL	**423**	**388**	**1.090**	**382**	**369**	**1.035**

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

RATES OF SALARY INCREASE

COMPARISON OF ACTUAL AND EXPECTED SALARIES
OF ACTIVE MEMBERS

SERVICE OF GROUP	SALARIES AT END OF YEAR ($1,000's)		
	MALES AND FEMALES		
	Actual	Expected	Ratio of Actual to Expected
0	$1,752,174	$1,765,022	0.993
1	1,229,678	1,292,200	0.952
2	1,183,728	1,224,495	0.967
3	1,170,572	1,203,756	0.972
4	1,111,660	1,140,610	0.975
5-9	4,628,553	4,726,570	0.979
10-14	3,692,472	3,773,749	0.978
15-19	2,816,546	2,888,808	0.975
20-24	2,171,847	2,225,924	0.976
25-29	1,088,677	1,112,350	0.979
30-34	493,901	503,794	0.980
35 & Over	206,845	211,816	0.977
TOTAL	$21,546,653	$22,069,094	0.976

Over the past four years, actual rates of salary increase have been less than expected at all service breakdowns. In the economic section of this experience study report, we are recommending the price inflation assumption be reduced from 3.50% to 3.00% (see page 8). As the price inflation assumption is part of our building block approach to determining the salary scale, the total salary scale will be reduced accordingly at all service intervals. The following table shows a comparison between the present and proposed rates of salary increase.

SERVICE OF GROUP	SALARY INCREASE RATES	
	MALES AND FEMALES	
	Present	Proposed
0	19.50%	19.00%
1	9.50%	9.00%
2	7.00%	6.50%
3	6.00%	5.50%
4	5.50%	5.00%
5-7	5.00%	4.50%
8-27	4.50%	4.00%
28 and Over	4.25%	3.75%

COMPARISON OF ACTUAL AND EXPECTED SALARIES
OF ACTIVE MEMBERS
BASED ON PROPOSED RATES

SERVICE OF GROUP	SALARIES AT END OF YEAR ($1,000's)		
	MALES AND FEMALES		
	Actual	Expected	Ratio of Actual to Expected
0	$1,752,174	$1,757,637	0.997
1	1,229,678	1,286,298	0.956
2	1,183,728	1,218,773	0.971
3	1,170,572	1,198,078	0.977
4	1,111,660	1,135,205	0.979
5-9	4,628,553	4,704,024	0.984
10-14	3,692,472	3,755,694	0.983
15-19	2,816,546	2,874,987	0.980
20-24	2,171,847	2,215,275	0.980
25-29	1,088,677	1,107,024	0.983
30-34	493,901	501,378	0.985
35 & Over	206,845	210,800	0.981
TOTAL	$21,546,653	$21,965,173	0.981

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

OTHER ASSUMPTIONS

AMORTIZATION METHOD: Currently, the unfunded accrued liability is amortized using the level percent of payroll amortization method. This method is a reasonable method under actuarial standards. Therefore, we recommend no change in this methodology.

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 20% of the difference between market value and expected market value. We recommend no change in this methodology.

OPTION FACTORS: The option factors, currently in use by all of the Retirement Systems, 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 proposed mortality table and the investment rate of return recommended 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 in the EAN Cost Method.

DEFERRED VESTEDS: Currently, the valuation assumes 70% of participants that leave the System as deferred vested will receive a deferred benefit upon attaining the eligibility requirements for retirement. This assumption was changed from 100% in prior valuations. Due to the higher employee contribution percentage, experience is showing more members are taking a refund of their employee contribution accounts and therefore, we recommend lowering the assumption to 60% due to increased refund activity among vested members.

DEATH ASSUMPTION: Currently, it is assumed that 6% of active member deaths are in the line of duty and 94% of active members deaths are not in the line of duty. During the experience investigation period, about 5.5% of active deaths each year were in the line of duty so, therefore, we recommend no change in this assumption at this time.

DISABILITY ASSUMPTION: Currently, it is assumed that 6% of active member disabilities are in the line of duty and 94% of active members disabilities are not in the line of duty. During the experience investigation period, an average of 7.0% of disabilities each year were in the line of duty. However, looking at the data by individual year, experience shows only 6.6% for the 2014 fiscal year. Therefore, we recommend no change at this time but will review closely at the next experience study.

PERCENT MARRIED: Currently, 85% of active members are assumed to be married and elect a joint & survivor payment form. 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 three years older than his spouse. We have reviewed this assumption and recommend no change at this time.

UNUSED LEAVE: Currently, we assume that participants will have on average 0.50 years of unused leave (sick and personal) at retirement. We reviewed this assumption for those participants who retired during this four year period and the average number of years of unused leave was 0.55 years. Therefore, we recommend no change at this time.

