



New York State and Local  
Employees' Retirement System  
Police and Fire Retirement System  
Public Employees' Group Life Insurance Plan

**Thomas P. DiNapoli, Comptroller**

**ANNUAL REPORT TO THE  
COMPTROLLER  
ON  
ACTUARIAL ASSUMPTIONS**  
With Attached Tables Based on  
Experience Studies for the Period  
April 1, 2005 through March 31, 2010

Michael R. Dutcher  
Retirement Systems Actuary

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## **I. Executive Summary**

“May you live in interesting times” is a well-known phrase, often referred to as a veiled curse. For the New York State and Local Retirement Systems (NYSLRS), comprised of the Employees Retirement System (ERS) and the Police and Fire Retirement System (PFRS), these are indeed interesting times.

In the 1970s and early 1980s, employer and employee contributions to NYSLRS actually exceeded the benefits paid (Appendix A). This positive net cash flow coincided with a shift in the asset allocation policy from about 16 percent equities in 1980 to about 50 percent equities in 1990. These actions turned out to have been exquisite long-term market timing as the high inflation of the late ‘70s and early ‘80s made equities “cheap”, and the subsequent significant decrease in inflation helped fuel substantial equity appreciation. The increase in investment income resulted in a reduction in employer contributions to negligible amounts in ERS from 1989-2004 and in PFRS from 1989-1991 and 1998-2004 and the contribution rates of the ‘70s and early ‘80s were soon a distant memory or forgotten altogether.

Inexpensive oil, technology driven productivity gains, and Y2K inspired business contributed toward keeping equity appreciation strong through the ‘90s and by the turn of the century some may have thought that investment income would relieve employer contributions forever. Then the new century opened with the exposure of massive fraud (e.g. Enron) and horribly destructive terrorist attacks. In addition to the tragic human toll, these contributed to market declines, with the latter also leading to an increase in the cost of homeland security.

The subsequent employer contribution increases were lagged (by smoothing methods and statute) in 2003, but would eventually set in until equity appreciation was renewed by a new force: housing appreciation. Many homeowners saw the market values of their homes increase rapidly during a five-year span in the early 2000s. Borrowing against homeowner equity provided consumers with more purchasing power, which was translated into higher consumer spending and higher consumer debt. A number of investment banks also became highly leveraged in housing related assets. The subsequent higher equity values contributed to a new season of employer contribution rate decline beginning in 2006. However, the latter part of the decade saw the housing bubble deflate, putting some homeowners and investment banks into bankruptcy as the value of housing related assets collapsed. The resulting financial collapse was severe as financial institutions teetered on insolvency and the largest decline in the value of the equity markets since the Great Depression was experienced by all investors. Although the equity markets rebounded through

the first quarter of 2010, a sluggish economy and an uncertain equity market raises the question as to the future of employer contribution rates.

The Common Retirement Fund's (CRF) asset valuation methodology "smooths" the loss incurred by the CRF in 2008-2009 over a five year period. As detailed later in this report, the intent of the smoothing process is to reduce volatility in contribution rates over time. As such, although the Fund experienced a 25.9 percent rate of return for the 2009-10 State Fiscal Year, employer contribution rates increased in 2010-2011 and will continue to reflect the market losses incurred in 2009 over the next four years.

The method for recognizing each year's investment income is not the only consideration in the actuarial determination of employer contribution rates. Other variables in such calculation include expected trends in the rate of inflation, an average expected rate of return of the assets of the pension plan over a 30 year period, an assumed annual rate of employee salary increases, any recent changes in employee benefits and other demographic factors.

In December 2009, the Governor signed into law (Chapter 504 of the Laws of 2009) the following pension benefit changes for ERS members joining the System on or after January 1, 2010 and PFRS members joining the System on or after January 9, 2010\*:

- A permanent employee contribution rate of 3 percent of salary for most employees as opposed to the current 10 year limit;
- An increase in the number of years to be vested from five to ten years;
- An increase in the retirement age with full benefits from 55 to 62; and
- A limit on the amount of overtime to be included in the calculation of final average salary.

\* For more info see <http://www.osc.state.ny.us/retire/employers/tier-5/index.php>

The adoption of these changes, referred to as "Tier 5", over time will act to reduce employer contribution rates as the number of members covered by these new provisions increases. (The Tier 5 plans expected to cover the majority of new members will have employer contribution rates approximately 20 percent lower than their closed tier counterparts). As to the actuarial assumptions contained in this report, the revised early retirement provisions may alter the pattern of retirement, or the overtime cap may have an impact upon the salary scale. As any such trends will take time to develop; these Tier 5 considerations do not play a role in the recommendations contained within this report.

In less interesting times, and between quinquennial experience studies, annual employer contribution rates can be determined with a continuation of many of the existing assumptions. However the most recent

quinquennial period ended on March 31, 2010 and State law (Section 11 of the New York Retirement and Social Security Law) requires a new experience study and full review and analysis of all assumptions used in the calculation of employer contribution rates. This report reflects the required review and recommends the adoption of the following modifications to the current actuarial assumptions beginning with the April 1, 2010 valuation:

**Summary of Recommendations**

<b>Assumption</b>	<b>Current</b>	<b>Recommendation</b>
<b>Inflation/CoLA</b>	3.0 Percent	2.7 Percent
<b>Investment Return</b>	8.0 Percent	7.5 Percent
<b>ERS Salary Scale</b>	5.4 Percent and Indexed by Age	4.9 Percent and Indexed by Service
<b>PFRS Salary Scale</b>	6.8 Percent and Indexed by Age	6.0 Percent and Indexed by Service
<b>Asset Valuation Method</b>	5 Year Smoothing	No Change
<b>Pensioner Mortality</b>	A 20 Percent Load Based on SFY 2001-05 Experience. Aggregate Table Used in the Active Valuation.	Based Upon SFY 2006-10 Experience with SOA Scale AA Loading. Gender/Collar Specific Tables Used in Both Valuations.
<b>Active Member Decrements</b>	SFY 2001-05 Experience with Adjustments (Primarily Due to 9/11)	Based Upon SFY 2006-10 Experience With No Adjustments.

These recommendations have been shared with the Systems’ outside Actuarial Advisory Committee for their review and comment. This Committee is composed of senior actuaries from major insurance companies as well as other pension plans. The comments of the Actuarial Advisory Committee have been incorporated into this analysis.

In addition to oversight provided by the Actuarial Advisory Committee, the Systems’ actuaries and their work are periodically reviewed by a number of organizations, including the Systems’ financial statement auditors, internal auditors of the Office of the State Comptroller, the New York State Insurance Department, and a quinquennial review by an external actuarial firm. The most recent review by an external firm was completed in March 2008 by Buck Consultants, LLC.

The revised actuarial assumptions contained in this report have been reviewed and certified by the Comptroller, Thomas P. DiNapoli, and will be used to develop employer contribution rates for the many

different plans covered by the Employees Retirement System and the Police and Fire Retirement System. The calculation of these employer contribution rates will be completed within the next few weeks.

## **II. Economic Assumptions**

### **A. Inflation (CPI-U) and the Cost of Living Adjustment (COLA)**

Prices for goods and services vary over time. If a “basket” of goods and services is held constant, its change in price over time is attributed to a change in the value of the currency. The Federal Bureau of Labor and Statistics (BLS) measures and tracks this phenomenon. Its Consumer Price Indices (CPI) program produces monthly data on changes in the prices paid by consumers for a representative basket of goods and services.

The BLS publishes thousands of CPI indices each month, including the All Items CPI for All Urban Consumers (CPI-U) and the CPI-U for All Items Less Food and Energy. The latter series, widely referred to as the "core" CPI, is closely watched by many economic analysts and policymakers under the belief that food and energy prices are volatile and are subject to price shocks that cannot be damped through monetary policy. However, all consumer goods and services, including food and energy, are represented in the headline CPI-U.

As seen in the chart below, the last 20 years has been marked predominantly by varying levels of inflation, with one brief episode of deflation. Inflation reduces the buying power of consumers with a fixed income, as is often the case with pensioners and beneficiaries.

To mitigate this reduction in buying power, Chapter 125 of the Laws of 2000 established a permanent COLA program which was first implemented in September, 2001. The program provides an annual COLA (each September) equal to one-half the CPI-U increase for the previous fiscal year (April through March). The COLA is rounded to the next highest 0.1 percent, and then subject to a 1 percent floor and a 3 percent ceiling. The COLA applies to up to \$18,000 of benefit for pensioners and accidental death benefit recipients, with most spousal beneficiaries provided 50 percent of the pensioner’s COLA.

The actuarial valuation must estimate future COLAs, which is done by means of a COLA assumption. The table below provides CPI-U data for the last two decades and COLA data for the last decade. Note that the BLS added digits to the CPI-U beginning January 2007.

**All Urban Consumer Price Index**  
**1990 – 2010**

<u>FY Ending 3/31</u>	<u>CPI-U</u>	<u>% Increase</u>	<u>FY Ending 3/31</u>	<u>CPI-U</u>	<u>% Increase</u>	<u>COLA</u>
1990	128.7					
1991	135.0	4.90	2001	176.2	2.92	1.5
1992	139.3	3.19	2002	178.8	1.48	1.0
1993	143.6	3.09	2003	184.2	3.02	1.6
1994	147.2	2.51	2004	187.4	1.74	1.0
1995	151.4	2.85	2005	193.3	3.15	1.6
1996	155.7	2.84	2006	199.8	3.36	1.7
1997	160.0	2.76	2007	205.352	2.78	1.4
1998	162.2	1.38	2008	213.528	3.98	2.0
1999	165.0	1.73	2009	212.709	-0.38	1.0
2000	171.2	3.76	2010	217.631	2.31	1.2

The calculation of an annualized increase in the CPI-U over the twenty year period listed above is given by the following equation:

$$(217.631 / 128.7) ^ (1 / 20) - 1 = 2.66\%, \text{ which rounds to } 2.7\%$$

This estimate is now tested as to whether it is a reasonable assumption for projecting future COLAs (which may differ from CPI-U due to the 1 percent floor and 3 percent ceiling). A valuation inflation assumption of 2.7 percent would project COLAs of 1.4 percent for all future years (2.7% / 2 = 1.35% rounded up to 1.4%). This projection would have properly valued the accumulated COLAs over the previous decade:

$$1.015 * 1.010 * 1.016 * 1.010 * 1.016 * 1.017 * 1.014 * 1.020 * 1.010 * 1.012 - 1 = 14.91\%$$

The level COLA, rounded to tenths of a percent that best matches this experience is 1.4 percent.

$$1.013 ^ 10 - 1 = 13.79\%$$

$$1.014 ^ 10 - 1 = 14.92\%$$

$$1.015 ^ 10 - 1 = 16.05\%$$

**Therefore it is recommended that the valuation inflation assumption be reduced from the current value of 3.0 percent to 2.7 percent.**

Note: The ^ is the exponentiation symbol, \* is the multiplication symbol and / is the division symbol.



## B. Investment Rate of Return (Discount Rate)

The actuarial investment rate of return assumption ( $i$ ) is an assumption concerning the long-term (e.g. 30 year) rate of return on pension plan assets. It is used to discount the value of future projected contributions and projected benefits.

The concept of discounting is perhaps best understood by way of illustration. Consider the following question:

- Who is older, person A, age 50 today, or person B, age 62 ten years from now?

The simple answer is B. This answer can be arrived at by adding ten years to the age of person A and comparing 60 to 62, or in reverse, by subtracting ten years from the age of person B and comparing 50 with 52. In either case, the data was brought to a common date and a comparison was made. This is a simple example of the “time value of age”.

A simple example applying this concept to investments is as follows:

- Assuming that you have an investment fund that has an annual rate of return of 8 percent. Which is worth more, \$100 today or \$120 three years from now?

Intuition may lead one to select \$100 as even at simple interest, \$100 earning 8 percent per year is worth \$124 after three years.

At compound interest, \$100 becomes  $\$100 * 1.08 * 1.08 * 1.08 = \$125.97$

Again, data was brought to a common date to make the comparison. In this case, \$100 was brought forward in time (accumulating). However, suppose that one were to bring the \$120 backward in time (discounting). In other words, \$120 three years from now is worth how much today?

To solve the problem by discounting, you would divide the \$120 by 1.08 three times.

$$((\$120 / 1.08) / 1.08) / 1.08 = \$95.26$$

These calculations illustrate the concept of the “time value of money”. Hopefully this exercise has illustrated the importance of the discount rate. If the interest rate assumption was 5 percent, the answer would have been different.

Actuarial valuations generally rely on discounting projected cash flows to a valuation date. The valuation for the State's retirement system projects benefits for over a million people, with the most distant benefit about 110 years down the road (for a baby beneficiary). This projected cash flow is discounted at present at 8 percent to arrive at the present value of future benefits (PVBs). The valuation also projects employee contributions and billing compensation, all of which are discounted back to the valuation date.

Therefore, the assumed investment return assumption becomes an important element of the actuarial valuation. If the assumption is too optimistic then contributions to the fund will be insufficient to meet pension obligations. If the assumption is too pessimistic then the contribution burden will be too great. Therefore it is not surprising that an Actuarial Standard of Practice for selecting and documenting investment return assumptions (ASOP 27) has been developed.

In the 2008 review of the Retirement Systems' actuarial policies and procedures, Buck recommended that the System more closely follow ASOP 27 in the development of economic assumptions. The ASOP outlines three steps for assumption development:

1. Identify assumption components and evaluate relevant data.
2. Develop a best-estimate range, which is defined as the narrowest range within which the actuary reasonably anticipates that the actual results, compounded over the measurement period, are more likely than not to fall. This is regarded to be the 25<sup>th</sup> percentile to 75<sup>th</sup> percentile range.
3. Select a specific point within the best-estimate range.

The following table provides a history of the investment assumption since fiscal year 1970.

