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PERS
of MISSISSIPPI

State of Mississippi Retirement Systems

Experience Investigation for the

Four-Year Period

Ending June 30, 2012

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

June 12, 2013

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 investigation covers the four-year period from July 1, 2008 to June 30, 2012. 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 in April, 2011. 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,

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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%	3.50%
Investment Return*	8.00%	8.00%
Wage Inflation	4.25%	4.25%

   * 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, 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, Retirement, Post-Retirement Mortality, Salary Scale
HSPRS	Post-Retirement Mortality, Salary Scale
SLRP	Withdrawal, 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) and employer contribution rates for each System.

Change in Unfunded Accrued Liability
(\$ in Thousands)

System	Before Changes	After Changes
PERS	$ 14,500,076	$14,270,891
HSPRS	152,991	154,088
SLRP	6,269	6,106
MRS	201,087	200,350

Change in Funding Ratio

System	Before Changes	After Changes
PERS	58.0%	58.3%
HSPRS	63.7%	63.5%
SLRP	67.9%	68.5%
MRS	43.6%	43.7%

Change in Employer Annual Required Contribution*

System	Before Changes	After Changes**
PERS	15.83%	15.38%
HSPRS	39.49%	39.48%
SLRP	7.75%	7.68%
MRS	N/A	N/A

* Amortization period kept at 30 years for all Systems.

** Estimated budgeted administrative expenses of 0.23% for all Systems are included in the normal cost of the annual required contribution rates.

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

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

Item	Current	Proposed
Price Inflation	3.50%	3.50%
Real Rate of Return*	4.50	4.50
Investment Return	8.00%	8.00%
Price Inflation	3.50%	3.50%
Real Wage Growth	0.75	0.75
Wage Inflation	4.25%	4.25%

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

Price Inflation

Background: As can be seen from the table on the previous page, 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. 25 and 27.

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 – 2012	86	3.00%	4.20%
1952 – 2012	60	3.66	2.91
1962 – 2012	50	4.14	2.92
1972 – 2012	40	4.36	3.14
1982 – 2012	30	2.91	1.39
1992 – 2012	20	2.49	1.37
2002 - 2012	10	2.46	1.82

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
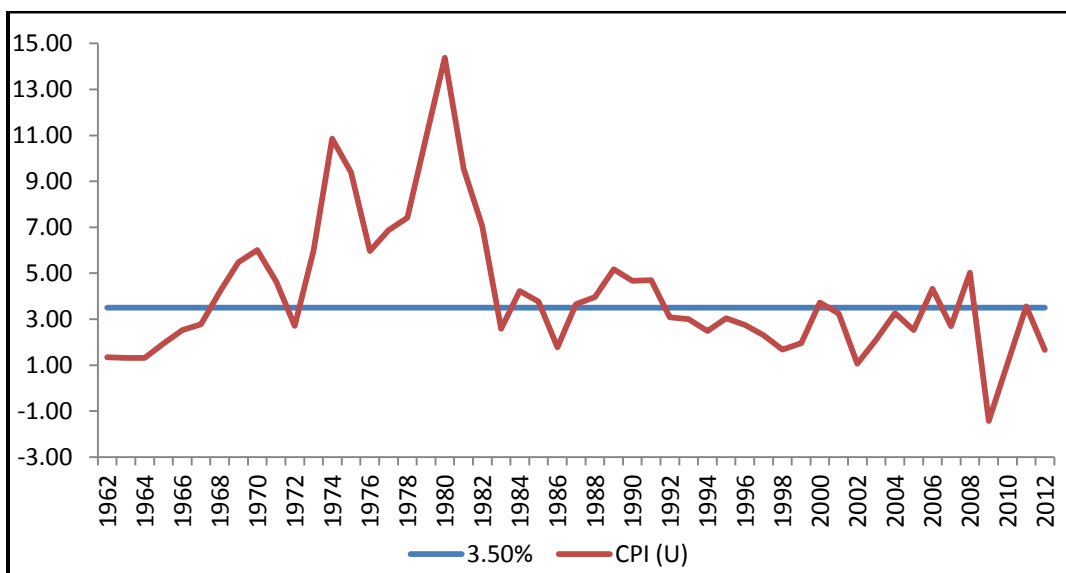
Over shorter historical periods, the average annual rate of increase in the CPI-U has been below 3.00%. The period of high inflation from 1973 to 1982 has a significant impact on the averages over periods which include these rates. Further, the average rate of 3.00% over the entire 86 year period is close to the average rate of 2.91% 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.

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, 2012.

Years to Maturity	Nominal Bond Yield	TIPS Yield	Breakeven Rate of Inflation
10	1.67%	-0.46%	2.13%
20	2.38	0.15	2.23
30	**2.76**	**0.56**	**2.20**

The bond market's expectation for the rate of inflation over the next 30 years is 2.20% 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 2012 as published by the Philadelphia Federal Reserve Bank, the mean expected annual rate of inflation for the ten years beginning July 1, 2012 is 2.48%. 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 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. Therefore, we recommend that PERS remain at the current price inflation assumption of 3.50%.

Price Inflation Assumption	
Current	3.50%
Reasonable Range	2.00% - 4.00%
Recommended	3.50%

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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 administrative and investment expenses. All returns provided by the investment consultants shown below are net of investment expenses. In addition, 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 for all divisions and funds. That amount is estimated as 0.23% of payroll for all Systems.

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 seven years is shown in the table below.

Year Ending 6/30	Actuarial Value	Market Value
2008	7.14%	(8.15)%
2009	(10.93)	(19.51)
2010	0.20	14.43
2011	3.71	25.17
2012	1.60	0.23
Average	0.15%	1.20%

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 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 5.70% 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	5.70%	15.57%	(17.82)%	(5.27)%	4.57%	15.44%	33.08%
5	4.80	6.88	(6.11)	0.05	4.57	9.30	16.48
10	4.69	4.85	(3.10)	1.36	4.57	7.89	12.86
20	4.63	3.43	(0.91)	2.29	4.57	6.91	10.37
30	4.61	2.80	0.07	2.70	4.57	6.48	9.28
40	4.60	2.42	0.66	2.95	4.57	6.22	8.64
50	4.60	2.17	1.07	3.12	4.57	6.05	8.20

Based on this analysis, there is 50% likelihood that the average real rate of return over a 50-year period will be 4.57%. It can also be inferred that for the 10 year time span, 5% of the resulting real rates of return will be below -3.10% and 95% were 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 3.12% and a 25% chance they will be above 6.05%. In other words, there is a 50% chance the real returns will be between 3.12% and 6.05%.

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	3.12%	4.57%	6.05%
Inflation	3.50	3.50	3.50
Net Investment Return	6.62%	8.07%	9.55%

Review of the *Public Fund Survey* finds that as of the December 2011 update to the fiscal year 2010 results, 8.00% remains the median rate for this assumption. From the table above, an 8.00% 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 8.00%. 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:
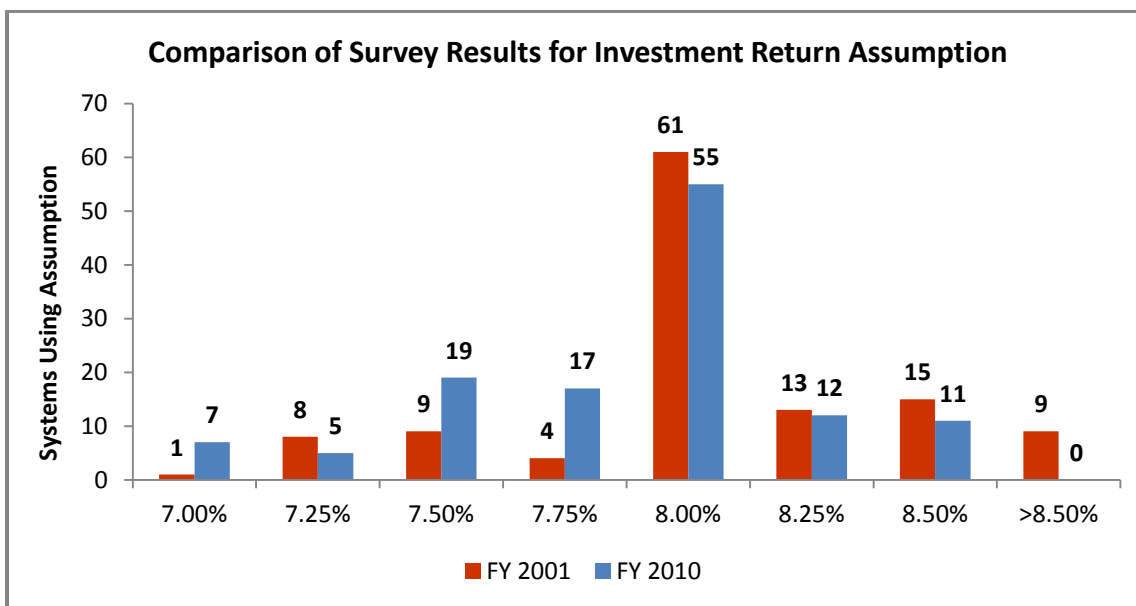
It is important to note that capital market assumptions vary significantly from consultant to consultant and from year to year. Further, a consultant's long-term assumptions may vary significantly from the same consultant's short-term assumptions for the same effective date. In order to give PERS a more in depth review of the capital market assumptions, we reviewed several other investment consultant assumptions using PERS' target asset allocation. Similar to PERS' investment consultant, Callan Associates, these firms use forward looking adjustments to better reflect near-term expectations. The capital market assumptions for each of these other firms are based on a 10-year time horizon and were summarized as mean real rates of return, net of investment expenses.

The following table provides a summary of the 25th, 50th and 75th percentiles of the average of the expected real rates of return using a 50 year time horizon.

Investment Consultant	Real Rates of Return		
	25th	50th	75th
1	4.04%	5.43%	6.83%
2	3.14%	4.64%	6.15%
3	3.83%	5.05%	6.29%
4	3.38%	4.54%	5.73%
5	4.69%	6.07%	7.48%
6	4.03%	5.42%	6.82%
Callan	3.12%	4.57%	6.05%
Average	**3.75%**	**5.10%**	**6.48%**

For the six investment consultants and Callan, the average real rate of return ranges from 3.75% to 6.48%. Adding a 3.50% price inflation assumption to these numbers, there is a 50% probability that the net investment return will be between 7.25% and 9.98% and the 50th percentile is 8.60%. PERS' current assumption of 8.00% is at the 39th percentile, meaning that of these seven firms, about 61% of all expected outcomes will result in an average return of greater than 8.00% over a 50-year time horizon.

Using this additional information from these other highly respected investment consultants with the information from PERS' current investment consultant, we are comfortable that the Board can keep the investment return assumption at 8.00% 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 8.00%.

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

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

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 2011. 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
2001-2011	2.70%	2.48%	0.22%
1991-2001	4.20%	2.51%	1.69%
1981-1991	4.70%	3.91%	0.79%
1971-1981	7.80%	8.62%	(0.82)%
1961-1971	4.75%	3.20%	1.55%
1991-2011	3.45%	2.49%	0.96%
1981-2011	3.87%	2.96%	0.91%
1971-2011	4.84%	4.35%	0.49%
1961-2011	4.82%	4.12%	0.70%

Thus over the last 50 years, annual real wage growth has averaged 0.70%.