MILITARY SERVICE: Currently, we assume that participants will have on average 0.25 years of military service at retirement. We reviewed this assumption for those participants who retired during this four year period and the average number of years of military service was 0.26 years. Therefore, we recommend no change at this time.

HIGHWAY SAFETY PATROL RETIREMENT SYSTEM

SUMMARY OF RESULTS

Over the period of this investigation, we have noted the following observations:

➢ There were 33 actual withdrawals versus 32 expected withdrawals over the four year period of this investigation. In the prior investigation, the number of actual withdrawals was less than the number of expected withdrawals. At this time, we recommend no change.

➢ There were 72 actual retirements versus 94 expected retirements over the four-year period of this investigation. We recommend decreasing the retirement decrements mostly at service levels of less than 25 years.

➢ There was one death while in active service over the four-year period of this investigation and there was one death in the prior study. We recommend updating the mortality assumption to the RP-2014 Blue Collar Employee Table with adjustments to be consistent with our change to PERS.

➢ There was 1 disability retirement over the four-year period of this investigation compared to 3 in the prior study. The current rates of disability expect four in the period. We recommend no change in disability rates at this time.

➢ Actual rates of salary increase were lower than expected over the four year period. Since we recommend lowering the price inflation assumption from 3.5% to 3.0%, total expected salary increases will be one-half percent lower.

➢ As mentioned in the PERS section of this report, we recommend that the rates of mortality for service retirements be revised to the RP-2014 Healthy Annuitant Blue Collar Mortality Table Projected with Scale BB to 2016 set forward one year for males. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2014

Disabled Mortality Table set back forward five years for males and set forward four years

for females. We recommend each of the Systems have the same mortality table.

SUPPLEMENTAL LEGISLATIVE RETIREMENT PLAN

SUMMARY OF RESULTS

Over the period of this investigation, we have noted the following observations:

➢ We have reviewed the withdrawal rates for both non-election years and election years. The number of withdrawals during non-election years (2% of exposed) was not enough to warrant adding withdrawal rates during these years. The actual number of withdrawals during the election year was more than expected (17 vs. 15). Therefore, we recommend an increase from 20% to 25% in the rates of withdrawal for election years to better match the experience.

➢ We also reviewed the service retirements rates for both non-election years and election years. The number of service retirements during non-election years (2% of exposed) was not enough to warrant adding rates during those years. The actual number of service retirements during the election year was less than expected (27 vs. 35) with many retirements above the maximum assumed retirement age of 75. We are recommending the retirement rates be extended to age 80.

➢ There were 6 deaths while in active service over the four-year period of this investigation compared with 4 expected. We recommend updating the mortality assumption to the RP-2014 Blue Collar Employee Table with adjustments to be consistent with our change to PERS.

➢ There were no disability retirements over the four-year period of this investigation which is close to what was expected. Therefore, we recommend no change at this time.

- Actual salary increases were about 98% of what was expected. In conjunction with the recommended decrease in the inflation assumption, we recommend that the salary scale be reduced to 3.75% for all ages.

- As mentioned in the PERS section of this report, we recommend that the rates of mortality for service retirements be revised to the RP-2014 Healthy Annuitant Blue Collar Mortality Table Projected with Scale BB to 2016 set forward one year for males. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2014 Disabled Mortality Table set back forward five years for males and set forward four years for females. We recommend each of the Systems have the same mortality table.

MUNICIPAL RETIREMENT SYSTEMS

SUMMARY OF RESULTS

Since this is a closed System with very few actives remaining, we have not investigated the active decrements, but have concentrated on the post-retirement mortality experience. Over the period of this investigation, we have found the following observations:

➢ As mentioned in the PERS section of this report, we recommend that the rates of mortality for service retirements be revised to the RP-2014 Healthy Annuitant Blue Collar Mortality Table Projected with Scale BB to 2016 set forward one year for males. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2014 Disabled Mortality Table set back forward five years for males and set forward four years for females. We recommend each of the Systems have the same mortality table.

Appendix A

Historical June CPI (U) Index

Year	CPI (U)	Year	CPI (U)
1961	29.8	1989	124.1
1962	30.2	1990	129.9
1963	30.6	1991	136.0
1964	31.0	1992	140.2
1965	31.6	1993	144.4
1966	32.4	1994	148.0
1967	33.3	1995	152.5
1968	35.7	1996	156.7
1969	34.7	1997	160.3
1970	38.8	1998	163.0
1971	40.6	1999	166.2
1972	41.7	2000	172.4
1973	44.2	2001	178.0
1974	49.0	2002	179.9
1975	53.6	2003	183.7
1976	56.8	2004	189.7
1977	60.7	2005	194.5
1978	65.2	2006	202.9
1979	72.3	2007	208.352
1980	82.7	2008	218.815
1981	90.6	2009	215.693
1982	97.0	2010	217.965
1983	99.5	2011	225.722
1984	103.7	2012	229.478
1985	107.6	2013	233.504
1986	109.5	2014	238.343
1987	113.5		
1988	118.0		