**Investment Rate of Return Assumption History**  
**1970 – 2009**

<u>FY</u>	<u>Rate</u>	<u>FY</u>	<u>Rate</u>	<u>FY</u>	<u>Rate</u>	<u>FY</u>	<u>Rate</u>	<u>FY</u>	<u>Rate</u>	<u>FY</u>	<u>Rate</u>	<u>FY</u>	<u>Rate</u>
70	4.87%	75	5.50%	82	7.50%	86	8.00%	89	8.75%	97	8.50%	01	8.00%
71	4.87	76	5.50	83	7.50	87	8.00	90	8.75	98	8.50	02	8.00
72	4.87	77	5.50	84	7.50	88	8.00	91	8.75	99	8.50	03	8.00
73	4.87	78	5.50	85	7.50			92	8.75	00	8.50	04	8.00
74	4.87	79	5.50					93	8.75			05	8.00
		80	5.50					94	8.75			06	8.00
		81	5.50					95	8.75			07	8.00
								96	8.75			08	8.00
												09	8.00
												10	8.00

As seen in the table above, NYSLRS has a track record of not adjusting this assumption very frequently, which is consistent with the Systems’ long-term (30 year) perspective. The NYSLRS historical returns by State Fiscal Year are as follows:

**Actual Rate of Return**  
**1981 – 2010**

<u>Year</u>	<u>Return</u>	<u>Year</u>	<u>Return</u>	<u>Year</u>	<u>Return</u>
81	16.7%	91	11.7%	01	-8.7%
82	3.3%	92	10.7%	02	2.8%
83	21.4%	93	12.5%	03	-10.2%
84	7.9%	94	6.9%	04	28.8%
85	13.7%	95	8.8%	05	8.5%
86	24.0%	96	21.8%	06	14.6%
87	17.8%	97	10.9%	07	12.6%
88	1.6%	98	30.4%	08	2.6%
89	13.4%	99	8.8%	09	-26.4%
90	13.9%	00	17.8%	10	25.9%

This produces the following time-weighted annualized returns (gross of expenses):

<u>Period</u>	<u>Annualized Return</u>
2006-2010: 5 years	4.2%
2001-2010: 10 years	3.7%
1996-2010: 15 years	8.2%
1991-2010: 20 years	8.7%
1986-2010: 25 years	9.7%
1981-2010: 30 years	10.1%

While the 8 percent return has been met over the longer time periods, the financial markets have been much more challenging in the past decade, which is a long enough period to consider a reduction in the assumption.

A fund's asset allocation (mix of stocks and bonds) is the most relevant characteristic for determining the fund's expected investment income. The funds of the Retirement System are invested within limitations set by the asset allocation policy and statute. The current policy and structure of the portfolio is shown below:

**NYS Common Retirement Fund**  
**Asset Allocation Policy**

<u>Asset Type</u>	<u>CRF 3/31/2000</u>		<u>CRF 3/31/2010</u>		
	<u>Market Value (billions)</u>	<u>Allocation</u>	<u>Market Value (billions)</u>	<u>Allocation</u>	<u>Target Allocation</u>
Equity					
Domestic Equity	\$65.8	51.8%	\$51.5	38.9%	35%
International Equity	\$16.8	13.2	\$21.2	16.0	16
Alternatives					
Private Equity	\$5.5	4.3	\$12.8	9.7	8
Real Estate	\$3.7	2.9	\$5.6	4.2	6
Absolute Return Strategies			\$3.8	2.9	5
Equity Assets	\$91.8	72.2	\$94.9	71.7	70
Bonds, Cash & Mortgages				19.9	22.5
Inflation Indexed Bonds				8.4	7.5
Non-Equity Assets	\$35.4	27.8	\$37.6	28.3	30
	\$127.2	100	\$132.5	100	100

The next table contains general historical market segment returns for equities and fixed income. The equity returns were compiled from the Ibbotson/Sinquefeld Monthly Returns. The fixed income information was obtained from the Leuthold Group.

**General Historical Returns**  
**1926 – 2009**

Calendar Years	Equities	Fixed Income
1926-29	19.19%	4.31%
1930-39	-0.05	3.62
1940-49	9.17	2.62
1950-59	19.35	3.55
1960-69	7.81	5.43
1970-79	5.86	8.70
1980-89	17.55	11.70
1990-99	18.26	7.99
2000-09	-0.95	5.97*
Inception (1926-2009)	9.82	6.19
*The CRF fixed income return on an amortized cost basis was 6.6% from 4/1/00 – 3/31/10; 5.5% in FY 2010.		

Given the 70 percent equity / 30 percent fixed income asset allocation policy and the historical returns above, the top of the best estimate range uses the following method:

$$70\% * 9.82\% + 30\% * 6.19\% = 6.87\% + 1.86\% = \mathbf{8.73\%}$$

As to the bottom of the best estimate range, the most recent two decades for equities is considered; with a 55 percent weighting to the most recent decade (as it has the advantage of inertia) and a 45 percent weighting to the 1990s. Further, a 5 percent return for bonds is chosen assuming a continuing decline. The result is as follows:

$$70\% * [1.1826^{(45\%)} * 0.9905^{(55\%)} - 1] + 30\% * [1.0500 - 1] = 5.09\% + 1.50\% = \mathbf{6.59\%}$$

These numbers are subject to adjustment for investment related expenses as discussed in ASOP 27.

Investment related expenses fall into two categories:

- Fees - a charge levied by an investment manager for managing an investment fund; and
- Commissions - a service charge assessed by a broker or investment advisor in return for providing investment advice and/or handling the purchase or sale of a security.

Investment related expenses are reported in the Comprehensive Annual Financial Report and have an average over the past decade of about 0.28 percent of the value of the Fund. After adjustment for these expenses, the **best estimate range** is:

(6.59% - 0.28%) to (8.73% - 0.28%) or **6.31% to 8.45%**.

The mid-point of this range is 7.38 percent.

The current assumption of 8.0 percent is too near the top of the range to leave unadjusted. The goal is to fund the benefits with a high probability of success. A reduction from 8.0 percent to 7.25 percent might indicate that too much weight is being given to recent market struggles. A reduction from 8.0 percent to 7.75 percent might lean in the direction of not being attentive enough to recent market struggles.

**Therefore, a change in the investment return assumption from the current 8.0 percent to 7.5 percent is recommended.** This brings the assumption more toward the middle of the best-estimate range and is both a measured and meaningful adjustment.

Such a move is likely to have detractors from both sides. Demonstrations of the application of ASOP 27 suggest that it is appropriate for the actuary to consider the prospect of future changes in the economy that are likely to have a fundamental effect on future investment returns. In that vein, to those that prefer the 8.0 percent or a smaller reduction, the prospects for generating consistent profits in the current economy are perhaps not as bright as they were in the '80s and '90s for reasons including the following:

## 1. The Cost of Oil.

Many products contain a form of oil and most are delivered by a system that uses a form of oil. The increase in the price of oil of the past decade seems likely to persist given the various challenges in improving supply. The table below provides the historical price of a barrel of crude oil. The data for 2010 is over a portion of the year.

### **Price per Barrel of Crude Oil** **1981 – 2010**

Year	Nominal	Inflation Adjusted	Year	Nominal	Inflation Adjusted	Year	Nominal	Inflation Adjusted
81	\$35.75	\$85.32	91	\$20.20	\$32.14	01	\$23.00	\$28.16
82	\$31.83	\$71.52	92	\$19.25	\$29.73	02	\$22.81	\$27.46
83	\$29.08	\$63.29	93	\$16.75	\$25.13	03	\$27.69	\$32.62
84	\$28.75	\$59.98	94	\$15.66	\$22.89	04	\$37.66	\$43.17
85	\$26.92	\$54.23	95	\$16.75	\$23.82	05	\$50.04	\$55.47
86	\$14.44	\$28.54	96	\$20.46	\$28.25	06	\$58.30	\$62.65
87	\$17.75	\$33.85	97	\$18.64	\$25.17	07	\$64.20	\$66.97
88	\$14.87	\$27.28	98	\$11.91	\$15.84	08	\$91.48	\$91.77
89	\$18.33	\$32.03	99	\$16.56	\$21.49	09	\$53.48	\$53.92
90	\$23.19	\$38.35	00	\$27.39	\$34.45	10	\$69.85	\$69.85

Source: [http://inflationdata.com/inflation/inflation\\_rate/historical\\_oil\\_prices\\_table.asp](http://inflationdata.com/inflation/inflation_rate/historical_oil_prices_table.asp)

## 2. The Cost of Government.

In part because of the recession, Federal & Local expenditures as a percentage of GDP are increasing. Increasing government spending generally leads to a combination of increasing deficits, debt, taxes, and uncertainty. The increased costs of oil, government, and security (mentioned in the Executive Summary) create a headwind, potentially prolonged, that the markets of the '80s and '90s did not have to overcome.

### **Government Expenditures as a Percentage of GDP** **1981 – 2009**

Year	% of GDP	Year	% of GDP	Year	% of GDP
81	31.5	91	33.5	01	29.2
82	32.8	92	33.4	02	30.4
83	33.3	93	32.4	03	31.3
84	31.6	94	31.8	04	30.9
85	32.5	95	31.6	05	31.0
86	32.5	96	31.0	06	31.1
87	32.0	97	30.1	07	30.9
88	31.6	98	29.5	08	32.3
89	31.5	99	29.0	09	36.1
90	32.5	00	28.8	10	?

Source: <http://www.gpoaccess.gov/usbudget/fy11/sheets/hist15z5.xls>

Others might take the position that the reduction to 7.5 percent does not go far enough. In response, it is important to remember the following:

- The long-term perspective of the assumption (30 years);
- The long-term nature of governments as opposed to private sector entities which are more exposed to expiration;
- The large size and experience of the trust and the efficiency of a sole trustee which allows the Fund to discover and take timely advantage of investment opportunities; and
- The Fund's 2010 market value of invested assets exceeded its net cash flow by about 26 times which provides an investment horizon that is longer than typical market cycles.

[See Appendix A, FY2010:  $\$132.5 / (\$7.7 - \$2.3 - \$0.3) = 26$ ]

Finally, consideration should be given to the position of other public retirement systems. In March, 2010, a National Association of State Retirement Administrators Issue Brief titled "Public Pension Plan Investment Return Assumption" presented the following investment return assumption distribution for public systems:

**Assumed Rates of Return**

<i>i</i>	No. of Public Systems
7.00	1
7.25	7
7.50	14
7.75	14
7.80	2
8.00	51
8.25	16
8.50	19
Average	7.97

Thus, a change from 8.0 percent to 7.5 percent will move NYSLRS from the average and mode of the assumption to the low-end of public systems. However, given the market performance over the last decade, it seems likely that other systems will be contemplating assumed investment rate of return reductions.



### C. Salary Scales

The salary scale is the assumed annual rate of salary increase. It is used to project an individual's final average salary and benefit. The current assumptions are indexed by system and age. The ERS regular plan assumptions are based upon ERS regular plan experience. The PFRS assumptions are based upon all PFRS experience. The PFRS assumptions are applied to ERS special plans as these contract tendencies are more similar to those of PFRS. ERS special plan experience is ignored as sporadic contract settlements lead to volatility. The current assumptions are in the table below:

#### **Annual Rate of Salary Increases**

<u>Age</u>	<u>ERS</u>	<u>PFRS</u>	<u>Age</u>	<u>ERS</u>	<u>PFRS</u>	<u>Age</u>	<u>ERS</u>	<u>PFRS</u>
20	11.47%	25.09%	37	6.27%	6.32%	54	4.79%	6.00%
21	10.98	23.20	38	6.12	6.13	55	4.75	6.09
22	10.49	21.36	39	5.99	6.00	56	4.71	6.21
23	10.03	19.58	40	5.87	5.90	57	4.68	6.35
24	9.61	17.87	41	5.77	5.84	58	4.65	6.51
25	9.24	16.25	42	5.67	5.80	59	4.62	6.69
26	8.90	14.75	43	5.58	5.78	60	4.59	6.87
27	8.59	13.36	44	5.49	5.77	61	4.56	7.03
28	8.30	12.10	45	5.40	5.76	62	4.53	7.16
29	8.02	10.98	46	5.32	5.77	63	4.50	7.22
30	7.76	9.99	47	5.24	5.77	64	4.46	7.17
31	7.50	9.14	48	5.16	5.78	65	4.39	6.96
32	7.26	8.41	49	5.09	5.79	66	4.26	6.55
33	7.03	7.80	50	5.01	5.81	67	4.01	5.87
34	6.81	7.30	51	4.95	5.83	68	4.01	5.87
35	6.62	6.89	52	4.89	5.87	69	4.01	5.87
36	6.43	6.57	53	4.84	5.92	70	4.01	5.87

The assumptions above were based on the patterns of increase in the 2001-2005 internal experience study which were then adjusted by an increase factor at all ages of 0.30 percent for ERS and 0.27 percent for PFRS. This resulted in a total overall salary scale of 5.4 percent in ERS and 6.8 percent in PFRS.

The table below provides a history of the assumption since fiscal year 1980 (the first year for which a total overall salary scale was computed). Distinctions between systems began in 1997.

**Overall Salary Scale Assumptions**  
**1980 – 2009**

FY		FY		FY	ERS	PFRS	FY	ERS	PFRS
80	5.0%	89	7.0%	97	6.0%	6.5%	01	5.5%	6.0%
81	5.0	90	7.0	98	6.0	6.5			
		91	7.0	99	6.0	6.5	02	5.9%	6.9%
82	8.5%	92	7.0	00	6.0	6.5	03	5.9	6.9
83	8.5	93	7.0				04	5.9	6.9
84	8.5	94	7.0						
85	8.5	95	7.0				05	5.4%	6.8%
86	8.5	96	7.0				06	5.4	6.8
							07	5.4	6.8
87	7.3%						08	5.4	6.8
88	7.3						09	5.4	6.8

NYSLRS has a track record of adjusting the salary scale assumption only slightly more frequently than the assumed investment return assumption.

The actual overall salary scale over the 2006-2010 period was 5.3 percent in ERS and 6.0 percent in PFRS. There is noticeable belt-tightening in the latter part of the period, particularly in PFRS. Given the economic challenges, these cost containment efforts are expected to continue and ERS to “catch-up” (and return to its 15 year and 20 year levels). The table below shows the actual salary increases for full-time members and the negotiated salary increases for the two largest unions representing employees for New York State (NYS provides over 40% of the ERS salaries).

**Salary Increases**  
**1991 – 2011**

FYE 3/31	PFRS	ERS	State CSEA & PEF	5 yr	10 yr	15 yr	20 yr
1991	10.8%	7.3%	5.50%				E: 4.9% P: 6.6%
1992	4.3	2.9	0.00				
1993	5.7	4.6	0.00				
1994	9.5	6.1	4.00				
1995	5.4	4.9	4.00 + 1.25				
1996	5.1	3.0	0.00				
1997	4.7	3.5	0.00 + \$550 Salary Increase				
1998	8.5	4.5	3.50 + \$700 Salary Increase				
1999	8.8	6.0	3.50				
2000	4.4	3.8	3.00 + \$500 Salary Increase				
2001	4.5	7.5	3.00				
2002	14.9	4.3	3.50				
2003	1.6	5.4	3.50				
2004	8.3	3.7	0.00				
2005	4.9	4.8	2.50 + \$800 Lump Sum				
2006	7.7	5.4	2.75	ERS: 5.3%  PFRS: 6.0%	E: 5.2%  P: 6.4%	E: 4.9%  P: 6.4%	
2007	8.0	6.3	3.00				
2008	5.8	4.9	3.00 + \$800 Salary Increase				
2009	3.2	5.5	3.00				
2010	5.8	4.7	3.00				
2011			4.00 last raise in current contract				

As with the investment rate of return assumption, the salary scale assumption is a long term estimate. However, the term is not the same. The term of the investment rate of return is the average remaining lifetime of the participants (both active and pensioner), which is about 30 years. The term of the salary scales is the average remaining working lifetime of the active participants, which is about 11 years in ERS and 14 years in PFRS. Therefore, the near term considerations should carry more influence in the setting of the salary scale than in the setting of the investment rate of return.