Annual Real Rates of Wage Growth
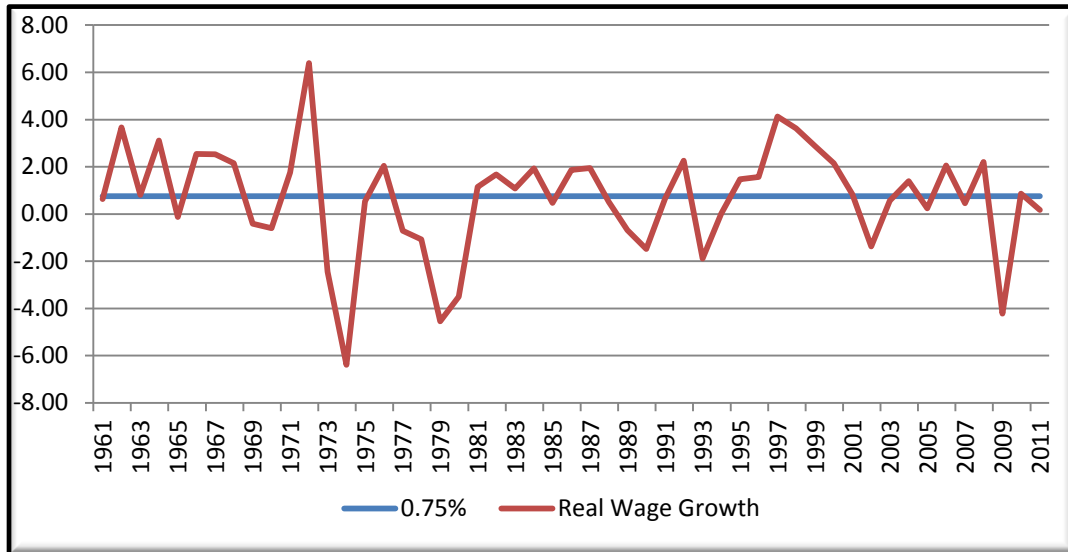
As the analysis of the national wage growth data shows, the shorter-term historical average real rate (0.22% for latest 10 year period) is significantly lower than the longer-term average real rates. The rate of real wage inflation over the prior 20 and 30 year periods is 0.96% and 0.91% respectively. Over the longer term, 50 years, the rate is 0.70% but this period is impacted by the high inflation experienced over the period between 1970 and 1980. Similarly to our discussion of the inflation assumption, we prefer to emphasize the analysis based on post-1980 data in anticipation of the continuation of the Federal Reserves' proactive stance on stabilizing inflation.

Recommendation: As with price inflation, we again look at the 2012 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.

Wage Inflation Assumption		
Current	4.25%	
	Reasonable Range	
Real Wage Growth	0.50%	1.50%
Inflation	3.50	3.50
Total	4.00%	5.00%
Recommended	4.25%	

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

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 (July 1, 2008, through June 30, 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.

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	146	142	1.028	174	113	1.540
25	1,430	1,396	1.024	2,453	2,246	1.092
30	2,051	2,118	0.968	3,951	3,997	0.988
35	1,639	1,826	0.898	3,299	3,316	0.995
40	1,526	1,626	0.938	3,084	3,000	1.028
45	1,378	1,459	0.944	2,549	2,577	0.989
50	1,239	1,337	0.927	2,521	2,495	1.010
53 & over	1,983	1,834	1.081	3,205	3,018	1.062
TOTAL	**11,392**	**11,738**	**0.971**	**21,236**	**20,762**	**1.023**

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
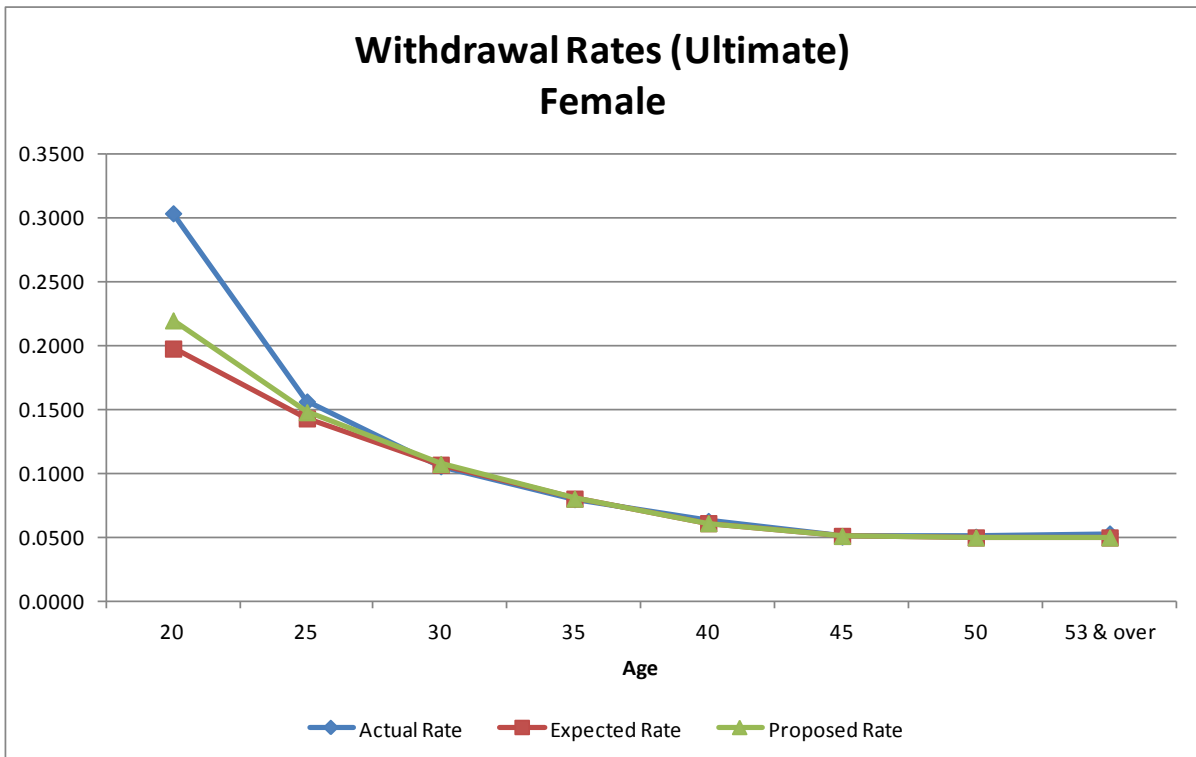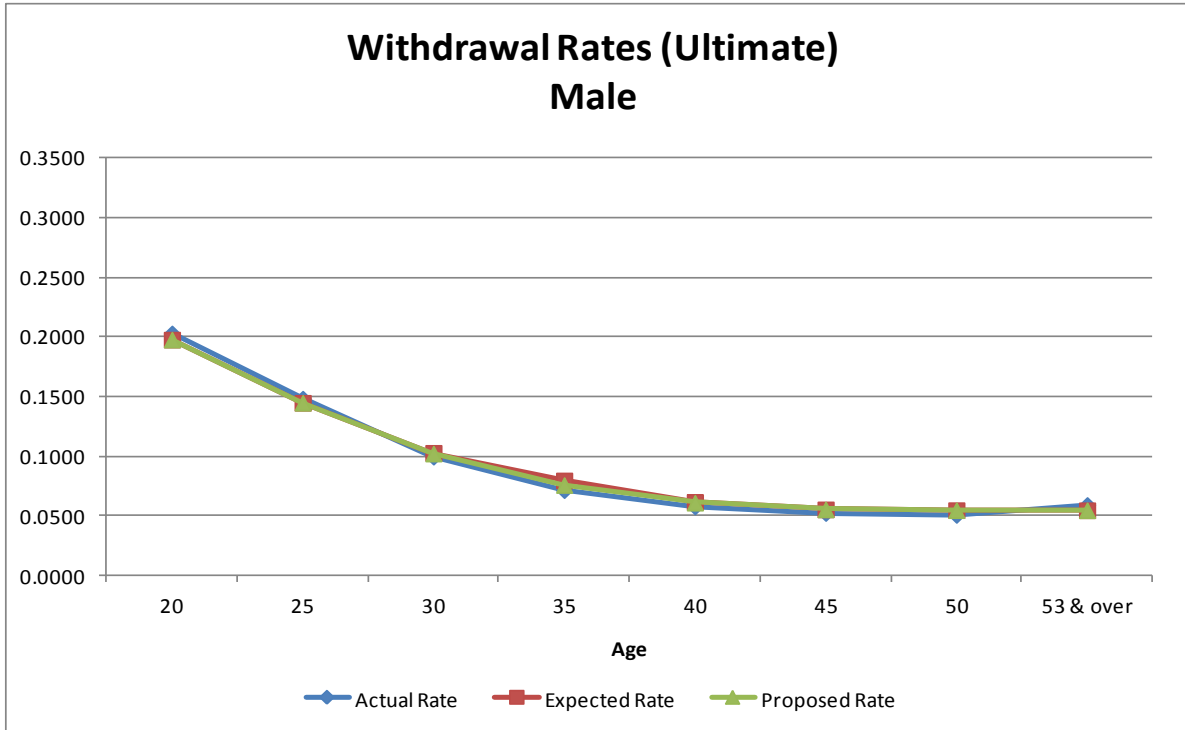
The rates of withdrawal adopted by the Board are used to determine the expected number of separations from active service which will occur as a result of resignation or dismissal. The preceding results indicate that for members with more than 2 years of service, the actual number of withdrawals is noticeably less than expected for males around age 35 and more than expected for females prior to age 28. Therefore, we recommend that the rates of withdrawal be revised to more closely reflect the experience of the system.

Moreover, the actual rates of withdrawal during the select period (first 2 years) indicate that members are withdrawing at a lesser rate during the first year of employment than currently expected. We recommend changing the rate from 34% to 32% during the first 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%	22.0%	22.0%	25.0%
25	15.0	15.0	15.0	15.5
30	10.0	10.0	10.5	10.5
35	8.0	7.5	8.0	8.0
40	6.0	6.0	6.0	6.0
45	5.5	5.5	5.0	5.0
50	5.5	5.5	5.0	5.0
55	5.5	5.5	5.0	5.0
60	5.5	5.5	5.0	5.0
65	5.5	5.5	5.0	5.0
70	5.5	5.5	5.0	5.0
74	5.5	5.5	5.0	5.0

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	146	142	1.028	174	126	1.381
25	1,430	1,396	1.024	2,453	2,322	1.056
30	2,051	2,105	0.974	3,951	4,018	0.983
35	1,639	1,739	0.942	3,299	3,316	0.995
40	1,526	1,610	0.948	3,084	3,000	1.028
45	1,378	1,459	0.944	2,549	2,577	0.989
50	1,239	1,337	0.927	2,521	2,495	1.010
53 & over	1,983	1,834	1.081	3,205	3,018	1.062
TOTAL	**11,392**	**11,622**	**0.980**	**21,236**	**20,872**	**1.017**

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	5	4	1.250
35	13	8	1.625	9	5	1.800
40	16	13	1.231	14	9	1.556
45	25	23	1.087	24	14	1.714
50	46	43	1.070	30	23	1.304
55	53	56	0.946	30	32	0.938
60	60	59	1.017	33	38	0.868
TOTAL	**220**	**207**	**1.063**	**145**	**125**	**1.160**