Appendix B

Capital Market Assumptions and Asset Allocation

Geometric Real Rates of Return and Standard Deviations by Asset Class

Asset Class	Expected Real Rate of Return	Standard Deviation
U.S. Broad	5.20%	19.30%
International Equity	5.00	20.10
Emerging Markets Equity	5.45	27.75
Fixed Income	0.25	3.50
Real Assets	4.00	16.20
Private Equity	6.15	30.90
Cash	(0.50)	0.90

Asset Class Correlation Coefficients

Asset Class	US Broad	Int'l Eq	Emerg Eq	Fixed	Real Assets	Priv Eq	Cash
U.S. Broad	**1.00**						
International Equity	0.85	**1.00**					
Emerging Markets Equity	0.84	0.84	**1.00**				
Fixed Income	0.05	0.05	0.01	**1.00**			
Real Assets	0.73	0.64	0.61	0.13	**1.00**		
Private Equity	0.91	0.86	0.84	0.00	0.71	**1.00**	
Cash	(0.05)	(0.01)	(0.10)	0.08	(0.05)	0.00	**1.00**

Asset Allocation Targets

Asset Class	Asset Allocation
U.S. Broad	34.00%
International Equity	19.00
Emerging Markets Equity	8.00
Fixed Income	20.00
Real Assets	10.00
Private Equity	8.00
Cash	1.00

Appendix C

Social Security Administration Wage Index

Year	Wage Index	Annual Increase	Year	Wage Index	Annual Increase
1960	$4,007.12	3.92%	1988	$19,334.04	4.93%
1961	4,086.76	1.99	1989	20,099.55	3.96
1962	4,291.40	5.01	1990	21,027.98	4.62
1963	4,396.64	2.45	1991	21,811.60	3.73
1964	4,576.32	4.09	1992	22,935.42	5.15
1965	4,658.72	1.80	1993	23,132.67	0.86
1966	4,938.36	6.00	1994	23,753.53	2.68
1967	5,213.44	5.57	1995	24,705.66	4.01
1968	5,571.76	6.87	1996	25,913.90	4.89
1969	5,893.76	5.78	1997	27,426.00	5.84
1970	6,186.24	4.96	1998	28,861.44	5.23
1971	6,497.08	5.02	1999	30,469.84	5.57
1972	7,133.80	9.80	2000	32,154.82	5.53
1973	7,580.16	6.26	2001	32,921.92	2.39
1974	8,030.76	5.94	2002	33,252.09	1.00
1975	8,630.92	7.47	2003	34,064.95	2.44
1976	9,226.48	6.90	2004	35,648.55	4.65
1977	9,779.44	5.99	2005	36,952.94	3.66
1978	10,556.03	7.94	2006	38,651.41	4.60
1979	11,479.46	8.75	2007	40,405.48	4.54
1980	12,513.46	9.01	2008	41,334.97	2.30
1981	13,773.10	10.07	2009	40,711.61	-1.51
1982	14,531.34	5.51	2010	41,673.83	2.36
1983	15,239.24	4.87	2011	42,979.61	3.13
1984	16,135.07	5.88	2012	44,321.67	3.12
1985	16,822.51	4.26	2013	44,888.16	1.28
1986	17,321.82	2.97			
1987	18,426.51	6.38			