The following factors support a reduction in the salary scales:

- The '06-'10 experience is less than the current assumption (ERS: 5.4 percent to 5.3 percent, PFRS: 6.8 percent to 6.0 percent);
- State employee contracts are expiring (at present there are no more raises in the pipeline);
- High national unemployment is forecast to be prolonged (reduces employee negotiating leverage);
- and
- The possibility exists that rising pension contribution rates will be viewed by employers as raises.

In its five year review, Buck suggested considering a service-related salary scale since many salary increases are a function of length of service. **Therefore, using service as an index and reducing the ERS total overall salary scale by 0.5 percent (to a value of 4.9 percent) and using the 2006 – 2010 experience for the PFRS salary scale (6.0 percent) is recommended.** The results are as follows:

**Salary Scale by Years of Service**

Srv	ERS	PFRS	Srv	ERS	PFRS	Srv	ERS	PFRS	Srv	ERS	PFRS
0	10.30%	29.76%	11	4.72%	4.62%	22	3.86%	4.24%	33	3.61%	4.08%
1	8.68	29.76	12	4.60	4.46	23	3.81	4.18	34	3.58	4.08
2	7.49	18.33	13	4.52	4.33	24	3.81	4.15	35	3.56	4.08
3	6.69	12.19	14	4.48	4.32	25	3.81	4.22	36	3.53	4.08
4	6.21	9.11	15	4.40	4.41	26	3.79	4.36	37	3.51	4.08
5	5.92	7.41	16	4.31	4.57	27	3.77		38	3.47	4.08
6	5.70	6.34	17	4.24	4.74	28	3.74	4.54	39	3.43	4.08
7	5.49	5.73	18	4.19	4.82	29	3.71	4.41	40+	3.36	4.08
8	5.27	5.36	19	4.14	4.68	30	3.68	4.24			
9	5.05	5.09	20	4.06	4.42	31	3.66	4.12			
10	4.86	4.85	21	3.95	4.28	32	3.63	4.08			

Alternatively, these salary scale recommendations can be examined in a building block fashion.

**Salary Scale Building Blocks**

		Proposed		Current	
		ERS	PFRS	ERS	PFRS
Wage Inflation	CPI-U (Price Inflation)	2.7%	2.7%	3.0%	3.0%
	Group Productivity Gains	0.8%	0.8%	1.0%	1.0%
	Individual Merit (Steps & Promotion)	1.4%	2.5%*	1.4%	2.8%
	Total	4.9%	6.0%	5.4%	6.8%
*Part IV reveals a delaying of retirements in PFRS, which spreads the merit increases over a longer period, reducing the annual rate.					

The new salary scales reflect a reduction in the assumed price inflation and a reduction in the negotiating leverage to be compensated for group-based productivity gains.

Finally, the spread between the assumed investment rate of return and the salary scale must be examined and is illustrated below:

**Salary Scale and Assumed Rate of Return Spread**

	Proposed		Current	
	ERS	PFRS	ERS	PFRS
Assumed Return	7.5%	7.5%	8.0%	8.0%
Salary Scale	4.9%	6.0%	5.4%	6.8%
Spread	2.6%	1.5%	2.6%	1.2%

In general, reductions in the assumed investment return should be accompanied by reductions in the salary scale as an economy that struggles to generate profits is also likely to be an economy in which it is a struggle to sustain wage growth.

The previous spreads were described by Buck as “within the normal range”, which the Actuarial Advisory Committee describes as 2 percent to 3 percent. The ERS spread has been maintained while the PFRS spread is still below “the normal range”.

### **III. Asset Valuation Method**

Pension fund managers could direct all assets to be invested in a fixed income portfolio. While this would greatly reduce investment income volatility, it would also increase the expected employer contribution rates. For example, a reduction from the current assumption of 8 percent to 5 percent, all things being equal, would increase FY 2011 employer contributions from over \$3 billion to about \$14 billion, close to a 300 percent increase.

In general, one expects to profit more as an owner (i.e. an investor in equities) than as a lender (i.e. an investor in bonds), especially if the equity ownership can be diversified. Thus pension funds invest in equity index funds. However, this policy introduces volatility in investment income.

The basic equation governing pension funding is:  $C + I = B + E$ , where

C = contributions (both employer and employee)

I = investment income

B = benefits

E = expenses [In NYSLRS, administrative expenses are funded independently of the benefits.]

From the basic equation it is clear that volatility in investment income translates into volatility in employer contributions. As a result, many public pension systems “smooth” the investment income volatility as part of their asset valuation method by phasing in “unexpected” gains and losses, where the “unexpected” and the period of smoothing are defined by the methodology.

The NYSLRS asset valuation method has the following features:

- Fixed income investments are valued at amortized cost (acknowledging a “buy and hold” policy);
- A 7 percent appreciation or gain in equities is expected and the unexpected gain is smoothed (= actual gain – expected gain); and
- Any unexpected gain is recognized over 5 years in equal annual portions, beginning immediately.

Note that there is no market value corridor.

The most significant feature of the method is the smoothing period. As the table below indicates, five years is clearly in the mainstream of public pension systems:

**Comparison of Smoothing Periods**

Smoothing Period (yrs.)	0	3	4	<b>5</b>	6	7	8	10	15	Other	Total
No. of Public Systems	7	5	13	<b>64</b>	1	3	7	7	1	2	110

Source: National Association of State Retirement Administrators (NASRA) Public Fund Survey

The market value of assets (MVA) and actuarial value of assets (AVA) of the Common Retirement Fund for the last decade is given below (in billions):

**Market Value v. Actuarial Value of Assets**

FY	MVA*	AVA			MVA*	AVA
2001	\$114.0	\$119.4		2006	\$142.6	\$132.0
2002	112.7	125.1		2007	156.6	142.5
2003	97.3	106.6		2008	155.8	151.7
2004**	120.8	117.4		2009	110.9	148.9
2005	128.0	123.7		2010	134.3	147.7
* Invested Assets + Receivables (i.e. Plan Net Assets for benefits) [both the MVA & AVA exclude funds for group term life insurance]						
** The equity smoothing was 'restarted'; MVA > AVA as the market value of the fixed income portfolio exceeded the amortized cost.						

**It is recommended that no changes be made to the current asset valuation method.**

A five year smoothing period works very well as long as market volatility is “reasonable” and the five years capture a market cycle. However, the smoothing can be insufficient in response to violent market swings such as the severe 2009 setback in the financial markets.

Therefore, legislation has been enacted as part of the SFY 2010-11 Enacted Budget that is ultimately an optional additional layer of smoothing. Employers could choose to immediately pay the contributions calculated from the actuarial valuation, or, they could amortize a portion of the contributions over a 10 year period at an interest rate comparable to fixed income investments.

Employers choosing to amortize would thereby be brought to their eventual rate peak a bit more slowly. In exchange, when rates descend, the descent for such employers would be lessened (just as the ascent was lessened), with the additional contributions used to hasten the repayment of previous amortizations.

The lessened descent would continue even after the expiration of these amortizations, with the additional contributions set aside in “contribution rate stabilization accounts” in preparation for future ascending rates.

The legislation includes phases of amortizing as well as phases of saving and phases of using that which has been saved. This is somewhat akin to a budget billing arrangement made with a utility company. A more level payment stream is easier to budget for and manage than a volatile payment stream.

The asset valuation method and the new legislation will allow the pension fund to invest in equities while dampening (but not eliminating) the resulting investment income volatility impact on employer contributions.

Some pension funds are managing the challenges of the recent financial crisis by changing their asset valuation methods. But at some point these adjusted methods become artful and contrived, and all participating employers are affected by the results.

The recently enacted legislation is employer optional, transparent, and straightforward. It allows for the maintenance of a mainstream asset valuation method, acknowledges that such methods may not provide sufficient smoothing for some employers during times of extreme investment income volatility, and provides such employers an optional additional mechanism for further smoothing.



## **IV. Demographic Assumptions**

### **A. Pensioner Mortality**

The most significant demographic assumption is pensioner mortality. The Retirement Systems' pensioner mortality tables are not developed on a "by number" basis, but on a "by liability" basis.

For example, a pensioner mortality of 1 percent for age 65 pensioners does not mean that we expect 1 in every 100 age 65 pensioners to expire within the year, rather it means that we expect \$1 in every \$100 age 65 pensioner liabilities to expire within a year.

By liability is preferred over by number because the valuation is concerned with the cessation of benefit obligations, not necessarily the cessation of benefit recipients. Generally, mortality by number and mortality by liability should be roughly equivalent. However, it is possible that pensioners with more lucrative benefits enjoy better longevity than those with lesser benefits. If this is true then a by number mortality table would undervalue the present value of future benefits.

A second feature of the pensioner mortality tables is the inclusion of an assumption regarding mortality improvement. Historically, the NYLRS actuary would determine the experience over the five year period and multiply the result by 80 percent. In other words, if the experience revealed that \$1 in every \$100 age 65 pensioner liabilities expired within a year, then the valuation assumption would be that \$0.80 in every \$100 age 65 pensioner liabilities would expire in the future.

Consecutive experience studies reveal that the 20 percent "load" is conservative. Further, the same 20 percent load was applied to both genders, at all ages, and for both service and disability benefits. The Society of Actuaries developed a Mortality Projection Scale AA which provides projections by gender and by age. Buck recommended that the Actuary consider use of the published Projection Scale AA. The recommendations in this report use Scale AA.

In the inactive valuation, Scale AA is used in a generational manner, i.e., the mortality is improved on an ongoing basis, so there is not one fixed set of mortality rates; rather, the rates vary in the future.

A generational application of Scale AA in the active valuation is much harder to implement as there are more unknowns. For example, in the inactive valuation, all male pensioners age 55 on the valuation date will have the same annuity value. However, in the active valuation, the age 55 annuity value for the active 25 year old will differ from the one for the active 26 year old, which will differ from the one for the active 27 year old, and so on.

Therefore, in the active valuation, Scale AA is used to project for a specific number of years. This mostly static projection, while not as theoretically pleasing as the generational projection, is still superior to the flat 20 percent load in that it uses the Scale AA experience, which provides variations by gender and by age. The specific number of years in the projection is set as follows:

ERS:	$11 + (\text{ValYear} - 2007.5)$	= 13.5 for ValYear 2010, ... 17.5 for ValYear 2014
PFRS:	$14 + (\text{ValYear} - 2007.5)$	= 16.5 for ValYear 2010, ... 20.5 for ValYear 2014

The average remaining future working lifetime for an ERS member is 11 years, and for a PFRS member is 14 years. The summand  $(\text{ValYear} - 2007.5)$  is the elapsed time between the middle of the experience period and the valuation year. The inclusion of this summand allows for one additional year's mortality improvement over each year in which the new assumptions are used, thus making the projection not entirely static (and allowing a phase-in or mortality improvement where the 20 percent load method imposes all the improvement immediately).

It should be noted that Scale AA is a "by number" table that we are applying to our "by liability" table. Approximating by liability mortality improvement using by number mortality improvement experience is much less subject to undervaluing liabilities than approximating by liability mortality using by number mortality experience as the latter pair involve numbers an order of magnitude larger than the former pair.

Finally, historically the NYSLRS actuary used gender and collar specific mortality tables in the inactive valuation while using aggregate tables in the active valuation. (As noted earlier, the greater number of unknowns in the active valuation makes the use of multiple tables more problematic). We have updated our active valuation to make use of gender and collar specific tables. This "removes" an "automatic" gain or loss as a participant moved from active membership (where aggregate tables were applied) to inactive membership (where gender and collar tables are applied).

Thus it is recommended that the April 1, 2005 through March 31, 2010 pensioner experience be used, with mortality improvement using the Society of Actuaries Mortality Projection Scale AA in the manner described above (rather than the flat 20 percent load used historically), and that gender and collar specific tables in the active valuation as well as the inactive valuation be used as well.

The table below provides some sample values of the pension liability mortality per \$1,000 in pensioner liability for valuation date 2010. (Additional pensioner mortality details can be found in Appendix B.)

**Pension Liability Mortality**  
**(Per \$1,000)**

ERS Clerk (White Collar) Service Retirements								
	Pension Valuation (Val date 2010)				Active Valuation (Val date 2010)			
	Male		Female		Male		Female	
Age	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables
55	\$4.6	\$6.1	\$3.3	\$3.2	\$4.4	\$4.9	Same as for males as aggregate tables were used.	\$2.9
62	\$7.4	\$7.4	\$5.9	\$6.5	\$7.6	\$6.3		\$6.1
65	\$10.0	\$9.4	\$7.4	\$8.2	\$9.9	\$8.1		\$7.8
70	\$15.9	\$17.0	\$11.7	\$13.3	\$15.6	\$14.4		\$12.6
80	\$41.3	\$45.3	\$31.6	\$35.9	\$39.5	\$40.6		\$33.2
90	\$132.1	\$149.5	\$102.7	\$117.9	\$120.4	\$143.1		\$114.1
100	\$242.7	\$238.1	\$211.4	\$224.8	\$224.7	\$235.5		\$222.4
Annuity Values (by liability)								
55	10.961	11.565	11.292	11.750	11.004	11.490	See males	11.659
62	10.060	10.902	10.493	10.810	10.121	10.495		10.717
65	9.567	10.005	10.063	10.313	9.651	9.946		10.222
2006-2010 Experience A/E Ratios '05 expecteds are loaded (sb 1.000 to 1.200) – '10 expecteds are pre-loaded (sb ~ 1.000)								
Total	1.097	1.016	1.162	1.012	N/A (assumptions based on pensioner experience)			

ERS Laborer (Blue Collar) Service Retirements								
	Pension Valuation (Val date 2010)				Active Valuation (Val date 2010)			
	Male		Female		Male		Female	
Age	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables
55	5.8	7.4	3.3	5.2	4.4	6.0	Same as for males as aggregate tables were used.	4.8
62	11.2	10.8	5.9	7.4	7.6	9.1		7.0
65	14.1	15.9	7.4	10.1	9.9	13.6		9.6
70	22.6	23.5	11.7	15.3	15.6	19.9		14.4
80	55.4	65.1	31.6	36.4	39.5	58.3		33.7
90	148.9	177.9	102.7	122.4	120.4	170.3		118.4
100	265.3	249.8	211.4	226.7	224.7	247.1		224.2
Annuity Values (by liability)								
55	10.563	11.096	11.292	11.562	11.004	11.020	See males	11.479
62	9.540	9.956	10.493	10.630	10.121	9.899		10.538
65	9.021	9.337	10.063	10.113	9.651	9.310		10.028
2006-2010 Experience A/E Ratios '05 expecteds are loaded (sb 1.000 to 1.200) – '10 expecteds are pre-loaded (sb ~ 1.000)								
Total	1.127	1.007	1.296	1.012	N/A (assumptions based on pensioner experience)			