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

Mortality Rates - Males

Mortality Rates - Females
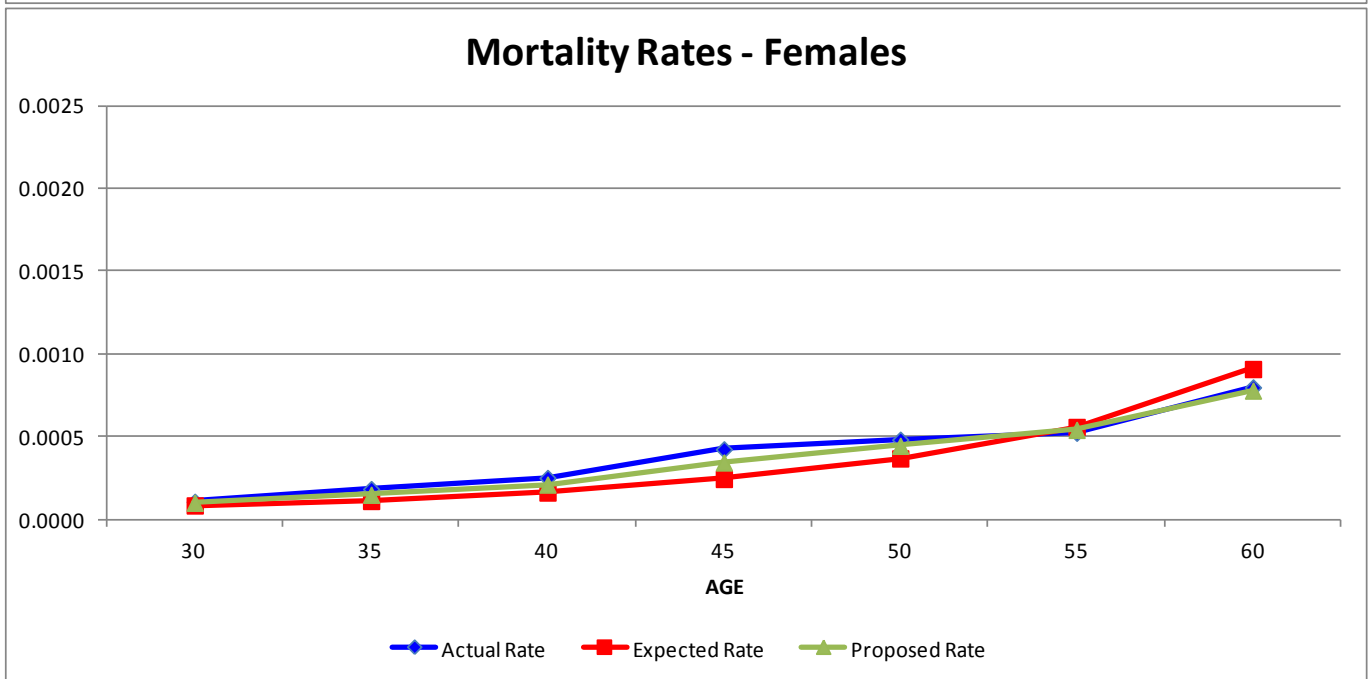
During the period of investigation, the actual rates of pre-retirement deaths were slightly more than expected over most age groups for males. However, the current rates allow for some improved mortality in the future so we recommend no change in the current rates for males. For females, actual rates of pre-retirement death were more than expected prior to age 52 and less than expected thereafter. Therefore, we recommend that the rates of mortality in active service for females be slightly revised to more closely reflect the experience of the system. The following table shows a comparison between the present death rates and the proposed rates.

COMPARATIVE RATES OF PRE-RETIREMENT MORTALITY

AGE	RATES OF DEATH			
	MALES		FEMALES	
	Present	Proposed	Present	Proposed
20	0.0100%	0.0100%	0.0045%	0.0080%
25	0.0100	0.0100	0.0060	0.0080
30	0.0200	0.0200	0.0083	0.0100
35	0.0300	0.0300	0.0113	0.0150
40	0.0400	0.0400	0.0158	0.0200
45	0.0700	0.0700	0.0240	0.0350
50	0.1400	0.1400	0.0368	0.0450
55	0.1900	0.1900	0.0555	0.0520
60	0.2200	0.2200	0.0915	0.0800
65	0.4000	0.4000	0.1612	0.1000

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	5	1.400	5	5	1.000
35	13	8	1.625	9	7	1.286
40	16	13	1.231	14	12	1.167
45	25	23	1.087	24	20	1.200
50	46	43	1.070	30	28	1.071
55	53	56	0.946	30	31	0.968
60	60	59	1.017	33	32	1.031
TOTAL	**220**	**207**	**1.063**	**145**	**135**	**1.074**

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	18	25	0.720	31	25	1.240
40	35	37	0.946	49	44	1.114
45	64	68	0.941	88	80	1.100
50	109	97	1.124	151	137	1.102
55	145	144	1.007	222	197	1.127
58 & over	160	171	0.936	199	195	1.021
TOTAL	**531**	**542**	**0.980**	**740**	**678**	**1.091**

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

Disability Rates - Males

Disability Rates - Females
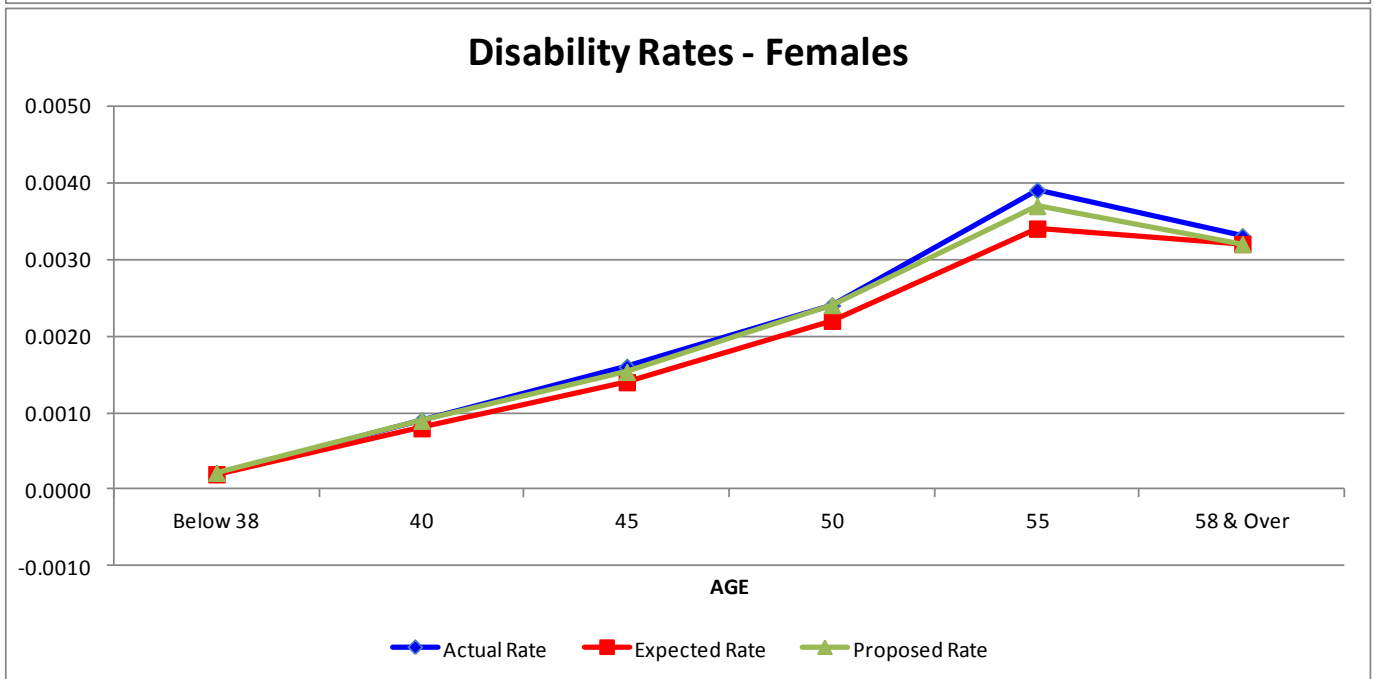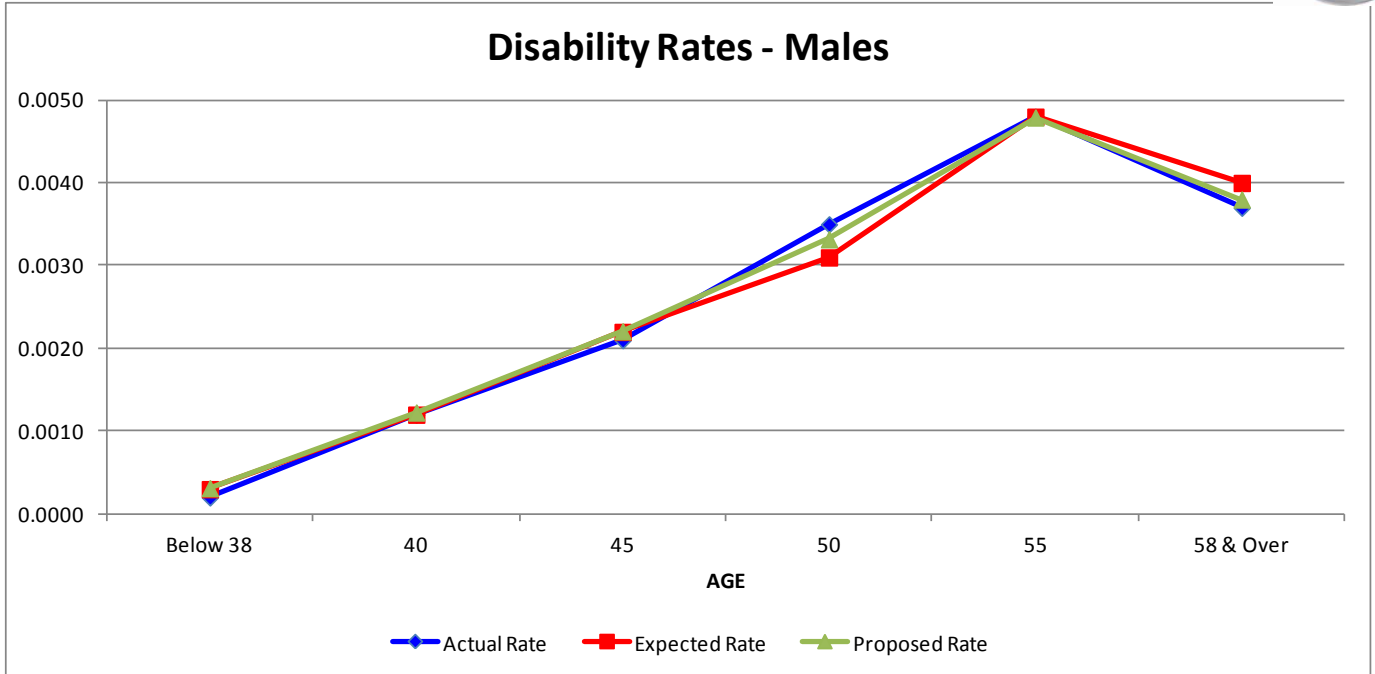
During the period under investigation, the actual rates of disability retirement were less than expected for most ages for males and the actual rates of disability retirement more than expected over all age groups for females. Therefore, we recommend the rates of disability retirement be revised to more closely reflect the experience of the System.