APPENDIX D
TABLE 1

PUBLIC EMPLOYEES' RETIREMENT SYSTEM
RATES OF SEPARATION FROM ACTIVE SERVICE – MALES

AGE	ULTIMATE RATES OF WITHDRAWAL*	RATES OF DEATH	RATES OF DISABILITY	RATES OF RETIREMENT	
				LESS THAN 25 YRS OF SERVICE**	25 OR MORE YEARS OF SERVICE**
20	0.2300	0.000159	0.00012		
21	0.2160	0.000232	0.00012		
22	0.2020	0.000261	0.00014		
23	0.1880	0.000287	0.00014		
24	0.1740	0.000318	0.00014		
25	0.1600	0.000346	0.00017		
26	0.1480	0.000360	0.00017		
27	0.1360	0.000365	0.00020		
28	0.1240	0.000342	0.00020		
29	0.1120	0.000327	0.00020		
30	0.1000	0.000318	0.00020		
31	0.0950	0.000314	0.00023		
32	0.0900	0.000315	0.00029		
33	0.0850	0.000320	0.00036		
34	0.0800	0.000327	0.00041		
35	0.0750	0.000337	0.00044		
36	0.0725	0.000348	0.00059		
37	0.0700	0.000359	0.00074		
38	0.0675	0.000370	0.00089		
39	0.0650	0.000379	0.00104		
40	0.0625	0.000390	0.00120		0.190
41	0.0615	0.000403	0.00144		0.190
42	0.0605	0.000421	0.00168		0.190
43	0.0595	0.000444	0.00192		0.190
44	0.0585	0.000475	0.00216		0.190
45	0.0575	0.000513	0.00240		0.190
46	0.0575	0.000561	0.00256		0.190
47	0.0575	0.000620	0.00272		0.190
48	0.0575	0.000688	0.00288		0.140
49	0.0575	0.000769	0.00304		0.140
50	0.0575	0.000859	0.00320		0.140
51	0.0575	0.000961	0.00360		0.140
52	0.0575	0.001072	0.00400		0.150
53	0.0575	0.001193	0.00440		0.130
54	0.0575	0.001324	0.00480		0.150
55	0.0575	0.001466	0.00520		0.180
56	0.0575	0.001619	0.00520		0.190
57	0.0575	0.001784	0.00520		0.180
58	0.0575	0.001965	0.00520		0.150
59	0.0575	0.002165	0.00520		0.150
60	0.0575	0.002391	0.00520	0.100	0.200
61	0.0575	0.002647	0.00520	0.100	0.220
62	0.0575	0.002938	0.00520	0.200	0.330
63	0.0575	0.003270	0.00520	0.170	0.260
64	0.0575	0.003648	0.00520	0.150	0.250
65	0.0575	0.004076	0.00200	0.230	0.300
66	0.0575	0.004560	0.00200	0.210	0.300
67	0.0575	0.005104	0.00200	0.180	0.240
68	0.0575	0.005716	0.00200	0.160	0.250
69	0.0575	0.006289	0.00200	0.190	0.250
70	0.0575	0.006921	0.00200	0.190	0.250
71	0.0575	0.007615	0.00200	0.180	0.230
72	0.0575	0.008380	0.00200	0.190	0.230
73	0.0575	0.009222	0.00200	0.170	0.180
74	0.0575	0.010147	0.00200	0.190	0.200
75	0.0000	0.011166	0.00000	1.000	1.000

*For all ages, rates of 32% for the first year of employment and 23% for the second year of employment.
**For Tier 4 members, 30 years of service.

TABLE 2

PUBLIC EMPLOYEES' RETIREMENT SYSTEM
RATES OF SEPARATION FROM ACTIVE SERVICE – FEMALES

AGE	ULTIMATE RATES OF WITHDRAWAL*	RATES OF DEATH	RATES OF DISABILITY	RATES OF RETIREMENT	
				LESS THAN 25 YRS OF SERVICE**	25 OR MORE YEARS OF SERVICE**
20	0.2800	0.000054	0.00011		
21	0.2570	0.000054	0.00011		
22	0.2340	0.000054	0.00012		
23	0.2110	0.000055	0.00012		
24	0.1880	0.000057	0.00012		
25	0.1650	0.000058	0.00014		
26	0.1530	0.000060	0.00014		
27	0.1410	0.000063	0.00018		
28	0.1290	0.000066	0.00018		
29	0.1170	0.000069	0.00018		
30	0.1050	0.000073	0.00018		
31	0.1000	0.000077	0.00019		
32	0.0950	0.000082	0.00019		
33	0.0900	0.000086	0.00020		
34	0.0850	0.000091	0.00021		
35	0.0800	0.000096	0.00022		
36	0.0770	0.000100	0.00036		
37	0.0740	0.000106	0.00050		
38	0.0710	0.000113	0.00064		
39	0.0680	0.000122	0.00078		
40	0.0650	0.000132	0.00090		0.160
41	0.0630	0.000145	0.00104		0.160
42	0.0610	0.000160	0.00118		0.160
43	0.0590	0.000177	0.00132		0.160
44	0.0570	0.000197	0.00146		0.160
45	0.0550	0.000220	0.00160		0.160
46	0.0550	0.000245	0.00174		0.160
47	0.0550	0.000273	0.00188		0.160
48	0.0550	0.000303	0.00202		0.120
49	0.0550	0.000335	0.00216		0.120
50	0.0550	0.000369	0.00230		0.120
51	0.0550	0.000403	0.00264		0.120
52	0.0550	0.000440	0.00298		0.140
53	0.0550	0.000478	0.00332		0.150
54	0.0550	0.000517	0.00366		0.160
55	0.0550	0.000557	0.00400		0.180
56	0.0550	0.000600	0.00400		0.180
57	0.0550	0.000645	0.00400		0.190
58	0.0550	0.000694	0.00400		0.190
59	0.0550	0.000747	0.00400		0.220
60	0.0550	0.000805	0.00400	0.125	0.220
61	0.0550	0.000869	0.00400	0.105	0.250
62	0.0550	0.000941	0.00400	0.180	0.360
63	0.0550	0.001022	0.00400	0.175	0.320
64	0.0550	0.001113	0.00400	0.175	0.320
65	0.0550	0.001214	0.00150	0.275	0.420
66	0.0550	0.001347	0.00150	0.250	0.370
67	0.0550	0.001495	0.00150	0.210	0.360
68	0.0550	0.001659	0.00150	0.190	0.260
69	0.0550	0.001841	0.00150	0.190	0.260
70	0.0550	0.002043	0.00150	0.230	0.230
71	0.0550	0.002267	0.00150	0.210	0.300
72	0.0550	0.002516	0.00150	0.200	0.220
73	0.0550	0.002791	0.00150	0.200	0.220
74	0.0550	0.003098	0.00150	0.180	0.220
75	0.0000	0.003437	0.00000	1.000	1.000