ERS Disability Retirements								
	Pension Valuation (Val date 2010)				Active Valuation (Val date 2010)			
	Male		Female		Male		Female	
Age	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables
55	25.1	31.7	26.7	32.1	25.7	25.7	Same as for males as aggregate tables were used.	29.4
62	28.2	27.0	22.1	27.3	25.6	22.8		25.8
65	30.9	31.8	24.6	27.3	28.3	27.2		25.8
70	39.0	34.3	26.8	29.3	34.0	29.0		27.7
80	81.2	85.4	47.2	57.5	64.9	76.5		53.2
90	150.6	168.4	168.1	139.3	156.2	161.2		134.8
100	235.2	245.9	239.7	233.7	236.7	243.2		231.1
Annuity Values (by liability)								
55	9.073	9.528	9.473	9.651	9.234	9.622	See males	9.677
62	8.324	8.756	9.067	9.189	8.624	8.793		9.166
65	7.918	8.211	8.733	8.861	8.248	8.271		8.831
2006-2010 Experience A/E Ratios '05 expecteds are loaded (sb 1.000 to 1.200) – '10 expecteds are pre-loaded (sb ~ 1.000)								
Total	1.082	1.015	1.156	1.017	N/A (assumptions based on pensioner experience)			

PFRS Retirements								
Pension Valuation (Val date 2010)					Active Valuation (Val date 2010)			
Service		Disability			Service		Disability	
Age	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables
55	4.3	3.8	4.8	7.5	Same as for pension valuation.	2.9	Same as for pension valuation.	5.8
62	7.6	7.2	15.6	9.8		5.8		7.9
65	10.1	9.8	16.5	13.4		8.1		11.0
70	17.4	15.8	23.6	14.8		12.7		11.9
80	50.2	57.2	73.9	58.7		49.7		51.0
90	136.5	142.3	166.1	148.7		134.5		140.6
100	249.8	235.1	266.9	237.7		231.8		234.4
Annuity Values (by liability)								
55	10.889	11.554	10.408	11.232	Same as for pension valuation.	11.493	Same as for pension valuation.	11.213
62	9.909	10.403	9.239	10.146		10.377		10.141
65	9.377	9.804	8.766	9.570		9.800		9.585
2006-2010 Experience A/E Ratios '05 expecteds are loaded (sb 1.000 to 1.200) – '10 expecteds are pre-loaded (sb ~ 1.000)								
Total	1.062	1.004	1.074	1.033	N/A (assumptions based on pensioner experience)			

Beneficiaries								
Pension Valuation (Val date 2010)					Active Valuation (Val date 2010)			
Male		Female			Aggregate			
Age	'05 tables	'10 tables	'05 tables	'10 tables	'05 tables	'10 tables		
55	7.1	Same as male clerk service.*	4.2	2.9	Same as females in pension valuation.	2.7		
62	10.5		7.7	8.9		8.5		
65	10.2		8.9	10.0		9.5		
70	23.6		14.1	13.9		13.1		
80	58.7		34.1	38.9		36.1		
90	150.8		100.5	119.2		115.3		
100	233.4		207.7	225.4		222.9		
Annuity Values (by liability)								
55	10.555	See males	11.131	11.618	Same as females	11.773		
62	9.625		10.312	10.601		10.815		
65	9.077		9.891	10.118		10.364		
2006-2010 Experience A/E Ratios '05 expecteds are loaded (sb 1.000 to 1.200) – '10 expecteds are pre-loaded (sb-1.000)								
Total	1.069	1.294	1.188	1.020	N/A (assumptions based on pensioner experience)			

\*Note: Male beneficiaries use male clerk (white collar) table.

## B. Active Member Decrements

The 30 active valuation decrements are as follows:

Decrement	ERS Study Group	PFRS Study Group	Also Applies to	Name
	(all service is for mid-year)			
Withdrawal	$0.00 \leq \text{service} \leq 1.99$			WDME01
	$2.00 \leq \text{service} \leq 2.99$			WDME2
	$3.00 \leq \text{service} \leq 3.99$			WDME3
	$4.00 \leq \text{service} \leq 4.99$			WDME4
	$5.00 \leq \text{service} \leq 9.99$			WDME59
	$10.00 \leq \text{service}$			WDMEV
		All P&F		WDMP
Accidental Death	All ERS			ADMERS
		All P&F		ADMPF
Ordinary Death	All ERS		Pens. mortality to age 45 disab age 50 srv/ben	ODMERS
		All P&F	Pens. mortality to age 45 disab & srv/ben	ODMPF
Accidental Disability	Tiers 1 & 2			AIMERST12
	Tiers 3, 4, & 5			AIMERST345
		All P&F	100%: ERS 14-b, shtas, cntypd75 50%: State Cos & UCPOs	AIMPF
Ordinary Disability	All ERS			OIMERS
		All P&F		OIMPF
IPOD Retirement		All P&F	ERS 14-B	IPODPF
Service Retirement	Tier 1, service $\leq 19.99$		P&F T-1 regular plans	OR55LT20T1
	T-1, $20.00 \leq \text{service} \leq 29.99$			OR552029T1
	T-1, $30.00 \leq \text{service}$			OR55GE30T1
	T-2,3,4, service $\leq 19.99$		P&F T-2 reg pl, ERS T-5	OR55LT20T234
	T-2,3,4 $20.00 \leq \text{serv} \leq 29.99$			OR552029T234
	T-2,3,4, $30.00 \leq \text{yr service}$			OR55GE30T234
	25 yr plan (T-3,5 State COs)		P&F T-2 25 yr	OR25SC
	25 yr + 60ths (T-1,2 state COs)		P&F 25 + 60ths	OR25p60SC
	25 yr w A15 (county COs)		P&F T-1 25 yr, ERS 25yr& 80a	OR2589E
		20 year plan	ERS 20 yr	OR20
		20 yr + 60ths (State Police)		OR20SP
		20 yr + 60ths (not St Pol)	ERS 20 + 60ths	OR20p60
		20 yr (P&F A14)		ORPFA14

**It is recommended that all the active member decrement assumptions be updated based on the experience from April 1, 2005 through March 31, 2010 and cease applying any adjustments related to 9/11/2001.**

The table below provides some values of the expected withdrawal decrements per 1,000 members (in a single decrement context). Withdrawals for ERS with service < 5 years did not vary much. There was a noticeable decrease in withdrawals for ERS with Service  $\geq 5$  years and for PFRS.

Withdrawals															
ERS (WDME)													PFRS (WDMP)		
Age	$0 \leq \text{Srv} < 2$		$2 \leq \text{Srv} < 3$		$3 \leq \text{Srv} < 4$		$4 \leq \text{Srv} < 5$		$5 \leq \text{Srv} < 10$		$10 \leq \text{Service}$		Srv	'05	'10
	'05	'10	'05	'10	'05	'10	'05	'10	'05	'10	'05	'10			
20	169	183	109	103	84	68	75	59	70	43	32	28	0	80	74
30	151	147	120	112	91	97	82	80	57	46	31	26	5	13	12
40	119	123	81	81	62	68	56	58	44	40	22	18	10	7	5
50	111	116	69	69	53	56	47	46	34	31	14	13	15	3	4
60	112	126	76	76	65	65	50	48	0	0	0	0	0	0	0
65	122	138	82	82	81	68	62	53	0	0	0	0	0	0	0
2006-2010 Experience A/E Ratios															
Total	1.017	0.989	0.954	1.005	1.056	1.006	0.990	1.002	0.873	1.003	0.894	1.004	Total	0.875	1.001

The table below provides some values of the expected death decrements per 1,000 members (in a single decrement context). Happily the actuarial death expectations were too high.

Deaths									
Age	ERS				PFRS				
	Accidental Death (ADMERS)		Ordinary Death (ODMERS)		Accidental Death (ADMPPF)		Ordinary Death (ODMPF)		
	'05 Tbls	'10 Tbls	'05 Tbls	'10 Tbls	'05 Tbls	'10 Tbls	'05 Tbls	'10 Tbls	
20	0.02	0.01	0.45	0.45	0.08	0.08	0.47	0.35	
30	0.02	0.01	0.49	0.55	0.08	0.08	0.47	0.35	
40	0.02	0.01	0.89	0.89	0.08	0.08	0.51	0.38	
50	0.02	0.01	1.90	1.64	0.08	0.08	1.24	0.93	
60	0.02	0.01	3.88	2.94	0.04	0.06	6.85	5.14	
65	0.02	0.01	6.18	4.63	0.04	0.06	10.04	7.54	
2006-2010 Experience A/E Ratios									
Total	0.270	0.540	0.837	0.992	1.048	1.008	0.732	0.964	

The table below provides some values of the expected disability decrements per 1,000 members (in a single decrement context).

Disability Retirements												
	ERS						PFRS					
	Accidental Disability (AIMERS)				Ordinary Disability (OIMERS)		Accidental Disability (AIMPF)		Ordinary Disability (OIMPF)		IPOD Disability (IPODPF)	
	'05 Tbls		'10 Tbls		'05 Tbls	'10 Tbls	'05 Tbls	'10 Tbls	'05 Tbls	'10 Tbls	'05 Tbls	'10 Tbls
Age	T-1&2	T-3&4	T-1&2	T-3&4								
20	0.2	0.03	0.2	0.01	0.48	0.67	1.17	0.44	0.40	0.23	0.20	0.23
30	0.2	0.03	0.2	0.01	0.48	0.67	1.17	0.44	0.40	0.23	0.20	0.23
35	0.2	0.03	0.2	0.02	0.74	0.67	2.19	1.75	0.40	0.23	1.08	1.04
40	0.2	0.03	0.2	0.06	1.39	1.52	3.45	3.74	0.44	0.23	1.61	2.22
45	0.2	0.05	0.2	0.07	2.29	2.29	3.94	4.73	0.51	0.55	2.31	2.50
50	0.2	0.08	0.2	0.07	3.93	3.82	4.00	4.42	0.72	1.70	2.77	3.01
2006-2010 Experience A/E Ratios												
Total	0.837	0.947	1.004	1.005	0.976	1.021	0.969	0.989	0.847	0.995	1.139	0.983

The table below provides some values of the expected ERS regular plan service retirement decrements per 1,000 members (in a single decrement context).

The average age at retirement for a tier 1 regular plan member increased from 58 to 59, while for tier 2, 3, & 4 members it remained at 61.

Regular Plan Service Retirements												
	Tier 1 (OR55...T1)						Tiers 2, 3, & 4 (OR55...T234)					
	'05 Tables			'10 Tables			'05 Tables			'10 Tables		
Age	0-19.99 yrs	20-29.99	> 30 yrs	0-19.99 yrs	20-29.99	> 30 yrs	0-19.99 yrs	20-29.99	> 30 yrs	0-19.99 yrs	20-29.99	> 30 yrs
55	141	217	390	157	298	559	54	88	283	59	82	418
60	122	175	240	98	160	193	64	118	237	49	78	200
62	246	392	376	175	294	301	209	392	437	149	321	360
65	272	311	277	205	256	232	199	311	277	158	258	277
2006-2010 Experience A/E Ratios												
Total	0.863	0.914	0.998	1.000	1.000	1.000	0.807	0.781	1.035	1.000	1.000	1.000



The table below provides some values of the expected ERS and PFRS special plan service retirement decrements per 1,000 members (in a single decrement context). The average years of service for a tier 1 or 2 state correction officer increased from 32 to 34, while for tier 3 state correction officers it increased from 26 to 27, and for county correction officers it decreased from 31 to 30.

The average years of service for a PFRS 20 year plan retiree remained at 26, while for a PFRS 20 year with additional 60ths plan it increased from 25 to 28 years, and for State Police it increased from 24 to 25 years. Note that during the 5 year study period the PFRS tier two 30 year service cap was increased to 32 years and the mandatory retirement age increased from 62 to 65 for municipal police while increasing from 57 to 60 for State Police. PF A14 is too new a plan to have any retirees in the study period (and thus no A/E ratios).

Special Plan Service Retirements														
Srv	ERS 25 Year Plans						PFRS 20 Year (OR20)		PFRS 20 Year w add'l 60ths (OR20p60)		State Police (OR20SP)		PF A14 (ORPFA14)	
	Correction Officers (State & County) (OR25...)													
	'05 Tables			'10 Tables			'07*	'10	'07*	'10	'05	'10	'09	'10
	T-1&2	T-3	County	T-1&2	T-3	County								
20							174	217	62	84	73	80	20	20
25	110	266	168	189	278	198	74	119	47	54	88	67	500	571
30	139	182	78	165	137	119	67	94	249	168	305	177	400	400
35	260	260	249	207	207	185	307	209	491	306	184	91	400	400
2006-2010 Experience A/E Ratios														
Total	0.876	0.978	0.877	1.000	1.001	1.000	0.886	1.012	0.810	0.975	0.753	1.003	N/A	
* '05 Tables were based on 2001-2005 experience with a 9/11 adjustment which was removed for 4/1/2007														

## V. Effect on Contributions

The table below summarizes the average employer contribution rates for the most recent valuations.

Valuation	Local Employer Billing Date	ERS	PFRS	Total Employer Contributions
4/1/2005	2/1/2007	10.7%	17.0%	\$2.7b
4/1/2006	2/1/2008	9.6%	16.6%	\$2.6b
4/1/2007	2/1/2009	8.5%	15.8%	\$2.5b
4/1/2008	2/1/2010	7.3%	15.1%	\$2.3b
4/1/2009	2/1/2011	11.9%	18.2%	\$3.6b
4/1/2010 using new recommended assumptions	<b>2/1/2012</b>	<b>16.3%</b>	<b>21.6%</b>	<b>\$4.9b</b>

## VI. Summary of Recommendations

<b>Assumption</b>	<b>Current</b>	<b>Recommendation</b>
<b>Inflation/CoLA</b>	3.0 Percent	2.7 Percent
<b>Investment Return</b>	8.0 Percent	7.5 Percent
<b>ERS Salary Scale</b>	5.4 Percent and Indexed by Age	4.9 Percent and Indexed by Service
<b>PFRS Salary Scale</b>	6.8 Percent and Indexed by Age	6.0 Percent and Indexed by Service
<b>Asset Valuation Method</b>	5 Year Smoothing	No Change
<b>Pensioner Mortality</b>	A 20 Percent Load Based on SFY 2001-05 Experience. Aggregate Table Used in the Active Valuation.	Based Upon SFY 2006-10 Experience with SOA Scale AA Loading. Gender/Collar Specific Tables Used in Both Valuations.
<b>Active Member Decrements</b>	SFY 2001-05 Experience with Adjustments (Primarily Due to 9/11)	Based Upon SFY 2006-10 Experience With No Adjustments.

These recommendations, after having been reviewed by the Actuarial Advisory Committee are heretofore submitted to the State Comptroller, Thomas P. DiNapoli, pursuant to Section 11 of the Retirement and Social Security law. The Actuary for the New York State Retirement System recommends adopting these new assumptions beginning with the April 1, 2010 valuation.