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	0.013%	0.012%	0.009%	0.011%
25	0.019	0.017	0.013	0.014
30	0.022	0.020	0.016	0.018
35	0.049	0.044	0.020	0.022
40	0.120	0.120	0.080	0.090
45	0.230	0.220	0.140	0.150
50	0.290	0.320	0.210	0.230
55	0.520	0.520	0.370	0.400
60	0.400	0.380	0.320	0.320
65	0.000	0.000	0.000	0.000

**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	18	23	0.783	31	28	1.107
40	35	37	0.946	49	50	0.980
45	64	67	0.955	88	87	1.011
50	109	104	1.048	151	150	1.007
55	145	144	1.007	222	211	1.052
58 & over	160	162	0.988	199	196	1.015
TOTAL	**531**	**537**	**0.989**	**740**	**722**	**1.025**

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	321	358	0.897	685	731	0.937
61	302	334	0.904	543	485	1.120
62	562	532	1.056	766	760	1.008
63	370	342	1.082	578	545	1.061
64	270	244	1.107	457	371	1.232
65	327	283	1.155	529	468	1.130
66	234	215	1.088	312	300	1.040
67	157	158	0.994	195	186	1.048
68	110	125	0.880	139	138	1.007
69	124	108	1.148	104	113	0.920
70	109	87	1.253	107	92	1.163
71	83	76	1.092	83	71	1.169
72	76	68	1.118	58	52	1.115
73	64	61	1.049	46	41	1.122
74	67	56	1.196	29	31	0.935
Subtotal	**3,176**	**3,047**	**1.042**	**4,631**	**4,384**	**1.056**

75 & Over	233	1,041	0.224	126	603	0.209
GRAND TOTAL	**3,409**	**4,088**	**0.834**	**4,757**	**4,987**	**0.954**

COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

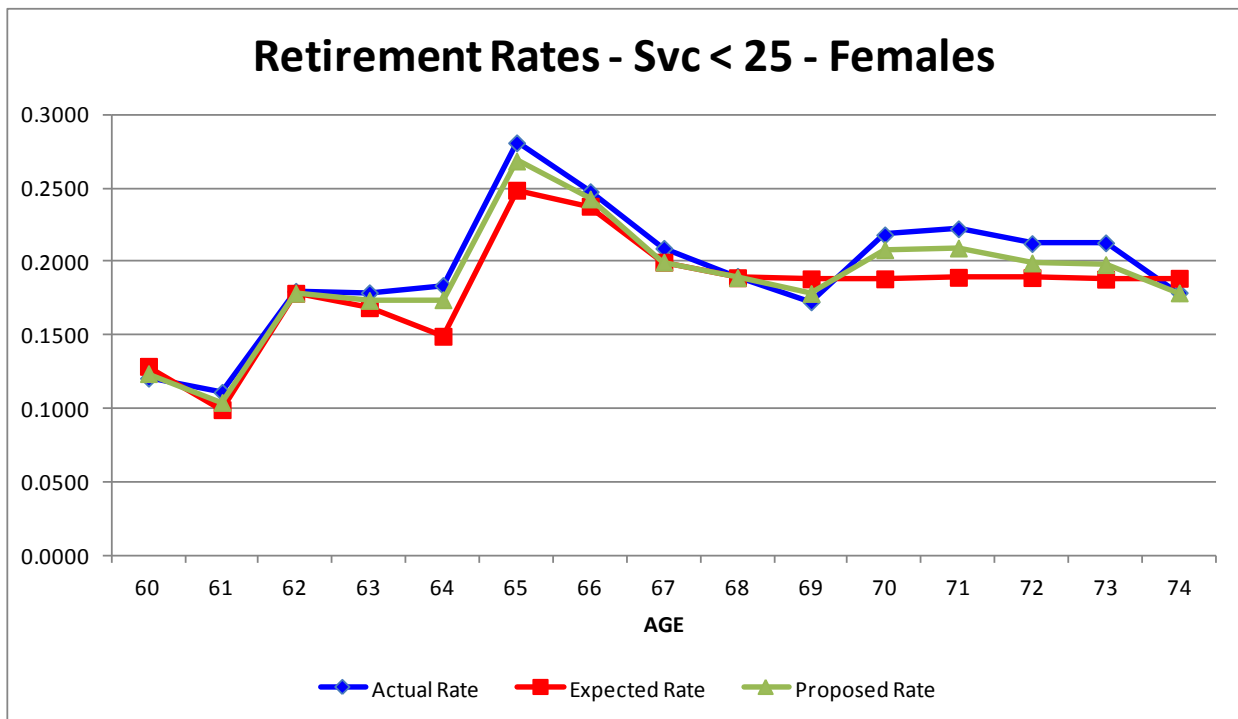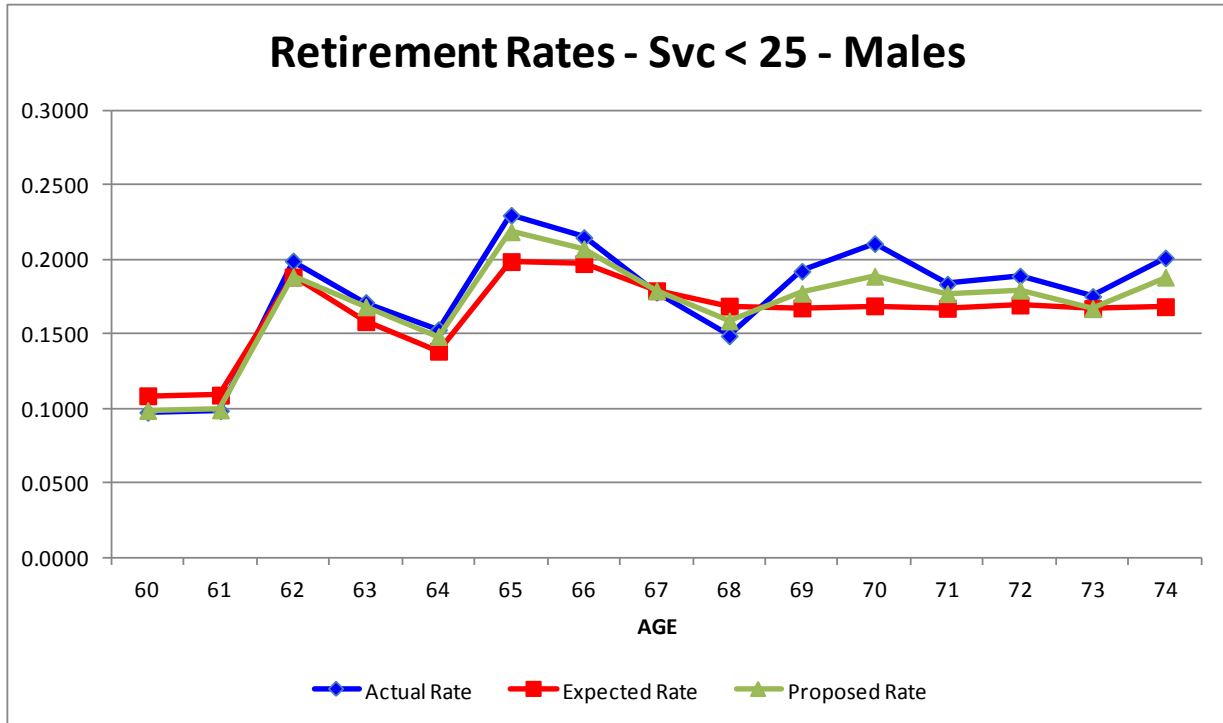## Retirements with 25 or more years of service

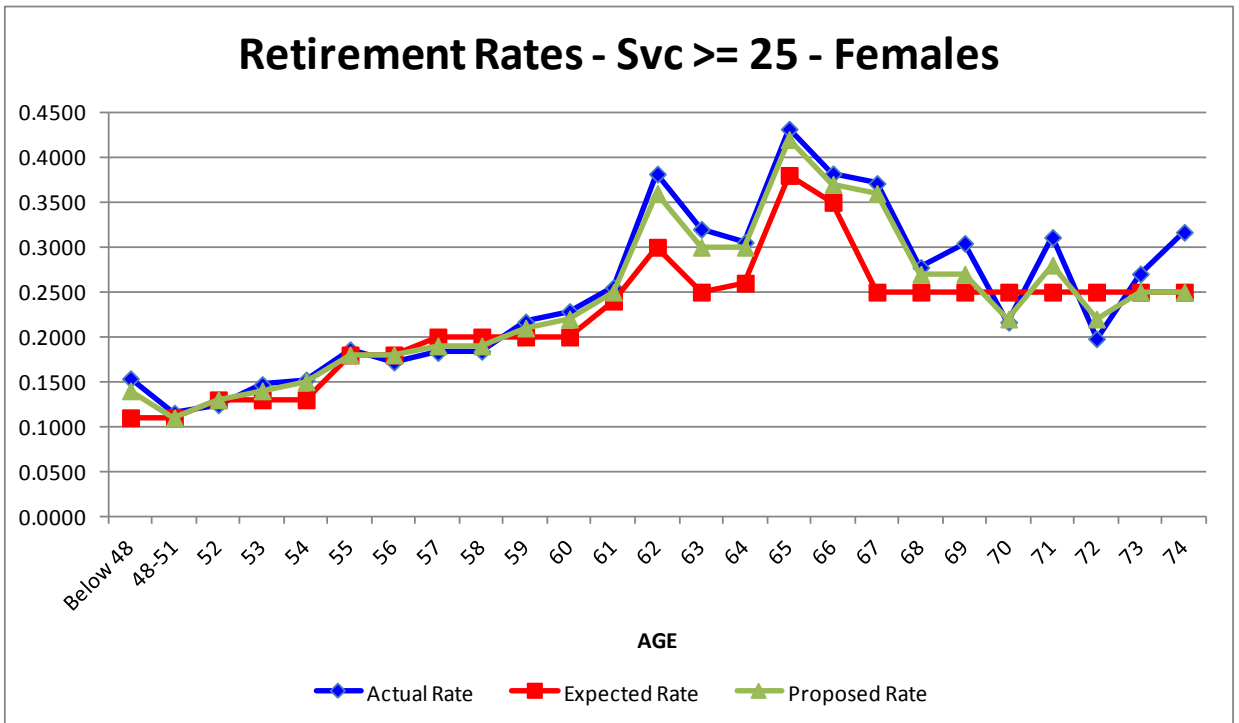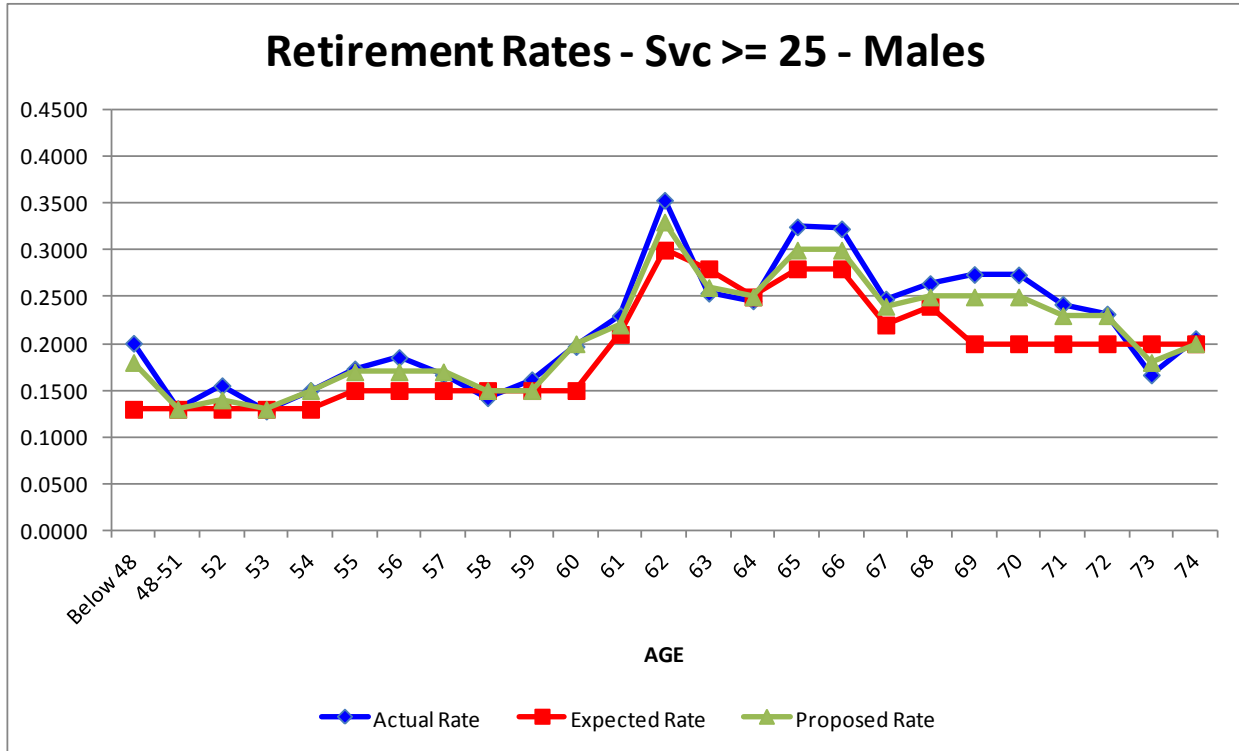| AGE OF GROUP	NUMBER OF RETIREMENTS					
	MALES			FEMALES		
	Actual	Expected	Ratio of Actual to Expected	Actual	Expected	Ratio of Actual to Expected
Below 48	163	106	1.538	144	103	1.398
48-51	400	398	1.005	664	634	1.047
52	151	126	1.198	241	252	0.956
53	135	137	0.985	310	274	1.131
54	169	146	1.158	326	279	1.168
55	198	172	1.151	404	391	1.033
56	204	165	1.236	370	387	0.956
57	177	159	1.113	390	427	0.913
58	148	156	0.949	382	415	0.920
59	168	156	1.077	420	388	1.082
60	196	149	1.315	406	356	1.140
61	210	192	1.094	404	380	1.063
62	308	262	1.176	541	425	1.273
63	161	178	0.904	336	263	1.278
64	131	133	0.985	252	215	1.172
65	140	121	1.157	268	236	1.136
66	91	79	1.152	155	142	1.092
67	54	48	1.125	105	71	1.479
68	51	46	1.109	53	48	1.104
69	40	29	1.379	49	40	1.225
70	32	23	1.391	29	34	0.853
71	23	19	1.211	37	30	1.233
72	19	16	1.188	20	25	0.800
73	14	17	0.824	20	19	1.053
74	15	15	1.000	19	15	1.267
Subtotal	**3,398**	**3,048**	**1.115**	**6,345**	**5,849**	**1.085**
75 & Over	73	268	0.272	74	243	0.305
GRAND TOTAL	**3,471**	**3,316**	**1.047**	**6,419**	**6,092**	**1.054**