*For all ages, rates of 32% for the first year of employment and 23% for the second year of employment.
**For Tier 4 members, 30 years of service.

TABLE 3

HIGHWAY SAFETY PATROL RETIREMENT SYSTEM
RATES OF SEPARATION FROM ACTIVE SERVICE

AGE	RATES OF WITHDRAWAL	RATES OF DEATH MALES	RATES OF DEATH FEMALES	RATES OF DISABILITY		SERVICE	RATES OF RETIREMENT*
20	0.0800	0.000159	0.000054	0.00090		0	0.00
21	0.0720	0.000232	0.000054	0.00090		1	0.00
22	0.0640	0.000261	0.000054	0.00090		2	0.00
23	0.0560	0.000287	0.000055	0.00090		3	0.00
24	0.0480	0.000318	0.000057	0.00102		4	0.00
25	0.0400	0.000346	0.000058	0.00102		5	0.05
26	0.0390	0.000360	0.000060	0.00102		6	0.05
27	0.0380	0.000365	0.000063	0.00102		7	0.05
28	0.0370	0.000342	0.000066	0.00120		8	0.05
29	0.0360	0.000327	0.000069	0.00120		9	0.05
30	0.0350	0.000318	0.000073	0.00126		10	0.05
31	0.0330	0.000314	0.000077	0.00138		11	0.05
32	0.0310	0.000315	0.000082	0.00144		12	0.05
33	0.0290	0.000320	0.000086	0.00162		13	0.05
34	0.0270	0.000327	0.000091	0.00180		14	0.05
35	0.0250	0.000337	0.000096	0.00186		15	0.05
36	0.0220	0.000348	0.000100	0.00204		16	0.05
37	0.0190	0.000359	0.000106	0.00210		17	0.05
38	0.0160	0.000370	0.000113	0.00228		18	0.05
39	0.0130	0.000379	0.000122	0.00240		19	0.05
40	0.0100	0.000390	0.000132	0.00252		20	0.05
41	0.0100	0.000403	0.000145	0.00270		21	0.05
42	0.0100	0.000421	0.000160	0.00282		22	0.05
43	0.0100	0.000444	0.000177	0.00306		23	0.05
44	0.0100	0.000475	0.000197	0.00318		24	0.05
45	0.0100	0.000513	0.000220	0.00342		25	0.01
46	0.0090	0.000561	0.000245	0.00360		26	0.15
47	0.0080	0.000620	0.000273	0.00396		27	0.20
48	0.0070	0.000688	0.000303	0.00432		28	0.25
49	0.0060	0.000769	0.000335	0.00462		29	0.25
50	0.0050	0.000859	0.000369	0.00510		30	0.25
51	0.0040	0.000961	0.000403	0.00552		31	0.25
52	0.0030	0.001072	0.000440	0.00606		32	0.25
53	0.0020	0.001193	0.000478	0.00672		33	0.25
54	0.0010	0.001324	0.000517	0.00750		34	0.25
55	0.0000	0.001466	0.000557	0.00822		35	0.25
56	0.0000	0.001619	0.000600	0.00930		36	0.35
57	0.0000	0.001784	0.000645	0.01068		37	0.50
58	0.0000	0.001965	0.000694	0.01200		38	0.75
59	0.0000	0.002165	0.000747	0.01356		39	0.75
60	0.0000	0.002391	0.000805	0.01554		40+	1.00
61	0.0000	0.000000	0.000000	0.00000			

* The annual rate of service retirement is 100% at age 61.