FY	Contributions [C]		Benefits [B]	Investments [CRF]	(C-B)/CRF	31-Mar S&P 500	Assumed CRF Return	Average Employer Contribution Rate (%)	
	Employer	Employee						ERS	PFRS
----- (in millions) -----									
1970	299.2	75.0	158.2	3,532.6	6.1%	89.63	4.87%	18.9	22.2
1971	346.0	77.4	194.3	3,888.2	5.9%	100.31	4.87%	19.8	23.9
1972	490.8	80.4	243.2	4,389.5	7.5%	107.20	4.87%	21.9	28.8
1973	553.0	73.0	287.9	5,167.8	6.5%	111.52	4.87%	20.3	31.4
1974	664.5	61.6	334.6	5,393.0	7.3%	93.98	4.87%	21.3	32.4
1975	749.3	52.9	373.4	5,915.3	7.2%	83.36	5.50%	20.4	32.9
1976	872.2	48.0	431.0	7,080.7	6.9%	102.77	5.50%	19.7	32.3
1977	981.3	41.7	461.3	7,852.0	7.2%	98.42	5.50%	19.6	33.3
1978	1,001.4	71.7	516.8	8,812.5	6.3%	89.21	5.50%	19.8	34.9
1979	1,020.6	61.2	568.8	10,326.7	5.0%	101.59	5.50%	18.8	35.1
1980	1,296.7	34.5	631.4	11,725.9	6.0%	102.09	5.50%	18.1	34.2
1981	1,296.0	47.8	695.5	14,194.6	4.6%	136.00	5.50%	17.0	33.1
1982	1,363.9	61.5	755.8	15,088.5	4.4%	111.96	7.50%	15.5	29.6
1983	1,481.3	84.0	840.3	18,626.5	3.9%	152.96	7.50%	15.1	28.7
1984	1,496.1	97.5	940.5	20,618.3	3.2%	159.18	7.50%	14.4	27.3
1985	1,610.5	116.0	1,063.4	24,062.3	2.8%	180.66	7.50%	14.2	26.5
1986	1,277.0	132.3	1,157.0	29,926.1	0.8%	238.90	8.00%	10.4	19.8
1987	1,174.0	151.2	1,275.8	35,621.8	0.1%	291.70	8.00%	9.4	13.3
1988	1,321.3	188.5	1,381.9	35,812.5	0.4%	258.89	8.00%	9.7	14.8
1989	759.4	194.7	1,624.7	40,280.6	-1.7%	294.87	8.75%	3.7	8.5
1990	412.2	229.9	1,670.4	45,189.3	-2.3%	339.94	8.75%	3.6	8.3
1991	-72.4	255.3	1,834.2	48,945.5	-3.4%	375.22	8.75%	0.3	7.8
1992	356.8	287.0	2,067.7	51,925.8	-2.7%	403.69	8.75%	0.4	11.5
1993	369.8	284.1	2,267.9	56,428.9	-2.9%	451.67	8.75%	0.6	14.0
1994	530.1	307.5	2,393.7	58,416.8	-2.7%	445.77	8.75%	0.7	11.3
1995	315.1	334.0	2,527.9	63,406.6	-3.0%	500.71	8.75%	0.7	13.9
1996	776.9	341.9	2,877.9	74,827.9	-2.4%	645.50	8.75%	2.2	13.0
1997	903.5	348.2	3,122.0	82,333.8	-2.3%	757.12	8.75%	3.7	9.8
1998	462.6	369.4	3,305.0	104,921.8	-2.4%	1,101.75	8.50%	1.7	7.0
1999	291.7	399.8	3,482.0	111,008.7	-2.5%	1,286.37	8.50%	1.3	2.4
2000	164.5	422.7	3,720.2	127,138.9	-2.5%	1,498.58	8.50%	0.9	1.9
2001	214.8	319.1	4,181.0	112,432.9	-3.2%	1,160.33	8.00%	0.9	1.6
2002	263.8	210.2	4,488.3	111,168.5	-3.6%	1,147.39	8.00%	1.2	1.6
2003	651.9	219.2	4,984.6	95,598.3	-4.3%	848.18	8.00%	1.5	1.4
2004	1,286.5	221.9	5,347.5	119,245.0	-3.2%	1,126.21	8.00%	5.9	5.8
2005	2,964.8	227.3	5,674.7	126,083.5	-2.0%	1,180.59	8.00%	12.9	17.6
2006	2,782.2	241.2	6,028.9	140,453.3	-2.1%	1,294.87	8.00%	11.3	16.3
2007	2,718.6	250.2	6,383.4	154,575.5	-2.2%	1,420.86	8.00%	10.7	17.0
2008	2,648.4	265.7	6,835.6	153,877.7	-2.5%	1,322.70	8.00%	9.6	16.6
2009	2,456.2	273.3	7,212.1	108,960.7	-4.1%	797.87	8.00%	8.5	15.8
2010	2,344.2	284.3	7,718.9	132,500.2	-3.8%	1,169.43	8.00%	7.3	15.1
2011								11.9	18.2

NYSLRS has large positive net cash flow

Asset allocation shifting to more equities,

Inflation drops significantly

Oil is inexpensive,

Gov't a lower % of GDP

Enron & 9/11

Housing Bubble

Housing decline consequences

## Appendix B

TABLE 1 Employees Retirement System Male Clerk Service Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	2010 Inact Val <sub>(age-55)q<sub>55</sub></sub>
0	0	0	0	55	0.006351	0.019	0.004902005	0.006053613
1	0	0.020	0.000000000	56	0.006463	0.018	0.005057539	0.006064910
2	0	0.020	0.000000000	57	0.006030	0.017	0.004783985	0.005582235
3	0	0.020	0.000000000	58	0.005790	0.016	0.004657066	0.005298484
4	0	0.020	0.000000000	59	0.006073	0.016	0.004884691	0.005468540
5	0	0.020	0.000000000	60	0.006670	0.016	0.005364876	0.005910022
6	0	0.020	0.000000000	61	0.007096	0.015	0.005786324	0.006240531
7	0	0.020	0.000000000	62	0.007723	0.015	0.006297601	0.006690063
8	0	0.020	0.000000000	63	0.008533	0.014	0.007054075	0.007358840
9	0	0.020	0.000000000	64	0.009015	0.014	0.007452536	0.007665672
10	0	0.020	0.000000000	65	0.009758	0.014	0.008066761	0.008181299
11	0	0.020	0.000000000	66	0.010499	0.013	0.008798923	0.008798923
12	0	0.020	0.000000000	67	0.011515	0.013	0.009650404	0.009524949
13	0	0.020	0.000000000	68	0.013055	0.014	0.010792330	0.010492260
14	0.000450	0.019	0.000347331	69	0.015418	0.014	0.012745779	0.012217916
15	0.000450	0.019	0.000347331	70	0.017677	0.015	0.014414437	0.013568836
16	0.000450	0.019	0.000347331	71	0.019206	0.015	0.015661236	0.014521357
17	0.000450	0.019	0.000347331	72	0.020579	0.015	0.016780828	0.015326068
18	0.000450	0.019	0.000347331	73	0.022688	0.015	0.018500579	0.016643281
19	0.000450	0.019	0.000347331	74	0.025027	0.015	0.020407881	0.018083719
20	0.000450	0.019	0.000347331	75	0.027331	0.014	0.022594039	0.019901514
21	0.000450	0.018	0.000352142	76	0.030218	0.014	0.024980669	0.021695678
22	0.000450	0.017	0.000357014	77	0.034252	0.013	0.028705657	0.024857427
23	0.000450	0.015	0.000366946	78	0.038533	0.012	0.032737957	0.028322717
24	0.000450	0.013	0.000377133	79	0.042607	0.011	0.036697028	0.031782107
25	0.000450	0.010	0.000392905	80	0.046464	0.010	0.040568759	0.035243939
26	0.000450	0.006	0.000414886	81	0.050466	0.009	0.044667662	0.039003002
27	0.000450	0.005	0.000420556	82	0.055992	0.008	0.050238140	0.044179450
28	0.000480	0.005	0.000448593	83	0.064118	0.008	0.057529095	0.050186391
29	0.000520	0.005	0.000485976	84	0.075056	0.007	0.068265342	0.060157079
30	0.000550	0.005	0.000514013	85	0.086710	0.007	0.078864952	0.069011229
31	0.000590	0.005	0.000551396	86	0.098167	0.007	0.089285385	0.077582781
32	0.000620	0.005	0.000579433	87	0.108795	0.006	0.100305587	0.088397340
33	0.000650	0.005	0.000607470	88	0.120377	0.005	0.112500669	0.100754136
34	0.000690	0.005	0.000644853	89	0.134362	0.005	0.125570623	0.111897120
35	0.000720	0.005	0.000672890	90	0.151015	0.004	0.143060967	0.129940723
36	0.000760	0.005	0.000710273	91	0.159779	0.004	0.151363363	0.136931772
37	0.000790	0.005	0.000738310	92	0.168543	0.003	0.161843536	0.149681964
38	0.000820	0.006	0.000756014	93	0.177306	0.003	0.170258212	0.156991936
39	0.000860	0.007	0.000782192	94	0.186070	0.003	0.178673850	0.164257583
40	0.000890	0.008	0.000798542	95	0.194834	0.002	0.189638737	0.178942191
41	0.000930	0.009	0.000823147	96	0.203598	0.002	0.198169044	0.186617365
42	0.000960	0.010	0.000838197	97	0.212362	0.002	0.206699352	0.194261123
43	0.001010	0.011	0.000869904	98	0.221126	0.001	0.218159385	0.211285418
44	0.001040	0.012	0.000883593	99	0.229889	0.001	0.226804821	0.219438787
45	0.001080	0.013	0.000905118	100	0.238653	0.001	0.235451244	0.227576592
46	0.001140	0.014	0.000942417	101	0.247417	0.000	0.247417000	0.247417000
47	0.001220	0.015	0.000994830	102	0.256181	0.000	0.256181000	0.256181000
48	0.001340	0.016	0.001077801	103	0.264945	0.000	0.264945000	0.264945000
49	0.001490	0.017	0.001182112	104	0.273709	0.000	0.273709000	0.273709000
50	0.001640	0.018	0.001283361	105	0.282472	0.000	0.282472000	0.282472000
51	0.002582	0.019	0.001992911	106	0.291236	0.000	0.291236000	0.291236000
52	0.003524	0.020	0.002682798	107	0.300000	0.000	0.300000000	0.300000000
53	0.004467	0.020	0.003400697	108	0.533333	0.000	0.533333000	0.533333000
54	0.005409	0.020	0.004117836	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000

TABLE 2 Employees Retirement System Female Clerk Service Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	2010 Inact Val <sub>(age-55)</sub> q <sub>55</sub>
0	0	0		55	0.003262	0.008	0.002926790	0.003197151
1	0	0.020	0.000000000	56	0.003762	0.006	0.003468446	0.003683589
2	0	0.020	0.000000000	57	0.004225	0.005	0.003948556	0.004130766
3	0	0.020	0.000000000	58	0.004779	0.005	0.004466308	0.004649047
4	0	0.020	0.000000000	59	0.005326	0.005	0.004977517	0.005155267
5	0	0.020	0.000000000	60	0.005666	0.005	0.005295271	0.005456946
6	0	0.020	0.000000000	61	0.006033	0.005	0.005638258	0.005781353
7	0	0.020	0.000000000	62	0.006556	0.005	0.006127037	0.006251125
8	0	0.020	0.000000000	63	0.007324	0.005	0.006844787	0.006948494
9	0	0.020	0.000000000	64	0.007849	0.005	0.007335436	0.007409344
10	0	0.020	0.000000000	65	0.008341	0.005	0.007795244	0.007834416
11	0	0.020	0.000000000	66	0.008886	0.005	0.008304584	0.008304584
12	0	0.020	0.000000000	67	0.009753	0.005	0.009114856	0.009069282
13	0	0.020	0.000000000	68	0.010758	0.005	0.010054098	0.009953809
14	0.000450	0.018	0.000352142	69	0.012055	0.005	0.011266235	0.011098085
15	0.000450	0.016	0.000361948	70	0.013463	0.005	0.012582109	0.012332348
16	0.000450	0.015	0.000366946	71	0.014698	0.006	0.013551096	0.013149413
17	0.000450	0.014	0.000372007	72	0.015916	0.006	0.014674054	0.014153649
18	0.000450	0.014	0.000372007	73	0.017603	0.007	0.016010376	0.015242152
19	0.000450	0.015	0.000366946	74	0.019941	0.007	0.018136847	0.017145722
20	0.000450	0.016	0.000361948	75	0.022792	0.008	0.020449845	0.019023703
21	0.000450	0.017	0.000357014	76	0.025041	0.008	0.022467732	0.020733660
22	0.000450	0.017	0.000357014	77	0.026738	0.007	0.024318891	0.022510519
23	0.000450	0.016	0.000361948	78	0.028807	0.007	0.026200700	0.024082628
24	0.000450	0.015	0.000366946	79	0.032165	0.007	0.029254886	0.026701683
25	0.000450	0.014	0.000372007	80	0.036534	0.007	0.033228603	0.030116296
26	0.000450	0.012	0.000382324	81	0.041260	0.007	0.037527020	0.033774024
27	0.000450	0.012	0.000382324	82	0.045944	0.007	0.041787237	0.037344929
28	0.000480	0.012	0.000407812	83	0.051516	0.007	0.046855113	0.041580931
29	0.000520	0.012	0.000441796	84	0.057964	0.007	0.052719733	0.046457911
30	0.000550	0.010	0.000480217	85	0.065264	0.006	0.060171367	0.053669949
31	0.000590	0.008	0.000529370	86	0.073426	0.005	0.068621698	0.062075907
32	0.000620	0.008	0.000556287	87	0.083131	0.004	0.078752450	0.072395268
33	0.000650	0.009	0.000575318	88	0.094180	0.004	0.089219494	0.081689305
34	0.000690	0.010	0.000602454	89	0.106037	0.003	0.101822105	0.095023432
35	0.000720	0.011	0.000620130	90	0.118790	0.003	0.114068182	0.106132482
36	0.000760	0.012	0.000645702	91	0.129449	0.003	0.124303494	0.115308758
37	0.000790	0.013	0.000662077	92	0.140109	0.003	0.134539767	0.124422910
38	0.000820	0.014	0.000677879	93	0.150768	0.002	0.146747760	0.139026022
39	0.000860	0.015	0.000701274	94	0.161428	0.002	0.157123510	0.148558098
40	0.000890	0.015	0.000725737	95	0.172087	0.002	0.167498287	0.158050571
41	0.000930	0.015	0.000758354	96	0.182746	0.002	0.177873064	0.167504480
42	0.000960	0.015	0.000782817	97	0.193406	0.001	0.190811275	0.184984001
43	0.001010	0.015	0.000823589	98	0.204065	0.001	0.201327275	0.194983669
44	0.001040	0.015	0.000848052	99	0.214725	0.001	0.211844261	0.204964107
45	0.001080	0.016	0.000868676	100	0.225384	0.001	0.222360260	0.214923435
46	0.001140	0.017	0.000904435	101	0.236044	0.000	0.236044000	0.236044000
47	0.001220	0.018	0.000954696	102	0.246703	0.000	0.246703000	0.246703000
48	0.001340	0.018	0.001048600	103	0.257362	0.000	0.257362000	0.257362000
49	0.001490	0.018	0.001165981	104	0.268022	0.000	0.268022000	0.268022000
50	0.001640	0.017	0.001301117	105	0.278681	0.000	0.278681000	0.278681000
51	0.001964	0.016	0.001579703	106	0.289341	0.000	0.289341000	0.289341000
52	0.002289	0.014	0.001892275	107	0.300000	0.000	0.300000000	0.300000000
53	0.002613	0.012	0.002220027	108	0.533333	0.000	0.533333000	0.533333000
54	0.002938	0.010	0.002565234	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000