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

The preceding results indicate that for most retirement ages the actual number of retirements is higher than expected number for both males and females and for both service breakdowns, retirements for members with less than 25 years of service as well as retirements for members with 25 or more years of service. Therefore, we recommend the rates of retirement be revised to more closely reflect the 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			13.0%	18.0%			11.0%	14.0%
50			13.0	13.0			11.0	11.0
55			15.0	17.0			18.0	18.0
60	11.0%	10.0%	15.0	20.0	13.0%	12.5%	20.0	22.0
62	19.0	19.0	30.0	33.0	18.0	18.0	30.0	36.0
65	20.0	22.0	28.0	30.0	25.0	27.0	38.0	42.0
70	17.0	19.0	20.0	25.0	19.0	21.0	25.0	22.0
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	321	325	0.988	685	703	0.974
61	302	304	0.993	543	510	1.065
62	562	532	1.056	766	760	1.008
63	370	364	1.016	578	561	1.030
64	270	262	1.031	457	433	1.055
65	327	311	1.051	529	506	1.045
66	234	226	1.035	312	306	1.020
67	157	158	0.994	195	186	1.048
68	110	117	0.940	139	138	1.007
69	124	114	1.088	104	107	0.972
70	109	98	1.112	107	102	1.049
71	83	80	1.038	83	78	1.064
72	76	72	1.056	58	54	1.074
73	64	61	1.049	46	43	1.070
74	67	63	1.063	29	29	1.000
Subtotal	**3,176**	**3,087**	**1.029**	**4,631**	**4,516**	**1.025**
75 & Over	233	1,041	0.224	126	603	0.209
GRAND TOTAL	**3,409**	**4,128**	**0.826**	**4,757**	**5,119**	**0.929**

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	163	146	1.116	144	131	1.099
48-51	400	398	1.005	664	634	1.047
52	151	136	1.110	241	252	0.956
53	135	137	0.985	310	295	1.051
54	169	169	1.000	326	322	1.012
55	198	194	1.021	404	391	1.033
56	204	187	1.091	370	387	0.956
57	177	181	0.978	390	406	0.961
58	148	156	0.949	382	394	0.970
59	168	156	1.077	420	407	1.032
60	196	199	0.985	406	391	1.038
61	210	201	1.045	404	396	1.020
62	308	288	1.069	541	510	1.061
63	161	165	0.976	336	315	1.067
64	131	133	0.985	252	248	1.016
65	140	129	1.085	268	261	1.027
66	91	85	1.071	155	150	1.033
67	54	52	1.038	105	102	1.029
68	51	48	1.063	53	52	1.019
69	40	37	1.081	49	43	1.140
70	32	29	1.103	29	29	1.000
71	23	22	1.045	37	33	1.121
72	19	19	1.000	20	22	0.909
73	14	15	0.933	20	19	1.053
74	15	15	1.000	19	15	1.267
Subtotal	**3,398**	**3,297**	**1.031**	**6,345**	**6,205**	**1.023**
75 & Over	73	268	0.272	74	243	0.305
GRAND TOTAL	**3,471**	**3,565**	**0.974**	**6,419**	**6,448**	**0.996**

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	27	10	2.700	16	8	2.000
55	35	30	1.167	42	30	1.400
60	134	108	1.241	147	124	1.185
65	302	312	0.968	302	329	0.918
70	459	470	0.977	421	454	0.927
75	598	588	1.017	602	574	1.049
80	690	694	0.994	896	835	1.073
85	688	601	1.145	1,001	951	1.053
90	435	369	1.179	922	828	1.114
95	140	131	1.069	549	462	1.188
98 & over	44	37	1.189	164	153	1.072
TOTAL	**3,552**	**3,350**	**1.060**	**5,062**	**4,748**	**1.066**
DISABILITY RETIREMENTS						
Below 48	15	20	0.750	22	10	2.200
50	27	30	0.900	36	19	1.895
55	49	56	0.875	60	42	1.429
60	91	89	1.022	78	68	1.147
65	66	78	0.846	60	73	0.822
70	64	53	1.208	42	56	0.750
75	41	37	1.108	30	49	0.612
80	36	22	1.636	29	31	0.935
85	15	12	1.250	14	16	0.875
88 & over	8	4	2.000	21	20	1.050
TOTAL	**412**	**401**	**1.027**	**392**	**384**	**1.021**

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

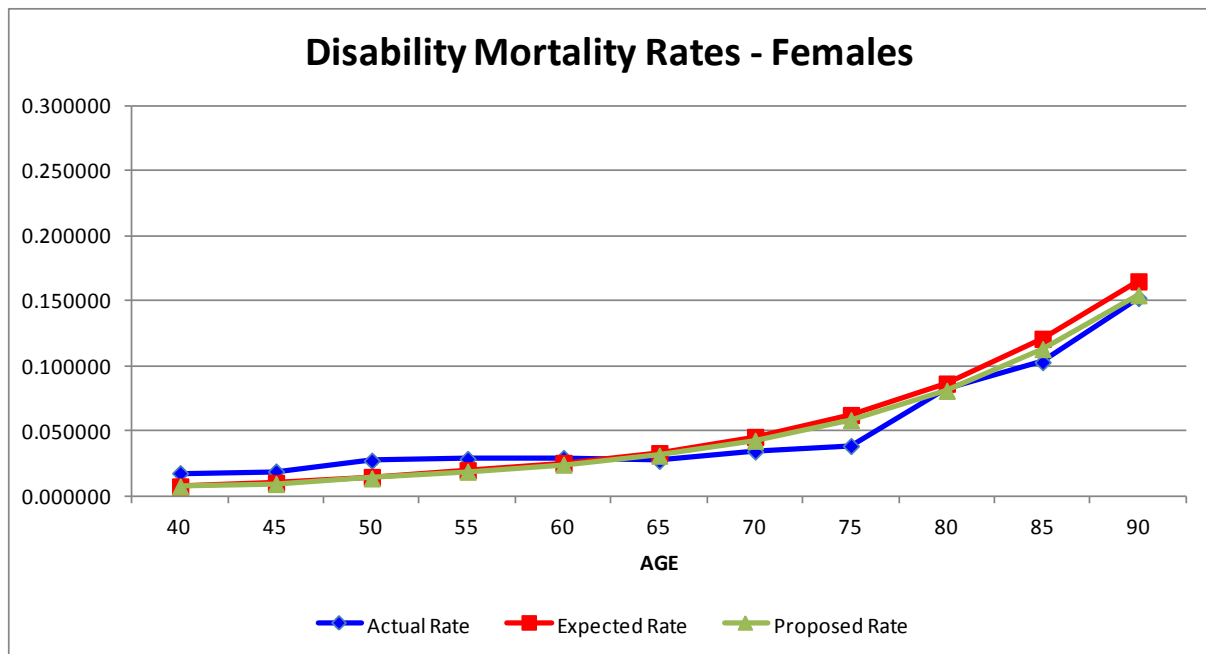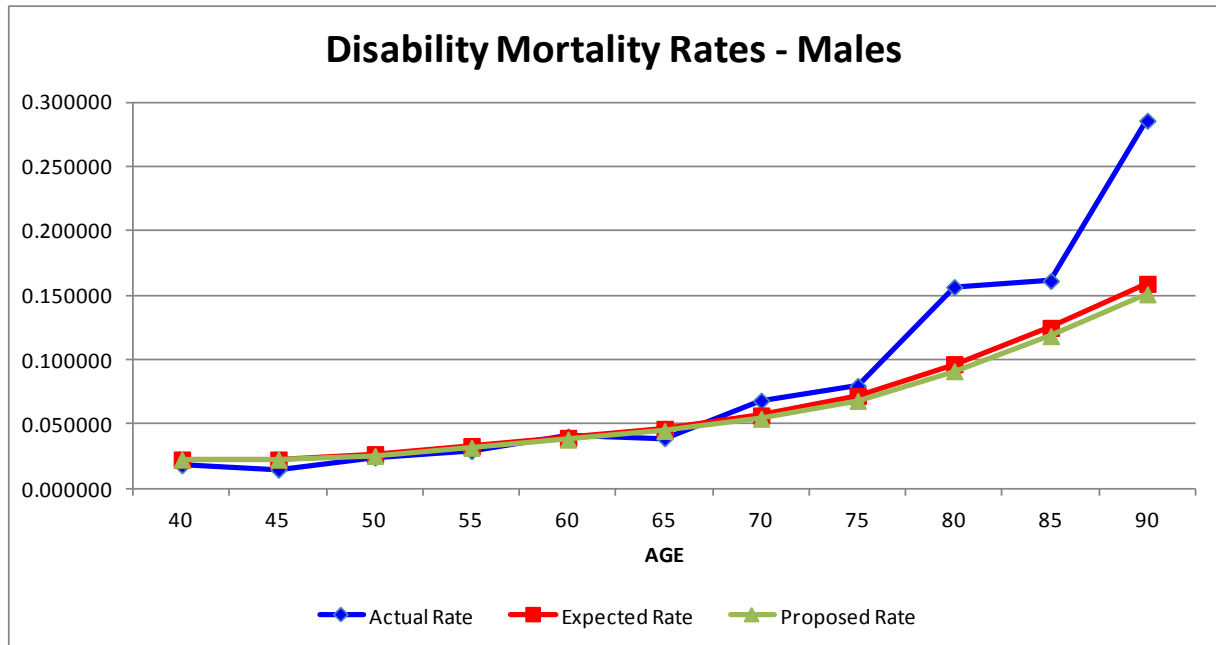Non-Disabled Mortality Rates - Males