TABLE 4

<u>**SUPPLEMENTAL LEGISLATIVE RETIREMENT SYSTEM**</u>
RATES OF SEPARATION FROM ACTIVE SERVICE

	RATES OF DEATH		RATES OF
AGE	MALES	FEMALES	DISABILITY
20	0.000159	0.000054	0.0004
21	0.000232	0.000054	0.0004
22	0.000261	0.000054	0.0005
23	0.000287	0.000055	0.0005
24	0.000318	0.000057	0.0005
25	0.000346	0.000058	0.0005
26	0.000360	0.000060	0.0006
27	0.000365	0.000063	0.0006
28	0.000342	0.000066	0.0007
29	0.000327	0.000069	0.0007
30	0.000318	0.000073	0.0007
31	0.000314	0.000077	0.0008
32	0.000315	0.000082	0.0009
33	0.000320	0.000086	0.0010
34	0.000327	0.000091	0.0011
35	0.000337	0.000096	0.0011
36	0.000348	0.000100	0.0012
37	0.000359	0.000106	0.0013
38	0.000370	0.000113	0.0014
39	0.000379	0.000122	0.0016
40	0.000390	0.000132	0.0017
41	0.000403	0.000145	0.0018
42	0.000421	0.000160	0.0019
43	0.000444	0.000177	0.0021
44	0.000475	0.000197	0.0022
45	0.000513	0.000220	0.0023
46	0.000561	0.000245	0.0025
47	0.000620	0.000273	0.0026
48	0.000688	0.000303	0.0027
49	0.000769	0.000335	0.0028
50	0.000859	0.000369	0.0030
51	0.000961	0.000403	0.0031
52	0.001072	0.000440	0.0032
53	0.001193	0.000478	0.0033
54	0.001324	0.000517	0.0034
55	0.001466	0.000557	0.0035
56	0.001619	0.000600	0.0036
57	0.001784	0.000645	0.0037
58	0.001965	0.000694	0.0038
59	0.002165	0.000747	0.0039
60	0.002391	0.000805	0.0040
61	0.002647	0.000869	0.0041
62	0.002938	0.000941	0.0042
63	0.003270	0.001022	0.0044
64	0.003648	0.001113	0.0045
65	0.004076	0.001214	0.0000
66	0.004560	0.001347	0.0000
67	0.005104	0.001495	0.0000
68	0.005716	0.001659	0.0000
69	0.006289	0.001841	0.0000
70	0.006921	0.002043	0.0000
71	0.007615	0.002267	0.0000
72	0.008380	0.002516	0.0000
73	0.009222	0.002791	0.0000
74	0.010147	0.003098	0.0000
75	0.011166	0.003437	0.0000
76	0.012287	0.003815	0.0000
77	0.013521	0.004233	0.0000
78	0.014878	0.004697	0.0000
79	0.016373	0.005213	0.0000
80	0.000000	0.000000	0.0000

- Withdrawal and Vesting: 20% in an election year, none in a non-election year.
- Service Retirement: 25% in an election year, non in a non-election year. All members assumed to retire no later than age 80.

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TABLE 5

MUNICIPAL RETIREMENT SYSTEM
RATES OF SEPARATION FROM ACTIVE SERVICE

AGE	RATES OF WITHDRAWAL	RATES OF DEATH	RATES OF DISABILITY	RATES OF RETIREMENT SERVICE	RATE*
20	0.10650	0.00060	0.00140	20	0.450
21	0.10248	0.00064	0.00160	21	0.175
22	0.09846	0.00068	0.00180	22	0.175
23	0.09444	0.00072	0.00200	23	0.175
24	0.09042	0.00076	0.00220	24	0.175
25	0.08640	0.00080	0.00240	25	0.175
26	0.08286	0.00088	0.00280	26	0.175
27	0.07932	0.00096	0.00320	27	0.175
28	0.07578	0.00104	0.00360	28	0.175
29	0.07224	0.00112	0.00400	29	0.350
30	0.06870	0.00120	0.00440	30	0.350
31	0.06468	0.00128	0.00504	31	0.350
32	0.06066	0.00136	0.00568	32	0.350
33	0.05664	0.00144	0.00632	33	0.350
34	0.05262	0.00152	0.00696	34	0.200
35	0.04860	0.00160	0.00760	35+	0.200
36	0.04482	0.00172	0.00800		
37	0.04104	0.00184	0.00840		
38	0.03726	0.00196	0.00880		
39	0.03348	0.00208	0.00920		
40	0.02970	0.00220	0.00960		
41	0.02664	0.00238	0.01004		
42	0.02358	0.00256	0.01048		
43	0.02052	0.00274	0.01092		
44	0.01746	0.00292	0.01136		
45	0.01440	0.00310	0.01180		
46	0.01200	0.00344	0.01340		
47	0.00960	0.00378	0.01500		
48	0.00720	0.00412	0.01660		
49	0.00480	0.00446	0.01820		
50	0.00240	0.00480	0.01980		
51	0.00000	0.00512	0.02136		
52		0.00544	0.02292		
53		0.00576	0.02448		
54		0.00608	0.02604		
55		0.00640	0.02760		
56		0.00678	0.02908		
57		0.00716	0.03056		
58		0.00754	0.03204		
59		0.00792	0.03352		
60		0.00830	0.03500		
61		0.00870	0.03685		
62		0.00910	0.03870		
63		0.00950	0.04055		
64		0.00990	0.04240		
65		0.00000	0.00000		

* The annual rate of service retirement is 100% at age 65.