TABLE 3 Employees Retirement System Male Laborer Service Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	2010		age	q <sub>x</sub>	2010		2010 Inact Val <sub>(age-55)</sub> q <sub>55</sub>
		AA	Act Val q <sub>x</sub>			AA	Act Val q <sub>x</sub>	
0	0	0		55	0.007811	0.019	0.006028902	0.007445248
1	0	0.020	0.000000000	56	0.007822	0.018	0.006121007	0.007340202
2	0	0.020	0.000000000	57	0.007827	0.017	0.006209660	0.007245797
3	0	0.020	0.000000000	58	0.008727	0.016	0.007019381	0.007986160
4	0	0.020	0.000000000	59	0.009771	0.016	0.007859100	0.008798470
5	0	0.020	0.000000000	60	0.010433	0.016	0.008391566	0.009244266
6	0	0.020	0.000000000	61	0.011081	0.015	0.009035830	0.009745114
7	0	0.020	0.000000000	62	0.011197	0.015	0.009130421	0.009699422
8	0	0.020	0.000000000	63	0.011933	0.014	0.009864793	0.010290992
9	0	0.020	0.000000000	64	0.014084	0.014	0.011642986	0.011975966
10	0	0.020	0.000000000	65	0.016498	0.014	0.013638596	0.013832247
11	0	0.020	0.000000000	66	0.017557	0.013	0.014714038	0.014714038
12	0	0.020	0.000000000	67	0.018145	0.013	0.015206824	0.015009136
13	0	0.020	0.000000000	68	0.019908	0.014	0.016457580	0.015999994
14	0.000450	0.019	0.000347331	69	0.022397	0.014	0.018515191	0.017748389
15	0.000450	0.019	0.000347331	70	0.024434	0.015	0.019924328	0.018755498
16	0.000450	0.019	0.000347331	71	0.025753	0.015	0.020999886	0.019471441
17	0.000450	0.019	0.000347331	72	0.027660	0.015	0.022554920	0.020599594
18	0.000450	0.019	0.000347331	73	0.030949	0.015	0.025236884	0.022703319
19	0.000450	0.019	0.000347331	74	0.034607	0.015	0.028219744	0.025005924
20	0.000450	0.019	0.000347331	75	0.038328	0.014	0.031685058	0.027909159
21	0.000450	0.018	0.000352142	76	0.042394	0.014	0.035046346	0.030437705
22	0.000450	0.017	0.000357014	77	0.046980	0.013	0.039372643	0.034094416
23	0.000450	0.015	0.000366946	78	0.052134	0.012	0.044293480	0.038319791
24	0.000450	0.013	0.000377133	79	0.058827	0.011	0.050667169	0.043881193
25	0.000450	0.010	0.000392905	80	0.066764	0.010	0.058293143	0.050641924
26	0.000450	0.006	0.000414886	81	0.075110	0.009	0.066480166	0.058049290
27	0.000450	0.005	0.000420556	82	0.083952	0.008	0.075324910	0.066240770
28	0.000480	0.005	0.000448593	83	0.091713	0.008	0.082288373	0.071785528
29	0.000520	0.005	0.000485976	84	0.099234	0.007	0.090255848	0.079535648
30	0.000550	0.005	0.000514013	85	0.107300	0.007	0.097592081	0.085398511
31	0.000590	0.005	0.000551396	86	0.116960	0.007	0.106378096	0.092435157
32	0.000620	0.005	0.000579433	87	0.128636	0.006	0.118598369	0.104518409
33	0.000650	0.005	0.000607470	88	0.142337	0.005	0.133023815	0.119134398
34	0.000690	0.005	0.000644853	89	0.159207	0.005	0.148790002	0.132588118
35	0.000720	0.005	0.000672890	90	0.179720	0.004	0.170254061	0.154639914
36	0.000760	0.005	0.000710273	91	0.186795	0.004	0.176956417	0.160084682
37	0.000790	0.005	0.000738310	92	0.193871	0.003	0.186164766	0.172175599
38	0.000820	0.006	0.000756014	93	0.200946	0.003	0.192958539	0.177923485
39	0.000860	0.007	0.000782192	94	0.208021	0.003	0.199752313	0.183635334
40	0.000890	0.008	0.000798542	95	0.215096	0.002	0.209360449	0.197551503
41	0.000930	0.009	0.000823147	96	0.222172	0.002	0.216247767	0.203642242
42	0.000960	0.010	0.000838197	97	0.229247	0.002	0.223134112	0.209706914
43	0.001010	0.011	0.000869904	98	0.236322	0.001	0.233151516	0.225805163
44	0.001040	0.012	0.000883593	99	0.243398	0.001	0.240132585	0.232333699
45	0.001080	0.013	0.000905118	100	0.250473	0.001	0.247112667	0.238848000
46	0.001140	0.014	0.000942417	101	0.257548	0.000	0.257548000	0.257548000
47	0.001220	0.015	0.000994830	102	0.264624	0.000	0.264624000	0.264624000
48	0.001340	0.016	0.001077801	103	0.271699	0.000	0.271699000	0.271699000
49	0.001490	0.017	0.001182112	104	0.278774	0.000	0.278774000	0.278774000
50	0.001640	0.018	0.001283361	105	0.285849	0.000	0.285849000	0.285849000
51	0.002874	0.019	0.002218290	106	0.292925	0.000	0.292925000	0.292925000
52	0.004108	0.020	0.003127393	107	0.300000	0.000	0.300000000	0.300000000
53	0.005343	0.020	0.004067590	108	0.533333	0.000	0.533333000	0.533333000
54	0.006577	0.020	0.005007026	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000

TABLE 4 Employees Retirement System Female Laborer Service Effective 4/1/2010 (For Valuation Purposes Onl

age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	2010 Inact Val <sub>(age-55)</sub> q <sub>55</sub>
0	0	0		55	0.005340	0.008	0.004791250	0.005233840
1	0	0.020	0.000000000	56	0.004328	0.006	0.003990281	0.004237792
2	0	0.020	0.000000000	57	0.004673	0.005	0.004367243	0.004568774
3	0	0.020	0.000000000	58	0.006136	0.005	0.005734518	0.005969147
4	0	0.020	0.000000000	59	0.007452	0.005	0.006964412	0.007213115
5	0	0.020	0.000000000	60	0.007854	0.005	0.007340109	0.007564217
6	0	0.020	0.000000000	61	0.007544	0.005	0.007050392	0.007229327
7	0	0.020	0.000000000	62	0.007447	0.005	0.006959739	0.007100691
8	0	0.020	0.000000000	63	0.007967	0.005	0.007445715	0.007558527
9	0	0.020	0.000000000	64	0.008964	0.005	0.008377481	0.008461888
10	0	0.020	0.000000000	65	0.010259	0.005	0.009587748	0.009635928
11	0	0.020	0.000000000	66	0.010622	0.005	0.009926997	0.009926997
12	0	0.020	0.000000000	67	0.011323	0.005	0.010582130	0.010529219
13	0	0.020	0.000000000	68	0.013151	0.005	0.012290523	0.012167925
14	0.000450	0.018	0.000352142	69	0.014738	0.005	0.013773685	0.013568111
15	0.000450	0.016	0.000361948	70	0.015445	0.005	0.014434425	0.014147895
16	0.000450	0.015	0.000366946	71	0.017264	0.006	0.015916868	0.015445058
17	0.000450	0.014	0.000372007	72	0.019698	0.006	0.018160940	0.017516875
18	0.000450	0.014	0.000372007	73	0.020944	0.007	0.019049101	0.018135069
19	0.000450	0.015	0.000366946	74	0.021811	0.007	0.019837660	0.018753590
20	0.000450	0.016	0.000361948	75	0.023989	0.008	0.021523838	0.020022798
21	0.000450	0.017	0.000357014	76	0.026384	0.008	0.023672723	0.021845648
22	0.000450	0.017	0.000357014	77	0.028434	0.007	0.025861447	0.023938368
23	0.000450	0.016	0.000361948	78	0.031178	0.007	0.028357184	0.026064782
24	0.000450	0.015	0.000366946	79	0.034135	0.007	0.031046651	0.028337073
25	0.000450	0.014	0.000372007	80	0.037033	0.007	0.033682456	0.030527640
26	0.000450	0.012	0.000382324	81	0.040725	0.007	0.037040424	0.033336091
27	0.000450	0.012	0.000382324	82	0.046578	0.007	0.042363876	0.037860267
28	0.000480	0.012	0.000407812	83	0.054987	0.007	0.050012076	0.044382535
29	0.000520	0.012	0.000441796	84	0.065038	0.007	0.059153716	0.052127693
30	0.000550	0.010	0.000480217	85	0.075816	0.006	0.069899981	0.062347402
31	0.000590	0.008	0.000529370	86	0.086152	0.005	0.080515029	0.072834739
32	0.000620	0.008	0.000556287	87	0.094537	0.004	0.089557690	0.082328270
33	0.000650	0.009	0.000575318	88	0.102110	0.004	0.096731817	0.088567582
34	0.000690	0.010	0.000602454	89	0.110968	0.003	0.106557101	0.099442272
35	0.000720	0.011	0.000620130	90	0.123305	0.003	0.118403714	0.110166391
36	0.000760	0.012	0.000645702	91	0.133699	0.003	0.128384560	0.119094513
37	0.000790	0.013	0.000662077	92	0.144093	0.003	0.138365406	0.127968075
38	0.000820	0.014	0.000677879	93	0.154486	0.002	0.150366619	0.142454460
39	0.000860	0.015	0.000701274	94	0.164880	0.002	0.160483463	0.151734886
40	0.000890	0.015	0.000725737	95	0.175274	0.002	0.170600306	0.160977620
41	0.000930	0.015	0.000758354	96	0.185668	0.002	0.180717149	0.170182777
42	0.000960	0.015	0.000782817	97	0.196062	0.001	0.193431642	0.187524344
43	0.001010	0.015	0.000823589	98	0.206456	0.001	0.203686197	0.197268264
44	0.001040	0.015	0.000848052	99	0.216849	0.001	0.213939765	0.206991555
45	0.001080	0.016	0.000868676	100	0.227243	0.001	0.224194320	0.216696155
46	0.001140	0.017	0.000904435	101	0.237637	0.000	0.237637000	0.237637000
47	0.001220	0.018	0.000954696	102	0.248031	0.000	0.248031000	0.248031000
48	0.001340	0.018	0.001048600	103	0.258425	0.000	0.258425000	0.258425000
49	0.001490	0.018	0.001165981	104	0.268819	0.000	0.268819000	0.268819000
50	0.001640	0.017	0.001301117	105	0.279212	0.000	0.279212000	0.279212000
51	0.002380	0.016	0.001914303	106	0.289606	0.000	0.289606000	0.289606000
52	0.003120	0.014	0.002579247	107	0.300000	0.000	0.300000000	0.300000000
53	0.003860	0.012	0.003279488	108	0.533333	0.000	0.533333000	0.533333000
54	0.004600	0.010	0.004016363	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000



TABLE 5 Employees Retirement System Male Disability Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	2010 Inact Val <sub>(age-55)</sub> q <sub>55</sub>
0	0	0		55	0.033278	0.019	0.025685547	0.031719749
1	0	0.020	0.000000000	56	0.029828	0.018	0.023341525	0.027990738
2	0	0.020	0.000000000	57	0.027454	0.017	0.021781015	0.025415371
3	0	0.020	0.000000000	58	0.026214	0.016	0.021084685	0.023988679
4	0	0.020	0.000000000	59	0.025874	0.016	0.020811213	0.023298701
5	0	0.020	0.000000000	60	0.026395	0.016	0.021230269	0.023387559
6	0	0.020	0.000000000	61	0.027326	0.015	0.022282565	0.024031674
7	0	0.020	0.000000000	62	0.028047	0.015	0.022870493	0.024295766
8	0	0.020	0.000000000	63	0.027545	0.014	0.022770949	0.023754746
9	0	0.020	0.000000000	64	0.028291	0.014	0.023387653	0.024056521
10	0	0.020	0.000000000	65	0.032965	0.014	0.027251564	0.027638503
11	0	0.020	0.000000000	66	0.039137	0.013	0.032799641	0.032799641
12	0	0.020	0.000000000	67	0.042307	0.013	0.035456331	0.034995399
13	0	0.020	0.000000000	68	0.041049	0.014	0.033934459	0.032990946
14	0.000900	0.019	0.000694663	69	0.037832	0.014	0.031275024	0.029979777
15	0.000900	0.019	0.000694663	70	0.035560	0.015	0.028996853	0.027295797
16	0.000900	0.019	0.000694663	71	0.038147	0.015	0.031106382	0.028842351
17	0.000900	0.019	0.000694663	72	0.044102	0.015	0.035962295	0.032844661
18	0.000900	0.019	0.000694663	73	0.050592	0.015	0.041254465	0.037112873
19	0.000900	0.019	0.000694663	74	0.055945	0.015	0.045619486	0.040424088
20	0.000900	0.019	0.000694663	75	0.059878	0.014	0.049500050	0.043601143
21	0.000900	0.018	0.000704284	76	0.065554	0.014	0.054192296	0.047065936
22	0.000900	0.017	0.000714028	77	0.072732	0.013	0.060954685	0.052783207
23	0.000900	0.015	0.000733891	78	0.079894	0.012	0.067878606	0.058724084
24	0.000900	0.013	0.000754265	79	0.084615	0.011	0.072878143	0.063117398
25	0.000900	0.010	0.000785810	80	0.087101	0.010	0.076049834	0.066067975
26	0.000900	0.006	0.000829772	81	0.090648	0.009	0.080232913	0.070057943
27	0.000900	0.005	0.000841113	82	0.096003	0.008	0.086137523	0.075749389
28	0.000960	0.005	0.000897187	83	0.105626	0.008	0.094771643	0.082675501
29	0.001040	0.005	0.000971952	84	0.112903	0.007	0.102688152	0.090491296
30	0.001100	0.005	0.001028026	85	0.121129	0.007	0.110169908	0.096404811
31	0.001180	0.005	0.001102792	86	0.129514	0.007	0.117796279	0.102356763
32	0.001240	0.005	0.001158866	87	0.137573	0.006	0.126838003	0.111779836
33	0.001300	0.005	0.001214940	88	0.146038	0.005	0.136482656	0.122232092
34	0.001380	0.005	0.001289706	89	0.155185	0.005	0.145031163	0.129238583
35	0.001440	0.005	0.001345780	90	0.168254	0.004	0.159391980	0.144774005
36	0.001520	0.005	0.001420546	91	0.176004	0.004	0.166733784	0.150836716
37	0.001580	0.005	0.001476620	92	0.183754	0.003	0.176449909	0.163190756
38	0.001640	0.006	0.001512029	93	0.191503	0.003	0.183890892	0.169562376
39	0.001720	0.007	0.001564384	94	0.199253	0.003	0.191332835	0.175895180
40	0.001780	0.008	0.001597083	95	0.207003	0.002	0.201483250	0.190118616
41	0.001860	0.009	0.001646294	96	0.214753	0.002	0.209026595	0.196842007
42	0.001920	0.010	0.001676395	97	0.222502	0.002	0.216568968	0.203536830
43	0.002020	0.011	0.001739808	98	0.230252	0.001	0.227162951	0.220005291
44	0.002080	0.012	0.001767185	99	0.238002	0.001	0.234808978	0.227182989
45	0.002160	0.013	0.001810236	100	0.245752	0.001	0.242455004	0.234346111
46	0.006134	0.014	0.005070866	101	0.253501	0.000	0.253501000	0.253501000
47	0.010108	0.015	0.008242412	102	0.261251	0.000	0.261251000	0.261251000
48	0.014081	0.016	0.011325759	103	0.269001	0.000	0.269001000	0.269001000
49	0.018055	0.017	0.014324187	104	0.276751	0.000	0.276751000	0.276751000
50	0.022029	0.018	0.017238516	105	0.284500	0.000	0.284500000	0.284500000
51	0.026949	0.019	0.020800523	106	0.292250	0.000	0.292250000	0.292250000
52	0.032328	0.020	0.024611091	107	0.300000	0.000	0.300000000	0.300000000
53	0.036018	0.020	0.027420263	108	0.533333	0.000	0.533333000	0.533333000
54	0.036361	0.020	0.027681387	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000