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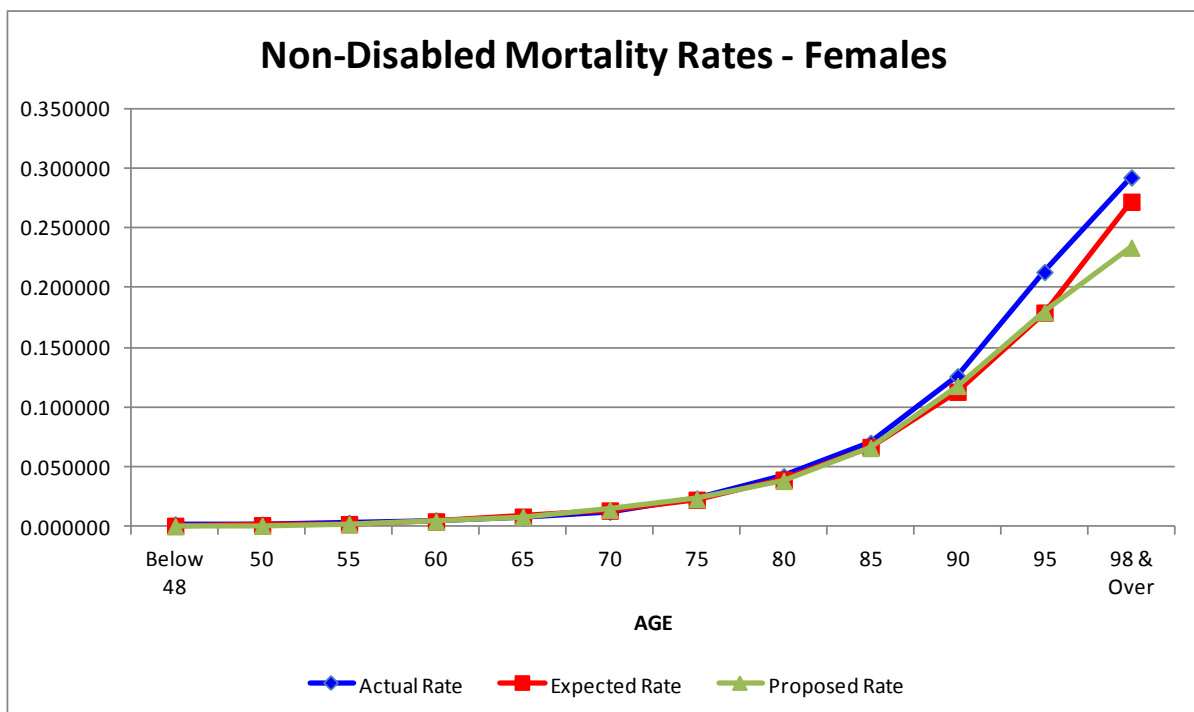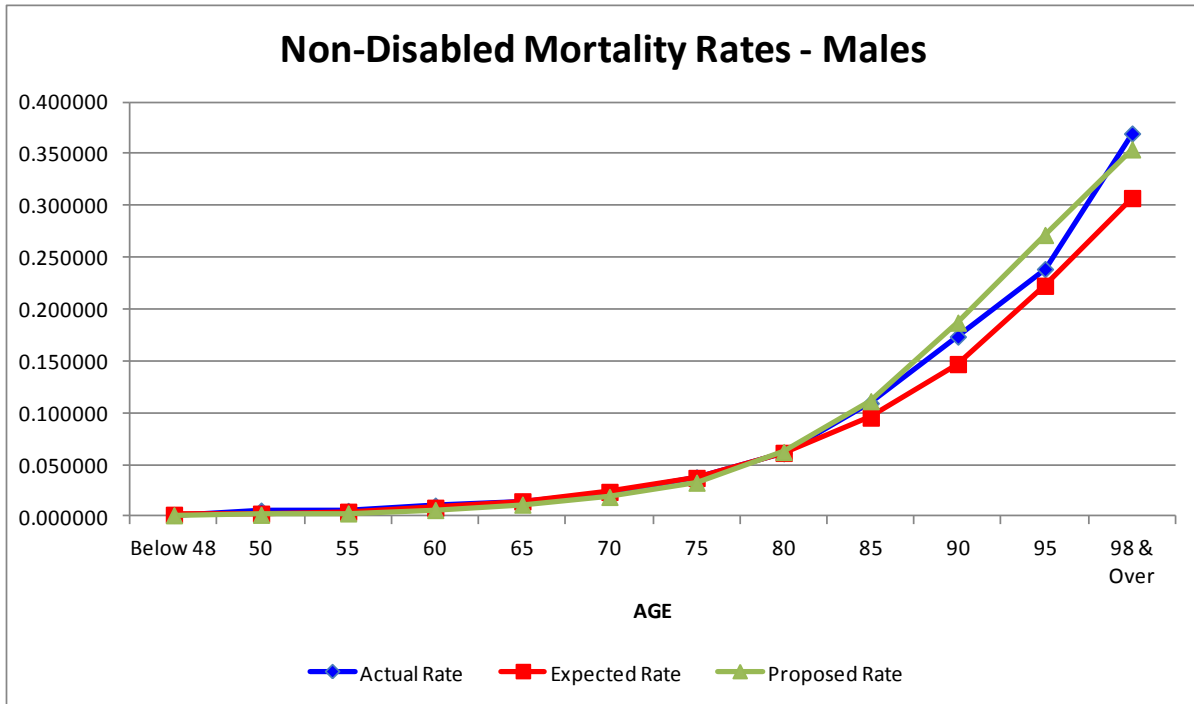
POST-RETIREMENT DEATHS
DISABILITY RETIREMENTS

Disability Mortality Rates - Males

Disability Mortality Rates - Females

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The preceding results indicate that the actual number of post-retirement deaths of service retirements was slightly more than expected for most ages for service retirees, beneficiaries and disabled retirees.

The margin for improved mortality going forward is within reasonable actuarial standards. However, since there is a more up-to-date mortality table that uses combined blue collar and white collar experience, we are recommending PERS and all other Systems change the rates of mortality for healthy retirements to the RP-2000 Combined Mortality Table Projected with Scale AA to 2025 set forward two years for males. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2000 Disabled Mortality Table set back three years for males and set forward two years for females. 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				
45	0.1578%	0.1250%	0.0973%	0.0751%
50	0.2579	0.1694	0.1428	0.1092
55	0.4425	0.2905	0.2294	0.2223
60	0.7976	0.5851	0.4439	0.4460
62	1.0147	0.7731	0.5832	0.5873
65	1.4535	1.1300	0.8636	0.8563
70	2.3730	1.8697	1.3730	1.4770
75	3.7211	3.2972	2.2686	2.2993
DISABILITY RETIREMENTS				
35	2.2571%	2.2571%	0.7450%	0.7450%
40	2.2571	2.2571	0.7450	0.7450
45	2.2571	2.2571	0.9775	0.8959
50	2.6404	2.5124	1.4465	1.3456
55	3.2859	3.1563	1.9710	1.8654
60	3.9334	3.8026	2.5293	2.4080
65	4.6584	4.4981	3.3234	3.1325
70	5.6909	5.4450	4.5769	4.2851
75	7.3292	6.9405	6.3545	5.9545
80	9.7640	9.2149	8.7838	8.2298
85	12.8343	12.1877	12.2464	11.4512
90	16.2186	15.5235	17.0433	15.9924

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	27	7	3.857	16	6	2.667
55	35	20	1.750	42	29	1.448
60	134	81	1.654	147	126	1.167
65	302	245	1.233	302	328	0.921
70	459	375	1.224	421	478	0.881
75	598	517	1.157	602	587	1.026
80	690	704	0.980	896	815	1.099
85	688	700	0.983	1,001	939	1.066
90	435	469	0.928	922	864	1.067
95	140	159	0.881	549	462	1.188
98 & over	44	42	1.048	164	131	1.252
TOTAL	**3,552**	**3,319**	**1.070**	**5,062**	**4,765**	**1.062**
DISABILITY RETIREMENTS						
Below 48	15	20	0.750	22	9	2.444
50	27	28	0.964	36	18	2.000
55	49	53	0.925	60	40	1.500
60	91	86	1.058	78	64	1.219
65	66	76	0.868	60	69	0.870
70	64	51	1.255	42	52	0.808
75	41	35	1.171	30	45	0.667
80	36	21	1.714	29	29	1.000
85	15	11	1.364	14	15	0.933
88 & over	8	4	2.000	21	19	1.105
TOTAL	**412**	**385**	**1.070**	**392**	**360**	**1.089**

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	$1,864,676	$1,875,152	0.994
1	1,387,160	1,459,490	0.950
2	1,298,627	1,343,761	0.966
3	1,171,672	1,204,792	0.973
4	1,051,234	1,077,762	0.975
5-9	4,534,946	4,626,549	0.980
10-14	3,475,353	3,548,181	0.979
15-19	2,748,756	2,816,047	0.976
20-24	2,154,900	2,206,581	0.977
25-29	1,102,943	1,124,712	0.981
30-34	543,095	551,408	0.985
35 & Over	198,714	201,976	0.984
TOTAL	**$21,532,076**	**$22,036,411**	**0.977**

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Over the past four years actual rates of salary increase have been significantly less than expected at all service breakdowns. In the previous study, we noted that for the fiscal year ending 2010, the salary increases were very small and we removed that one year from our analysis. However, we have seen the same trend for fiscal years ending in 2011 and 2012. Therefore, we are recommending a 0.50% decrease in rates of salary increase at each service group prior to 28 years and a 0.25% decrease in rates of salary for service on or after 25 years. 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	20.00%	19.50%
1	10.00%	9.50%
2	7.50%	7.00%
3	6.50%	6.00%
4	6.00%	5.50%
5-7	5.50%	5.00%
8-27	5.00%	4.50%
28 and Over	4.50%	4.25%

**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	$1,864,676	$1,867,338	0.999
1	1,387,160	1,452,856	0.955
2	1,298,627	1,337,512	0.971
3	1,171,672	1,199,136	0.977
4	1,051,234	1,072,677	0.980
5-9	4,534,946	4,604,583	0.985
10-14	3,475,353	3,531,287	0.984
15-19	2,748,756	2,802,638	0.981
20-24	2,154,900	2,196,074	0.981
25-29	1,102,943	1,120,212	0.985
30-34	543,095	550,089	0.987
35 & Over	198,714	201,492	0.986
TOTAL	**$21,532,076**	**$21,935,894**	**0.982**

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 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 that 100% of participants that leave the System as deferred vested will receive a deferred benefit upon attaining the eligibility requirements for retirement. However, after review of the experience of the data, we have noted that for this four year period, about 30% of those participants who were vested chose to forfeit their accrued benefit and receive their employee contributions with interest. Therefore, we recommend a change in our assumption at this time.