TABLE 6

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

SERVICE	PERS
0	0.1900
1	0.0900
2	0.0650
3	0.0550
4	0.0500
5	0.0450
6	0.0450
7	0.0450
8	0.0400
9	0.0400
10	0.0400
11	0.0400
12	0.0400
13	0.0400
14	0.0400
15	0.0400
16	0.0400
17	0.0400
18	0.0400
19	0.0400
20	0.0400
21	0.0400
22	0.0400
23	0.0400
24	0.0400
25	0.0400
26	0.0400
27	0.0400
28	0.0375
29	0.0375
30	0.0375
31	0.0375
32	0.0375
33	0.0375
34	0.0375
35	0.0375
36	0.0375
37	0.0375
38	0.0375
39	0.0375
40	0.0375

AGE	HSPRS	SLRP	MRS
20	0.09314	0.0375	0.060
21	0.08930	0.0375	0.060
22	0.07530	0.0375	0.060
23	0.07130	0.0375	0.060
24	0.06698	0.0375	0.060
25	0.06059	0.0375	0.060
26	0.05740	0.0375	0.060
27	0.05641	0.0375	0.060
28	0.05243	0.0375	0.060
29	0.05243	0.0375	0.060
30	0.05243	0.0375	0.060
31	0.05243	0.0375	0.060
32	0.05243	0.0375	0.060
33	0.05243	0.0375	0.060
34	0.05243	0.0375	0.060
35	0.05243	0.0375	0.060
36	0.05243	0.0375	0.060
37	0.05243	0.0375	0.060
38	0.05243	0.0375	0.060
39	0.05243	0.0375	0.060
40	0.05243	0.0375	0.060
41	0.05243	0.0375	0.060
42	0.05243	0.0375	0.060
43	0.04745	0.0375	0.055
44	0.04745	0.0375	0.055
45	0.04745	0.0375	0.055
46	0.04745	0.0375	0.055
47	0.04745	0.0375	0.055
48	0.04248	0.0375	0.050
49	0.04248	0.0375	0.050
50	0.04248	0.0375	0.050
51	0.04248	0.0375	0.050
52	0.04248	0.0375	0.050
53	0.04248	0.0375	0.045
54	0.04248	0.0375	0.045
55	0.04248	0.0375	0.045
56	0.04248	0.0375	0.045
57	0.04248	0.0375	0.045
58	0.04248	0.0375	0.045
59	0.04248	0.0375	0.045
60	0.00000	0.0375	0.045
61		0.0375	0.045
62		0.0375	0.045
63		0.0375	0.045
64		0.0375	0.045
65		0.0375	0.045
66		0.0375	0.045
67		0.0375	0.045
68		0.0375	0.045
69		0.0375	0.045
70		0.0375	0.045
71		0.0375	0.045
72		0.0375	0.045
73		0.0375	0.045
74		0.0375	0.045
75		0.0375	0.045