TABLE 6 Employees Retirement System Female Disability Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	2010		age	q <sub>x</sub>	2010		2010	
		AA	Act Val q <sub>x</sub>			AA	Act Val q <sub>x</sub>	Inact Val	(age-55)q <sub>55</sub>
0	0	0		55	0.032664	0.008	0.029307376	0.032014634	
1	0	0.020	0.000000000	56	0.027732	0.006	0.025568037	0.027153983	
2	0	0.020	0.000000000	57	0.026106	0.005	0.024397871	0.025523733	
3	0	0.020	0.000000000	58	0.026320	0.005	0.024597868	0.025604295	
4	0	0.020	0.000000000	59	0.025051	0.005	0.023411900	0.024247954	
5	0	0.020	0.000000000	60	0.024945	0.005	0.023312835	0.024024625	
6	0	0.020	0.000000000	61	0.026707	0.005	0.024959547	0.025593006	
7	0	0.020	0.000000000	62	0.027574	0.005	0.025769819	0.026291722	
8	0	0.020	0.000000000	63	0.027289	0.005	0.025503466	0.025889876	
9	0	0.020	0.000000000	64	0.027102	0.005	0.025328702	0.025583901	
10	0	0.020	0.000000000	65	0.027517	0.005	0.025716548	0.025845777	
11	0	0.020	0.000000000	66	0.028207	0.005	0.026361401	0.026361401	
12	0	0.020	0.000000000	67	0.028735	0.005	0.026854854	0.026720579	
13	0	0.020	0.000000000	68	0.029903	0.005	0.027946431	0.027667665	
14	0.000900	0.018	0.000704284	69	0.030847	0.005	0.028828664	0.028398393	
15	0.000900	0.016	0.000723896	70	0.029559	0.005	0.027624939	0.027076570	
16	0.000900	0.015	0.000733891	71	0.027931	0.006	0.025751508	0.024988178	
17	0.000900	0.014	0.000744014	72	0.029654	0.006	0.027340061	0.026370464	
18	0.000900	0.014	0.000744014	73	0.034368	0.007	0.031258571	0.029758693	
19	0.000900	0.015	0.000733891	74	0.039843	0.007	0.036238222	0.034257911	
20	0.000900	0.016	0.000723896	75	0.044292	0.008	0.039740458	0.036969018	
21	0.000900	0.017	0.000714028	76	0.046050	0.008	0.041317802	0.038128870	
22	0.000900	0.017	0.000714028	77	0.047210	0.007	0.042938696	0.039745740	
23	0.000900	0.016	0.000723896	78	0.049712	0.007	0.045214329	0.041559190	
24	0.000900	0.015	0.000733891	79	0.053190	0.007	0.048377659	0.044155527	
25	0.000900	0.014	0.000744014	80	0.058439	0.007	0.053151758	0.048173379	
26	0.000900	0.012	0.000764647	81	0.066044	0.007	0.060068699	0.054061358	
27	0.000900	0.012	0.000764647	82	0.075310	0.007	0.068496361	0.061214665	
28	0.000960	0.012	0.000815624	83	0.084733	0.007	0.077066820	0.068391899	
29	0.001040	0.012	0.000883593	84	0.092985	0.007	0.084572224	0.074527100	
30	0.001100	0.010	0.000960435	85	0.099185	0.006	0.091445468	0.081564934	
31	0.001180	0.008	0.001058741	86	0.104960	0.005	0.098092412	0.088735424	
32	0.001240	0.008	0.001112575	87	0.109955	0.004	0.104163617	0.095755154	
33	0.001300	0.009	0.001150635	88	0.116564	0.004	0.110424518	0.101104610	
34	0.001380	0.010	0.001204909	89	0.128454	0.003	0.123348045	0.115112083	
35	0.001440	0.011	0.001240259	90	0.143757	0.003	0.138042761	0.128439154	
36	0.001520	0.012	0.001291405	91	0.152948	0.003	0.146868426	0.136240867	
37	0.001580	0.013	0.001324154	92	0.162139	0.003	0.155694090	0.143994613	
38	0.001640	0.014	0.001355758	93	0.171329	0.002	0.166760500	0.157985709	
39	0.001720	0.015	0.001402547	94	0.180520	0.002	0.175706421	0.166127981	
40	0.001780	0.015	0.001451474	95	0.189711	0.002	0.184652342	0.174237053	
41	0.001860	0.015	0.001516708	96	0.198902	0.002	0.193598263	0.182313025	
42	0.001920	0.015	0.001565634	97	0.208092	0.001	0.205300249	0.199030489	
43	0.002020	0.015	0.001647178	98	0.217283	0.001	0.214367943	0.207613439	
44	0.002080	0.015	0.001696104	99	0.226474	0.001	0.223435637	0.216179025	
45	0.002160	0.016	0.001737351	100	0.235665	0.001	0.232503331	0.224727271	
46	0.006819	0.017	0.005409949	101	0.244855	0.000	0.244855000	0.244855000	
47	0.011479	0.018	0.008982746	102	0.254046	0.000	0.254046000	0.254046000	
48	0.016138	0.018	0.012628588	103	0.263237	0.000	0.263237000	0.263237000	
49	0.020798	0.018	0.016275212	104	0.272428	0.000	0.272428000	0.272428000	
50	0.025457	0.017	0.020196667	105	0.281618	0.000	0.281618000	0.281618000	
51	0.029629	0.016	0.023831470	106	0.290809	0.000	0.290809000	0.290809000	
52	0.033810	0.014	0.027950110	107	0.300000	0.000	0.300000000	0.300000000	
53	0.036840	0.012	0.031299570	108	0.533333	0.000	0.533333000	0.533333000	
54	0.037216	0.010	0.032494123	109	0.766666	0.000	0.766666000	0.766666000	
				110	1.000000	0.000	1.000000000	1.000000000	

TABLE 7 Police & Fire Retirement System Service Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	2010 Inact Val <sub>(age-55)</sub> q <sub>55</sub>
0	0	0		55	0.003971	0.019	0.002893600	0.003785057
1	0	0.020	0.000000000	56	0.004397	0.018	0.003258337	0.004126166
2	0	0.020	0.000000000	57	0.004831	0.017	0.003640576	0.004472268
3	0	0.020	0.000000000	58	0.005048	0.016	0.003868463	0.004619473
4	0	0.020	0.000000000	59	0.005237	0.016	0.004013301	0.004715749
5	0	0.020	0.000000000	60	0.005543	0.016	0.004247799	0.004911432
6	0	0.020	0.000000000	61	0.006080	0.015	0.004738069	0.005347017
7	0	0.020	0.000000000	62	0.007455	0.015	0.005809590	0.006457908
8	0	0.020	0.000000000	63	0.009150	0.014	0.007250871	0.007890939
9	0	0.020	0.000000000	64	0.009970	0.014	0.007900676	0.008477732
10	0	0.020	0.000000000	65	0.010185	0.014	0.008071052	0.008539304
11	0	0.020	0.000000000	66	0.010307	0.013	0.008305491	0.008638013
12	0	0.020	0.000000000	67	0.010693	0.013	0.008616534	0.008845009
13	0	0.020	0.000000000	68	0.011676	0.014	0.009252587	0.009383963
14	0.000350	0.019	0.000255039	69	0.013253	0.014	0.010502273	0.010502273
15	0.000350	0.019	0.000255039	70	0.016357	0.015	0.012746808	0.012555606
16	0.000350	0.019	0.000255039	71	0.021275	0.015	0.016579345	0.016085695
17	0.000350	0.019	0.000255039	72	0.026885	0.015	0.020951149	0.020022419
18	0.000350	0.019	0.000255039	73	0.030811	0.015	0.024010632	0.022602086
19	0.000350	0.019	0.000255039	74	0.034023	0.015	0.026513704	0.024583944
20	0.000350	0.019	0.000255039	75	0.037354	0.014	0.029600988	0.027199925
21	0.000350	0.018	0.000259363	76	0.039722	0.014	0.031477498	0.028519283
22	0.000350	0.017	0.000263755	77	0.042292	0.013	0.034079345	0.030692231
23	0.000350	0.015	0.000272751	78	0.046413	0.012	0.038030254	0.034114713
24	0.000350	0.013	0.000282034	79	0.052365	0.011	0.043629468	0.039060953
25	0.000350	0.010	0.000296516	80	0.058642	0.010	0.049680903	0.044481213
26	0.000350	0.006	0.000316915	81	0.064367	0.009	0.055447066	0.049746487
27	0.000350	0.005	0.000322217	82	0.069767	0.008	0.061107236	0.055048359
28	0.000350	0.005	0.000322217	83	0.074823	0.008	0.065535665	0.058565401
29	0.000350	0.005	0.000322217	84	0.080798	0.007	0.071955370	0.064759269
30	0.000350	0.005	0.000322217	85	0.089031	0.007	0.079287341	0.070858479
31	0.000360	0.005	0.000331424	86	0.099889	0.007	0.088957028	0.078943702
32	0.000380	0.005	0.000349836	87	0.112110	0.006	0.101512540	0.091090821
33	0.000380	0.005	0.000349836	88	0.123896	0.005	0.114061248	0.103699497
34	0.000380	0.005	0.000349836	89	0.134385	0.005	0.123717640	0.111916274
35	0.000380	0.005	0.000349836	90	0.143710	0.004	0.134513562	0.123655142
36	0.000380	0.005	0.000349836	91	0.152904	0.004	0.143119210	0.131039847
37	0.000380	0.005	0.000349836	92	0.162097	0.003	0.154257074	0.143957313
38	0.000380	0.006	0.000344080	93	0.171291	0.003	0.163006400	0.151666078
39	0.000380	0.007	0.000338412	94	0.180484	0.003	0.171754775	0.159326413
40	0.000380	0.008	0.000332833	95	0.189678	0.002	0.183514715	0.174206745
41	0.000380	0.009	0.000327340	96	0.198871	0.002	0.192409003	0.182284610
42	0.000410	0.010	0.000347348	97	0.208065	0.002	0.201304258	0.190330381
43	0.000450	0.011	0.000374931	98	0.217258	0.001	0.213700891	0.207589552
44	0.000530	0.012	0.000434276	99	0.226452	0.001	0.222744360	0.216158025
45	0.000620	0.013	0.000499603	100	0.235645	0.001	0.231786845	0.224708199
46	0.002154	0.014	0.001706926	101	0.244839	0.000	0.244839000	0.244839000
47	0.001750	0.015	0.001363753	102	0.254032	0.000	0.254032000	0.254032000
48	0.001814	0.016	0.001390133	103	0.263226	0.000	0.263226000	0.263226000
49	0.002196	0.017	0.001654876	104	0.272419	0.000	0.272419000	0.272419000
50	0.002966	0.018	0.002197914	105	0.281613	0.000	0.281613000	0.281613000
51	0.004094	0.019	0.002983228	106	0.290806	0.000	0.290806000	0.290806000
52	0.004913	0.020	0.003520278	107	0.300000	0.000	0.300000000	0.300000000
53	0.005027	0.020	0.003601962	108	0.533333	0.000	0.533333000	0.533333000
54	0.004468	0.020	0.003201426	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000