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 5.8% 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, about 6.8% of disabilities each year were in the line of duty so, therefore, we recommend no change in this assumption at this time.

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 0.52 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 0.28 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 31 actual withdrawals versus 35 expected withdrawals over the four year period of this investigation. In the prior investigation, the number of actual withdrawals was also less than the number of expected withdrawals and we made a slight change in the rates of withdrawal to match experience. At this time, we recommend no change but if this trend continues in the next experience study, we may further lower the rates of withdrawal.

➢ There were 98 actual retirements versus 100 expected retirements over the four-year period of this investigation. We, therefore, recommend no change to the retirement decrements at this time.

➢ 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 no changes in active death decrements at this time.

➢ There were 3 disability retirements over the four-year period of this investigation compared to 2 in the prior study. The current rates of disability expect four in the period. Therefore, we recommend no change in disability rates at this time.

➢ Actual rates of salary increase were significantly lower for the periods ending June 30, 2009 and June 30, 2011. The average of the four years was about 2.8% lower than expected. Similar to PERS, we recommend a small change in the HSPRS rates of salary increase, lowering all rates by 0.25%.

➤ As mentioned in the PERS section of this report, we recommend that the rates of mortality for service retirements be revised to the RP-2000 Combined Mortality Table Projected with Scale AA to 2025 set forward two years for males. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2000 Disabled Mortality Table set back three years for males and set forward two 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 (1% 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 (19 vs. 11). Therefore, we recommend an increase from 15% to 20% 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 (1% of exposed) was not enough to warrant adding rates during those years. The actual number of service retirements during the election year was close to expected (25 vs. 28), so therefore, we recommend no changes at this time.

➢ There were 3 deaths while in active service over the four-year period of this investigation which is exactly what was expected. Therefore, we recommend no change at this time.

➢ 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.

➢ The salary scale was lowered in the 2008 investigation study from 5.0% to 4.5% for all ages. Last study and this year's study, actual salary increases were about 96% of expected. We recommend that the salary scale be further reduced to 4.25% 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-2000 Combined Mortality Table

Projected with Scale AA to 2025 set forward two years for males. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2000 Disabled Mortality Table set back three years for males and set forward two 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-2000 Combined Mortality Table Projected with Scale AA to 2025 set forward two years for males. In addition, we recommend that the rates of mortality for disability retirements be revised to the RP-2000 Disabled Mortality Table set back three years for males and set forward two years for females. We recommend each of the Systems have the same mortality table.

Historical June CPI (U) Index

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

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

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	0.220	0.000100	0.00012		
21	0.206	0.000100	0.00012		
22	0.192	0.000100	0.00014		
23	0.178	0.000100	0.00014		
24	0.164	0.000100	0.00014		
25	0.150	0.000100	0.00017		
26	0.140	0.000100	0.00017		
27	0.130	0.000125	0.00020		
28	0.120	0.000150	0.00020		
29	0.110	0.000175	0.00020		
30	0.100	0.000200	0.00020		
31	0.095	0.000220	0.00023		
32	0.090	0.000240	0.00029		
33	0.085	0.000260	0.00036		
34	0.080	0.000280	0.00041		
35	0.075	0.000300	0.00044		
36	0.072	0.000320	0.00059		
37	0.069	0.000340	0.00074		
38	0.066	0.000360	0.00089		
39	0.063	0.000380	0.00104		
40	0.060	0.000400	0.00120		0.180
41	0.059	0.000460	0.00140		0.180
42	0.058	0.000520	0.00160		0.180
43	0.057	0.000580	0.00180		0.180
44	0.056	0.000640	0.00200		0.180
45	0.055	0.000700	0.00220		0.180
46	0.055	0.000840	0.00240		0.180
47	0.055	0.000980	0.00260		0.180
48	0.055	0.001120	0.00280		0.130
49	0.055	0.001260	0.00300		0.130
50	0.055	0.001400	0.00320		0.130
51	0.055	0.001500	0.00360		0.130
52	0.055	0.001600	0.00400		0.140
53	0.055	0.001700	0.00440		0.130
54	0.055	0.001800	0.00480		0.150
55	0.055	0.001900	0.00520		0.170
56	0.055	0.001960	0.00492		0.170
57	0.055	0.002020	0.00464		0.170
58	0.055	0.002080	0.00436		0.150
59	0.055	0.002140	0.00408		0.150
60	0.055	0.002200	0.00380	0.100	0.200
61	0.055	0.002560	0.00380	0.100	0.220
62	0.055	0.002920	0.00380	0.190	0.330
63	0.055	0.003280	0.00380	0.170	0.260
64	0.055	0.003640	0.00380	0.150	0.250
65	0.055	0.004000	0.00000	0.220	0.300
66	0.055	0.004000	0.00000	0.210	0.300
67	0.055	0.004000	0.00000	0.180	0.240
68	0.055	0.004000	0.00000	0.160	0.250
69	0.055	0.004000	0.00000	0.180	0.250
70	0.055	0.004000	0.00000	0.190	0.250
71	0.055	0.004000	0.00000	0.180	0.230
72	0.055	0.004000	0.00000	0.180	0.230
73	0.055	0.004000	0.00000	0.170	0.180
74	0.055	0.004000	0.00000	0.190	0.200
75	0.000	0.000000	0.00000	1.000	1.000

*For all ages, rates of 32% for the first year of employment and 22% 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	0.250	0.000080	0.00011		
21	0.231	0.000080	0.00011		
22	0.212	0.000080	0.00012		
23	0.193	0.000080	0.00012		
24	0.174	0.000080	0.00012		
25	0.155	0.000080	0.00014		
26	0.145	0.000080	0.00014		
27	0.135	0.000080	0.00018		
28	0.125	0.000087	0.00018		
29	0.115	0.000093	0.00018		
30	0.105	0.000100	0.00018		
31	0.100	0.000110	0.00019		
32	0.095	0.000120	0.00019		
33	0.090	0.000130	0.00020		
34	0.085	0.000140	0.00021		
35	0.080	0.000150	0.00022		
36	0.076	0.000160	0.00036		
37	0.072	0.000170	0.00050		
38	0.068	0.000180	0.00064		
39	0.064	0.000190	0.00078		
40	0.060	0.000200	0.00090		0.140
41	0.058	0.000230	0.00102		0.140
42	0.056	0.000260	0.00114		0.140
43	0.054	0.000290	0.00126		0.140
44	0.052	0.000320	0.00138		0.140
45	0.050	0.000350	0.00150		0.140
46	0.050	0.000370	0.00166		0.140
47	0.050	0.000390	0.00182		0.140
48	0.050	0.000410	0.00198		0.110
49	0.050	0.000430	0.00214		0.110
50	0.050	0.000450	0.00230		0.110
51	0.050	0.000464	0.00264		0.110
52	0.050	0.000478	0.00298		0.130
53	0.050	0.000492	0.00332		0.140
54	0.050	0.000506	0.00366		0.150
55	0.050	0.000520	0.00400		0.180
56	0.050	0.000576	0.00384		0.180
57	0.050	0.000632	0.00368		0.190
58	0.050	0.000688	0.00352		0.190
59	0.050	0.000744	0.00336		0.210
60	0.050	0.000800	0.00320	0.125	0.220
61	0.050	0.000840	0.00320	0.105	0.250
62	0.050	0.000880	0.00320	0.180	0.360
63	0.050	0.000920	0.00320	0.175	0.300
64	0.050	0.000960	0.00320	0.175	0.300
65	0.050	0.001000	0.00000	0.270	0.420
66	0.050	0.001000	0.00000	0.245	0.370
67	0.050	0.001000	0.00000	0.200	0.360
68	0.050	0.001000	0.00000	0.190	0.270
69	0.050	0.001000	0.00000	0.180	0.270
70	0.050	0.001000	0.00000	0.210	0.220
71	0.050	0.001000	0.00000	0.210	0.280
72	0.050	0.001000	0.00000	0.200	0.220
73	0.050	0.001000	0.00000	0.200	0.250
74	0.050	0.001000	0.00000	0.180	0.250
75	0.000	0.000000	0.00000	1.000	1.000

*For all ages, rates of 32% for the first year of employment and 22% 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 & FEMALES	RATES OF DISABILITY		SERVICE	RATES OF RETIREMENT*
20	0.0800	0.000200	0.00090		0	0.00
21	0.0720	0.000200	0.00090		1	0.00
22	0.0640	0.000200	0.00090		2	0.00
23	0.0560	0.000250	0.00102		3	0.00
24	0.0480	0.000275	0.00102		4	0.00
25	0.0400	0.000275	0.00102		5	0.05
26	0.0390	0.000300	0.00102		6	0.05
27	0.0380	0.000325	0.00120		7	0.05
28	0.0370	0.000350	0.00120		8	0.05
29	0.0360	0.000375	0.00126		9	0.05
30	0.0350	0.000395	0.00138		10	0.05
31	0.0330	0.000420	0.00144		11	0.05
32	0.0310	0.000445	0.00162		12	0.05
33	0.0290	0.000470	0.00180		13	0.05
34	0.0270	0.000495	0.00186		14	0.05
35	0.0250	0.000515	0.00204		15	0.05
36	0.0220	0.000565	0.00210		16	0.05
37	0.0190	0.000590	0.00228		17	0.05
38	0.0160	0.000640	0.00240		18	0.05
39	0.0130	0.000685	0.00252		19	0.05
40	0.0100	0.000735	0.00270		20	0.10
41	0.0100	0.000760	0.00282		21	0.10
42	0.0100	0.000830	0.00306		22	0.10
43	0.0100	0.000930	0.00318		23	0.15
44	0.0100	0.001000	0.00342		24	0.15
45	0.0100	0.001050	0.00360		25	0.15
46	0.0090	0.001145	0.00396		26	0.15
47	0.0080	0.001295	0.00432		27	0.15
48	0.0070	0.001390	0.00462		28	0.25
49	0.0060	0.001490	0.00510		29	0.25
50	0.0050	0.001610	0.00552		30	0.25
51	0.0040	0.001730	0.00606		31	0.25
52	0.0030	0.001795	0.00672		32	0.25
53	0.0020	0.001910	0.00750		33	0.25
54	0.0010	0.002025	0.00822		34	0.25
55	0.0000	0.002145	0.00930		35+	0.25
56	0.0000	0.002265	0.01068			
57	0.0000	0.002385	0.01200			
58	0.0000	0.002510	0.01356			
59	0.0000	0.002635	0.01554			
60	0.0000	0.000000	0.00000			

* The annual rate of service retirement is 100% at age 60.