* Includes inflation of 3.75%

TABLE 7

ALL SYSTEMS

**RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF SERVICE
AND BENEFICIARIES OF DECEASED MEMBERS**

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.000522	0.000181	71	0.022969	0.015043
20	0.000578	0.000181	72	0.025234	0.016614
21	0.000628	0.000181	73	0.027756	0.018357
22	0.000655	0.000181	74	0.030569	0.020287
23	0.000664	0.000185	75	0.033706	0.022423
24	0.000622	0.000189	76	0.037204	0.024787
25	0.000594	0.000193	77	0.041107	0.027411
26	0.000578	0.000200	78	0.045461	0.030333
27	0.000572	0.000209	79	0.050315	0.033597
28	0.000574	0.000219	80	0.055724	0.037254
29	0.000581	0.000230	81	0.061749	0.041357
30	0.000596	0.000243	82	0.068460	0.045969
31	0.000615	0.000258	83	0.075931	0.051147
32	0.000637	0.000274	84	0.084246	0.056956
33	0.000659	0.000290	85	0.093496	0.063460
34	0.000681	0.000308	86	0.103780	0.070728
35	0.000704	0.000326	87	0.115448	0.078838
36	0.000736	0.000347	88	0.128444	0.087882
37	0.000786	0.000377	89	0.142917	0.097962
38	0.000866	0.000418	90	0.158265	0.109418
39	0.000988	0.000480	91	0.174146	0.121849
40	0.001168	0.000571	92	0.190362	0.135131
41	0.001417	0.000699	93	0.206829	0.149180
42	0.001742	0.000875	94	0.223544	0.163949
43	0.002130	0.001103	95	0.240547	0.179412
44	0.002560	0.001380	96	0.257889	0.195547
45	0.002995	0.001689	97	0.275592	0.212335
46	0.003394	0.002007	98	0.293041	0.230139
47	0.003717	0.002304	99	0.312107	0.249619
48	0.003935	0.002550	100	0.332362	0.269235
49	0.004040	0.002721	101	0.353182	0.289877
50	0.004358	0.002805	102	0.373027	0.310199
51	0.004705	0.003027	103	0.393194	0.331237
52	0.005120	0.003255	104	0.412006	0.351528
53	0.005540	0.003493	105	0.430946	0.372273
54	0.005963	0.003733	106	0.448227	0.391860
55	0.006396	0.003985	107	0.464592	0.410849
56	0.006846	0.004253	108	0.479987	0.429112
57	0.007305	0.004543	109	0.494376	0.446544
58	0.007803	0.004862	110	0.500000	0.463061
59	0.008355	0.005220	111	0.500000	0.478604
60	0.008974	0.005621	112	0.500000	0.493137
61	0.009672	0.006072	113	0.500000	0.500000
62	0.010462	0.006576	114	0.500000	0.500000
63	0.011350	0.007153	115	0.500000	0.500000
64	0.012339	0.007796	116	0.500000	0.500000
65	0.013437	0.008517	117	0.500000	0.500000
66	0.014647	0.009322	118	0.500000	0.500000
67	0.015978	0.010226	119	0.500000	0.500000
68	0.017445	0.011237	120	1.000000	1.000000
69	0.019101	0.012369			
70	0.020935	0.013633			

TABLE 8

ALL SYSTEMS

RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF DISABILITY

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.009036	0.002286	71	0.057934	0.041045
20	0.008476	0.002328	72	0.061945	0.044413
21	0.008090	0.002383	73	0.066363	0.048078
22	0.007863	0.002465	74	0.071235	0.052059
23	0.007775	0.002576	75	0.076616	0.056372
24	0.007810	0.002700	76	0.082562	0.061036
25	0.007915	0.002837	77	0.089136	0.066074
26	0.008108	0.003003	78	0.096405	0.071506
27	0.008353	0.003182	79	0.104436	0.077357
28	0.008616	0.003361	80	0.113303	0.083652
29	0.008896	0.003553	81	0.123081	0.090420
30	0.009159	0.003746	82	0.133850	0.097694
31	0.009386	0.003939	83	0.145697	0.105510
32	0.009649	0.004132	84	0.158714	0.113909
33	0.009982	0.004380	85	0.173005	0.122939
34	0.010420	0.004669	86	0.187464	0.132652
35	0.010997	0.005027	87	0.202100	0.143420
36	0.011750	0.005454	88	0.216924	0.155186
37	0.012696	0.005964	89	0.231944	0.167890
38	0.013887	0.006570	90	0.247169	0.181474
39	0.015340	0.007286	91	0.262610	0.195880
40	0.017039	0.008112	92	0.278276	0.211049
41	0.017741	0.009049	93	0.294176	0.226923
42	0.018428	0.009635	94	0.310320	0.243443
43	0.019101	0.010215	95	0.326717	0.260551
44	0.019757	0.010787	96	0.343376	0.278189
45	0.020395	0.011352	97	0.360308	0.296297
46	0.021016	0.011907	98	0.377522	0.314819
47	0.021621	0.012450	99	0.395026	0.333694
48	0.022210	0.012979	100	0.412831	0.352865
49	0.022791	0.013494	101	0.430946	0.372273
50	0.023369	0.013992	102	0.448227	0.391860
51	0.023953	0.014479	103	0.464592	0.410849
52	0.024557	0.014958	104	0.479987	0.429112
53	0.025190	0.015439	105	0.494376	0.446544
54	0.025868	0.015931	106	0.500000	0.463061
55	0.026604	0.016447	107	0.500000	0.478604
56	0.027414	0.016999	108	0.500000	0.493137
57	0.028312	0.017603	109	0.500000	0.500000
58	0.029314	0.018273	110	0.500000	0.500000
59	0.030433	0.019028	111	0.500000	0.500000
60	0.031685	0.019884	112	0.500000	0.500000
61	0.033081	0.020860	113	0.500000	0.500000
62	0.034633	0.021976	114	0.500000	0.500000
63	0.036353	0.023250	115	0.500000	0.500000
64	0.038253	0.024702	116	0.500000	0.500000
65	0.040346	0.026348	117	0.500000	0.500000
66	0.042647	0.028203	118	0.500000	0.500000
67	0.045170	0.030280	119	0.500000	1.000000
68	0.047935	0.032591	120	1.000000	
69	0.050965	0.035148			
70	0.054287	0.037962			