TABLE 4

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

AGE	RATES OF DEATH MALES	RATES OF DEATH FEMALES	RATES OF DISABILITY
20	0.00024	0.00012	0.0004
21	0.00026	0.00013	0.0004
22	0.00026	0.00014	0.0005
23	0.00027	0.00015	0.0005
24	0.00029	0.00016	0.0005
25	0.00030	0.00017	0.0005
26	0.00031	0.00017	0.0006
27	0.00033	0.00018	0.0006
28	0.00034	0.00019	0.0007
29	0.00036	0.00020	0.0007
30	0.00038	0.00022	0.0007
31	0.00040	0.00023	0.0008
32	0.00043	0.00026	0.0009
33	0.00046	0.00027	0.0010
34	0.00049	0.00029	0.0011
35	0.00052	0.00031	0.0011
36	0.00056	0.00033	0.0012
37	0.00060	0.00035	0.0013
38	0.00065	0.00037	0.0014
39	0.00070	0.00040	0.0016
40	0.00076	0.00044	0.0017
41	0.00082	0.00047	0.0018
42	0.00089	0.00050	0.0019
43	0.00100	0.00054	0.0021
44	0.00113	0.00060	0.0022
45	0.00129	0.00065	0.0023
46	0.00146	0.00070	0.0025
47	0.00166	0.00076	0.0026
48	0.00187	0.00083	0.0027
49	0.00212	0.00090	0.0028
50	0.00237	0.00099	0.0030
51	0.00264	0.00107	0.0031
52	0.00294	0.00116	0.0032
53	0.00324	0.00126	0.0033
54	0.00356	0.00137	0.0034
55	0.00390	0.00149	0.0035
56	0.00426	0.00163	0.0036
57	0.00463	0.00179	0.0037
58	0.00502	0.00198	0.0038
59	0.00545	0.00219	0.0039
60	0.00596	0.00245	0.0040
61	0.00656	0.00274	0.0041
62	0.00722	0.00308	0.0042
63	0.00793	0.00345	0.0044
64	0.00870	0.00385	0.0045
65	0.00959	0.00431	0.0000
66	0.01063	0.00478	0.0000
67	0.01182	0.00528	0.0000
68	0.01316	0.00581	0.0000
69	0.01460	0.00644	0.0000
70	0.01613	0.00717	0.0000
71	0.01775	0.00800	0.0000
72	0.01947	0.00893	0.0000
73	0.02129	0.00996	0.0000
74	0.02320	0.01109	0.0000
75	0.00000	0.00000	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 75.

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	0.1950
1	0.0950
2	0.0700
3	0.0600
4	0.0550
5	0.0500
6	0.0500
7	0.0500
8	0.0450
9	0.0450
10	0.0450
11	0.0450
12	0.0450
13	0.0450
14	0.0450
15	0.0450
16	0.0450
17	0.0450
18	0.0450
19	0.0450
20	0.0450
21	0.0450
22	0.0450
23	0.0450
24	0.0450
25	0.0450
26	0.0450
27	0.0450
28	0.0425
29	0.0425
30	0.0425
31	0.0425
32	0.0425
33	0.0425
34	0.0425
35	0.0425
36	0.0425
37	0.0425
38	0.0425
39	0.0425
40	0.0425

AGE	HSPRS	SLRP	MRS
20	0.09841	0..0425	0.060
21	0.09455	0..0425	0.060
22	0.08048	0..0425	0.060
23	0.07646	0..0425	0.060
24	0.07212	0..0425	0.060
25	0.06570	0..0425	0.060
26	0.06250	0..0425	0.060
27	0.06150	0..0425	0.060
28	0.05750	0..0425	0.060
29	0.05750	0..0425	0.060
30	0.05750	0..0425	0.060
31	0.05750	0..0425	0.060
32	0.05750	0..0425	0.060
33	0.05750	0..0425	0.060
34	0.05750	0..0425	0.060
35	0.05750	0..0425	0.060
36	0.05750	0..0425	0.060
37	0.05750	0..0425	0.060
38	0.05750	0..0425	0.060
39	0.05750	0..0425	0.060
40	0.05750	0..0425	0.060
41	0.05750	0..0425	0.060
42	0.05750	0..0425	0.060
43	0.05250	0..0425	0.055
44	0.05250	0..0425	0.055
45	0.05250	0..0425	0.055
46	0.05250	0..0425	0.055
47	0.05250	0..0425	0.055
48	0.04750	0..0425	0.050
49	0.04750	0..0425	0.050
50	0.04750	0..0425	0.050
51	0.04750	0..0425	0.050
52	0.04750	0..0425	0.050
53	0.04750	0..0425	0.045
54	0.04750	0..0425	0.045
55	0.04750	0..0425	0.045
56	0.04750	0..0425	0.045
57	0.04750	0..0425	0.045
58	0.04750	0..0425	0.045
59	0.04750	0..0425	0.045
60	0.00000	0..0425	0.045
61		0..0425	0.045
62		0..0425	0.045
63		0..0425	0.045
64		0..0425	0.045
65		0..0425	0.045
66		0..0425	0.045
67		0..0425	0.045
68		0..0425	0.045
69		0..0425	0.045
70		0..0425	0.045
71		0..0425	0.045
72		0..0425	0.045
73		0..0425	0.045
74		0..0425	0.045
75		0..0425	0.045

* Includes inflation of 4.25%

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	0.000221	0.000130	71	0.020825	0.015984
20	0.000227	0.000128	72	0.023233	0.017778
21	0.000237	0.000125	73	0.025929	0.019270
22	0.000245	0.000126	74	0.028900	0.021358
23	0.000258	0.000132	75	0.032972	0.022993
24	0.000273	0.000138	76	0.036640	0.025332
25	0.000297	0.000146	77	0.041765	0.028612
26	0.000338	0.000158	78	0.047599	0.031540
27	0.000363	0.000165	79	0.054637	0.034821
28	0.000392	0.000174	80	0.062604	0.038490
29	0.000440	0.000183	81	0.071568	0.042601
30	0.000496	0.000205	82	0.081626	0.047227
31	0.000557	0.000251	83	0.090607	0.052439
32	0.000619	0.000286	84	0.103019	0.058321
33	0.000682	0.000314	85	0.114132	0.066628
34	0.000742	0.000338	86	0.126336	0.076203
35	0.000798	0.000360	87	0.143174	0.087152
36	0.000850	0.000380	88	0.161806	0.097072
37	0.000901	0.000399	89	0.176240	0.110532
38	0.000928	0.000420	90	0.195953	0.122153
39	0.000958	0.000444	91	0.211384	0.134140
40	0.000994	0.000484	92	0.232553	0.146213
41	0.001036	0.000530	93	0.248135	0.162113
42	0.001087	0.000584	94	0.263361	0.173875
43	0.001144	0.000642	95	0.285214	0.185013
44	0.001195	0.000705	96	0.299904	0.195353
45	0.001250	0.000751	97	0.314087	0.209923
46	0.001307	0.000797	98	0.336045	0.218415
47	0.001367	0.000842	99	0.349769	0.225671
48	0.001429	0.000911	100	0.362504	0.231601
49	0.001595	0.000984	101	0.383040	0.244834
50	0.001694	0.001092	102	0.392003	0.254498
51	0.001805	0.001237	103	0.397886	0.266044
52	0.001929	0.001419	104	0.400000	0.279055
53	0.002187	0.001632	105	0.400000	0.293116
54	0.002535	0.001885	106	0.400000	0.307811
55	0.002905	0.002223	107	0.400000	0.322725
56	0.003348	0.002658	108	0.400000	0.337441
57	0.003872	0.003068	109	0.400000	0.351544
58	0.004508	0.003461	110	0.400000	0.364617
59	0.005129	0.003918	111	0.400000	0.376246
60	0.005851	0.004460	112	0.400000	0.386015
61	0.006862	0.005129	113	0.400000	0.393507
62	0.007731	0.005873	114	0.400000	0.398308
63	0.008953	0.006747	115	0.400000	0.400000
64	0.010129	0.007604	116	0.400000	0.400000
65	0.011300	0.008563	117	0.400000	0.400000
66	0.012885	0.009664	118	1.000000	0.400000
67	0.014277	0.010730	119	1.000000	0.400000
68	0.015610	0.011861	120	1.000000	1.000000
69	0.017271	0.013110			
70	0.018697	0.014770			

TABLE 8

ALL SYSTEMS

RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF DISABILITY

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.022571	0.007450	71	0.056909	0.045769
20	0.022571	0.007450	72	0.059613	0.048895
21	0.022571	0.007450	73	0.062583	0.052230
22	0.022571	0.007450	74	0.065841	0.055777
23	0.022571	0.007450	75	0.069405	0.059545
24	0.022571	0.007450	76	0.073292	0.063545
25	0.022571	0.007450	77	0.077512	0.067793
26	0.022571	0.007450	78	0.082067	0.072312
27	0.022571	0.007450	79	0.086951	0.077135
28	0.022571	0.007450	80	0.092149	0.082298
29	0.022571	0.007450	81	0.097640	0.087838
30	0.022571	0.007450	82	0.103392	0.093794
31	0.022571	0.007450	83	0.109372	0.100203
32	0.022571	0.007450	84	0.115544	0.107099
33	0.022571	0.007450	85	0.121877	0.114512
34	0.022571	0.007450	86	0.128343	0.122464
35	0.022571	0.007450	87	0.134923	0.130972
36	0.022571	0.007450	88	0.141603	0.140049
37	0.022571	0.007450	89	0.148374	0.149698
38	0.022571	0.007450	90	0.155235	0.159924
39	0.022571	0.007450	91	0.162186	0.170433
40	0.022571	0.007450	92	0.169233	0.182799
41	0.022571	0.007450	93	0.183408	0.194509
42	0.022571	0.007450	94	0.199769	0.205379
43	0.022571	0.007450	95	0.216605	0.215240
44	0.022571	0.008184	96	0.233662	0.223947
45	0.022571	0.008959	97	0.250693	0.231387
46	0.022571	0.009775	98	0.267491	0.237467
47	0.022571	0.010634	99	0.283905	0.244834
48	0.022571	0.011535	100	0.299852	0.254498
49	0.023847	0.012477	101	0.315296	0.266044
50	0.025124	0.013456	102	0.330207	0.279055
51	0.026404	0.014465	103	0.344556	0.293116
52	0.027687	0.015497	104	0.358628	0.307811
53	0.028975	0.016544	105	0.371685	0.322725
54	0.030268	0.017598	106	0.383040	0.337441
55	0.031563	0.018654	107	0.392003	0.351544
56	0.032859	0.019710	108	0.397886	0.364617
57	0.034152	0.020768	109	0.400000	0.376246
58	0.035442	0.021839	110	0.400000	0.386015
59	0.036732	0.022936	111	0.400000	0.393507
60	0.038026	0.024080	112	0.400000	0.398308
61	0.039334	0.025293	113	0.400000	0.400000
62	0.040668	0.026600	114	0.400000	0.400000
63	0.042042	0.028026	115	0.400000	0.400000
64	0.043474	0.029594	116	0.400000	0.400000
65	0.044981	0.031325	117	0.400000	0.400000
66	0.046584	0.033234	118	0.400000	1.000000
67	0.048307	0.035335	119	0.400000	1.000000
68	0.050174	0.037635	120	1.000000	1.000000
69	0.052213	0.040140			
70	0.054450	0.042851			