TABLE 8 Police & Fire Retirement System Disability Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	2010 Inact Val <sub>(age=55)</sub> q <sub>55</sub>
0	0	0		55	0.007906	0.019	0.005760968	0.007535799
1	0	0.020	0.000000000	56	0.008113	0.018	0.006012028	0.007613278
2	0	0.020	0.000000000	57	0.007993	0.017	0.006023416	0.007399471
3	0	0.020	0.000000000	58	0.008327	0.016	0.006381278	0.007620116
4	0	0.020	0.000000000	59	0.008482	0.016	0.006500060	0.007637767
5	0	0.020	0.000000000	60	0.008156	0.016	0.006250235	0.007226707
6	0	0.020	0.000000000	61	0.008599	0.015	0.006701095	0.007562335
7	0	0.020	0.000000000	62	0.010131	0.015	0.007894963	0.008775998
8	0	0.020	0.000000000	63	0.012273	0.014	0.009725677	0.010584207
9	0	0.020	0.000000000	64	0.013231	0.014	0.010484839	0.011250639
10	0	0.020	0.000000000	65	0.013842	0.014	0.010969023	0.011605404
11	0	0.020	0.000000000	66	0.014427	0.013	0.011625431	0.012090871
12	0	0.020	0.000000000	67	0.015036	0.013	0.012116169	0.012437441
13	0	0.020	0.000000000	68	0.015127	0.014	0.011987315	0.012157520
14	0.000700	0.019	0.000510078	69	0.015084	0.014	0.011953239	0.011953239
15	0.000700	0.019	0.000510078	70	0.015331	0.015	0.011947259	0.011768050
16	0.000700	0.019	0.000510078	71	0.016366	0.015	0.012753822	0.012374077
17	0.000700	0.019	0.000510078	72	0.019754	0.015	0.015394049	0.014711655
18	0.000700	0.019	0.000510078	73	0.025988	0.015	0.020252128	0.019064068
19	0.000700	0.019	0.000510078	74	0.035419	0.015	0.027601590	0.025592650
20	0.000700	0.019	0.000510078	75	0.046338	0.014	0.036720314	0.033741771
21	0.000700	0.018	0.000518725	76	0.054766	0.014	0.043399040	0.039320454
22	0.000700	0.017	0.000527510	77	0.058759	0.013	0.047348630	0.042642694
23	0.000700	0.015	0.000545501	78	0.059701	0.012	0.048918281	0.043881725
24	0.000700	0.013	0.000564067	79	0.059621	0.011	0.049675022	0.044473467
25	0.000700	0.010	0.000593033	80	0.060171	0.010	0.050976257	0.045640993
26	0.000700	0.006	0.000633831	81	0.063088	0.009	0.054345309	0.048758003
27	0.000700	0.005	0.000644435	82	0.069355	0.008	0.060746375	0.054723278
28	0.000700	0.005	0.000644435	83	0.079713	0.008	0.069818698	0.062392898
29	0.000700	0.005	0.000644435	84	0.093801	0.007	0.083535306	0.075181121
30	0.000700	0.005	0.000644435	85	0.109617	0.007	0.097620384	0.087242578
31	0.000720	0.005	0.000662847	86	0.125290	0.007	0.111578112	0.099018475
32	0.000760	0.005	0.000699672	87	0.138325	0.006	0.125249506	0.112390846
33	0.000760	0.005	0.000699672	88	0.147268	0.005	0.135577999	0.123261587
34	0.000760	0.005	0.000699672	89	0.151165	0.005	0.139165659	0.125890714
35	0.000760	0.005	0.000699672	90	0.150229	0.004	0.140615392	0.129264410
36	0.000760	0.005	0.000699672	91	0.159039	0.004	0.148861613	0.136297587
37	0.000760	0.005	0.000699672	92	0.167849	0.003	0.159730875	0.149065627
38	0.000760	0.006	0.000688159	93	0.176659	0.003	0.168114774	0.156419063
39	0.000760	0.007	0.000676825	94	0.185469	0.003	0.176498672	0.163727036
40	0.000760	0.008	0.000665666	95	0.194279	0.002	0.187966213	0.178432460
41	0.000760	0.009	0.000654680	96	0.203089	0.002	0.196489946	0.186150817
42	0.000820	0.010	0.000694696	97	0.211899	0.002	0.205013679	0.193837587
43	0.000900	0.011	0.000749862	98	0.220709	0.001	0.217095389	0.210886975
44	0.001060	0.012	0.000868551	99	0.229520	0.001	0.225762128	0.219086561
45	0.001240	0.013	0.000999205	100	0.238330	0.001	0.234427885	0.227268583
46	0.001089	0.014	0.000862973	101	0.247140	0.000	0.247140000	0.247140000
47	0.001558	0.015	0.001214130	102	0.255950	0.000	0.255950000	0.255950000
48	0.002028	0.016	0.001554129	103	0.264760	0.000	0.264760000	0.264760000
49	0.002497	0.017	0.001881705	104	0.273570	0.000	0.273570000	0.273570000
50	0.004188	0.018	0.003103460	105	0.282380	0.000	0.282380000	0.282380000
51	0.004455	0.019	0.003246283	106	0.291190	0.000	0.291190000	0.291190000
52	0.005164	0.020	0.003700126	107	0.300000	0.000	0.300000000	0.300000000
53	0.006129	0.020	0.004391571	108	0.533333	0.000	0.533333000	0.533333000
54	0.007017	0.020	0.005027843	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000

TABLE 9 Employees Retirement System Male Beneficiaries Effective 4/1/2010 (For Valuation Purposes Only)

age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	2010 Act Val q <sub>x</sub>	2010 Inact Val <sub>(age=55)</sub> q <sub>55</sub>
0	0	0		55	0.006351	0.019		0.006053613
1	0	0.020		56	0.006463	0.018		0.006064910
2	0	0.020		57	0.006030	0.017		0.005582235
3	0	0.020		58	0.005790	0.016		0.005298484
4	0	0.020		59	0.006073	0.016		0.005468540
5	0	0.020		60	0.006670	0.016		0.005910022
6	0	0.020		61	0.007096	0.015		0.006240531
7	0	0.020		62	0.007723	0.015		0.006690063
8	0	0.020		63	0.008533	0.014		0.007358840
9	0	0.020		64	0.009015	0.014		0.007665672
10	0	0.020		65	0.009758	0.014		0.008181299
11	0	0.020		66	0.010499	0.013		0.008798923
12	0	0.020		67	0.011515	0.013		0.009524949
13	0	0.020		68	0.013055	0.014		0.010492260
14	0.000450	0.019		69	0.015418	0.014		0.012217916
15	0.000450	0.019		70	0.017677	0.015		0.013568836
16	0.000450	0.019		71	0.019206	0.015		0.014521357
17	0.000450	0.019		72	0.020579	0.015		0.015326068
18	0.000450	0.019		73	0.022688	0.015		0.016643281
19	0.000450	0.019		74	0.025027	0.015		0.018083719
20	0.000450	0.019		75	0.027331	0.014		0.019901514
21	0.000450	0.018		76	0.030218	0.014		0.021695678
22	0.000450	0.017		77	0.034252	0.013		0.024857427
23	0.000450	0.015		78	0.038533	0.012		0.028322717
24	0.000450	0.013		79	0.042607	0.011		0.031782107
25	0.000450	0.010		80	0.046464	0.010		0.035243939
26	0.000450	0.006		81	0.050466	0.009		0.039003002
27	0.000450	0.005		82	0.055992	0.008		0.044179450
28	0.000480	0.005		83	0.064118	0.008		0.050186391
29	0.000520	0.005		84	0.075056	0.007		0.060157079
30	0.000550	0.005		85	0.086710	0.007		0.069011229
31	0.000590	0.005		86	0.098167	0.007		0.077582781
32	0.000620	0.005		87	0.108795	0.006		0.088397340
33	0.000650	0.005		88	0.120377	0.005		0.100754136
34	0.000690	0.005		89	0.134362	0.005		0.111897120
35	0.000720	0.005		90	0.151015	0.004		0.129940723
36	0.000760	0.005		91	0.159779	0.004		0.136931772
37	0.000790	0.005		92	0.168543	0.003		0.149681964
38	0.000820	0.006		93	0.177306	0.003		0.156991936
39	0.000860	0.007		94	0.186070	0.003		0.164257583
40	0.000890	0.008		95	0.194834	0.002		0.178942191
41	0.000930	0.009		96	0.203598	0.002		0.186617365
42	0.000960	0.010		97	0.212362	0.002		0.194261123
43	0.001010	0.011		98	0.221126	0.001		0.211285418
44	0.001040	0.012		99	0.229889	0.001		0.219438787
45	0.001080	0.013		100	0.238653	0.001		0.227576592
46	0.001140	0.014		101	0.247417	0.000		0.247417000
47	0.001220	0.015		102	0.256181	0.000		0.256181000
48	0.001340	0.016		103	0.264945	0.000		0.264945000
49	0.001490	0.017		104	0.273709	0.000		0.273709000
50	0.001640	0.018		105	0.282472	0.000		0.282472000
51	0.002582	0.019		106	0.291236	0.000		0.291236000
52	0.003524	0.020		107	0.300000	0.000		0.300000000
53	0.004467	0.020		108	0.533333	0.000		0.533333000
54	0.005409	0.020		109	0.766666	0.000		0.766666000
				110	1.000000	0.000		1.000000000

The active valuation assumes all beneficiaries will be female.

TABLE 10 Employees Retirement System **Female Beneficiaries** Effective 4/1/2010 (For Valuation Purposes Onl

2010				2010				2010
age	q <sub>x</sub>	AA	Act Val q <sub>x</sub>	age	q <sub>x</sub>	AA	Act Val q <sub>x</sub>	Inact Val <sub>(age-55)q<sub>55</sub></sub>
0	0	0		55	0.002961	0.008	0.002656721	0.002902135
1	0	0.020	0.000000000	56	0.003787	0.006	0.003491496	0.003708068
2	0	0.020	0.000000000	57	0.004572	0.005	0.004272852	0.004470026
3	0	0.020	0.000000000	58	0.005021	0.005	0.004692473	0.004884467
4	0	0.020	0.000000000	59	0.005119	0.005	0.004784061	0.004954903
5	0	0.020	0.000000000	60	0.005986	0.005	0.005594333	0.005765139
6	0	0.020	0.000000000	61	0.007716	0.005	0.007211138	0.007394153
7	0	0.020	0.000000000	62	0.009043	0.005	0.008451312	0.008622472
8	0	0.020	0.000000000	63	0.009308	0.005	0.008698973	0.008830773
9	0	0.020	0.000000000	64	0.009573	0.005	0.008946634	0.009036775
10	0	0.020	0.000000000	65	0.010175	0.005	0.009509244	0.009557030
11	0	0.020	0.000000000	66	0.010475	0.005	0.009789615	0.009789615
12	0	0.020	0.000000000	67	0.009921	0.005	0.009271864	0.009225504
13	0	0.020	0.000000000	68	0.009417	0.005	0.008800841	0.008713052
14	0.000450	0.018	0.000352142	69	0.010770	0.005	0.010065313	0.009915087
15	0.000450	0.016	0.000361948	70	0.014045	0.005	0.013126028	0.012865470
16	0.000450	0.015	0.000366946	71	0.017894	0.006	0.016497708	0.016008681
17	0.000450	0.014	0.000372007	72	0.021812	0.006	0.020109982	0.019396795
18	0.000450	0.014	0.000372007	73	0.025187	0.007	0.022908217	0.021809014
19	0.000450	0.015	0.000366946	74	0.027183	0.007	0.024723630	0.023372557
20	0.000450	0.016	0.000361948	75	0.028661	0.008	0.025715733	0.023922357
21	0.000450	0.017	0.000357014	76	0.029885	0.008	0.026813952	0.024744436
22	0.000450	0.017	0.000357014	77	0.031426	0.007	0.028582747	0.026457311
23	0.000450	0.016	0.000361948	78	0.033531	0.007	0.030497298	0.028031888
24	0.000450	0.015	0.000366946	79	0.036306	0.007	0.033021231	0.030139323
25	0.000450	0.014	0.000372007	80	0.039638	0.007	0.036051770	0.032675035
26	0.000450	0.012	0.000382324	81	0.044372	0.007	0.040357463	0.036321401
27	0.000450	0.012	0.000382324	82	0.049822	0.007	0.045314377	0.040497106
28	0.000480	0.012	0.000407812	83	0.054914	0.007	0.049945680	0.044323613
29	0.000520	0.012	0.000441796	84	0.061376	0.007	0.055823034	0.049192615
30	0.000550	0.010	0.000480217	85	0.067669	0.006	0.062388702	0.055647704
31	0.000590	0.008	0.000529370	86	0.073418	0.005	0.068614221	0.062069144
32	0.000620	0.008	0.000556287	87	0.080834	0.004	0.076576434	0.070394908
33	0.000650	0.009	0.000575318	88	0.091739	0.004	0.086907062	0.079572044
34	0.000690	0.010	0.000602454	89	0.105365	0.003	0.101176816	0.094421229
35	0.000720	0.011	0.000620130	90	0.120084	0.003	0.115310746	0.107288601
36	0.000760	0.012	0.000645702	91	0.130667	0.003	0.125473080	0.116393711
37	0.000790	0.013	0.000662077	92	0.141251	0.003	0.135636373	0.125444113
38	0.000820	0.014	0.000677879	93	0.151834	0.002	0.147785335	0.140009001
39	0.000860	0.015	0.000701274	94	0.162417	0.002	0.158086139	0.149468249
40	0.000890	0.015	0.000725737	95	0.173000	0.002	0.168386942	0.158889101
41	0.000930	0.015	0.000758354	96	0.183584	0.002	0.178688719	0.168272588
42	0.000960	0.015	0.000782817	97	0.194167	0.001	0.191562066	0.185711863
43	0.001010	0.015	0.000823589	98	0.204750	0.001	0.202003085	0.195638185
44	0.001040	0.015	0.000848052	99	0.215334	0.001	0.212445090	0.205545423
45	0.001080	0.016	0.000868676	100	0.225917	0.001	0.222886109	0.215431697
46	0.001140	0.017	0.000904435	101	0.236500	0.000	0.236500000	0.236500000
47	0.001220	0.018	0.000954696	102	0.247084	0.000	0.247084000	0.247084000
48	0.001340	0.018	0.001048600	103	0.257667	0.000	0.257667000	0.257667000
49	0.001490	0.018	0.001165981	104	0.268250	0.000	0.268250000	0.268250000
50	0.001640	0.017	0.001301117	105	0.278833	0.000	0.278833000	0.278833000
51	0.001904	0.016	0.001531443	106	0.289417	0.000	0.289417000	0.289417000
52	0.002168	0.014	0.001792246	107	0.300000	0.000	0.300000000	0.300000000
53	0.002433	0.012	0.002067097	108	0.533333	0.000	0.533333000	0.533333000
54	0.002697	0.010	0.002354811	109	0.766666	0.000	0.766666000	0.766666000
				110	1.000000	0.000	1.000000000	1.000000000

Note: Beneficiaries in the active valuation have a 2 year age setback.  
 A bene age 55 corresponds with a member age 57.

TABLE 11

**EMPLOYEES RETIREMENT SYSTEM**  
**DEATH AND DISABILITY CENTRAL RATES OF DECREMENT**  
 EFFECTIVE 4/1/2010

Age x	ord dth	acc dth	ord dis	Tiers 1&2	Tiers 3, 4 &5
				acc dis	acc dis
15	0.00045	0.00001	0.00067	0.00020	0.00001
16	0.00045	0.00001	0.00067	0.00020	0.00001
17	0.00045	0.00001	0.00067	0.00020	0.00001
18	0.00045	0.00001	0.00067	0.00020	0.00001
19	0.00045	0.00001	0.00067	0.00020	0.00001
20	0.00045	0.00001	0.00067	0.00020	0.00001
21	0.00045	0.00001	0.00067	0.00020	0.00001
22	0.00045	0.00001	0.00067	0.00020	0.00001
23	0.00045	0.00001	0.00067	0.00020	0.00001
24	0.00045	0.00001	0.00067	0.00020	0.00001
25	0.00045	0.00001	0.00067	0.00020	0.00001
26	0.00045	0.00001	0.00067	0.00020	0.00001
27	0.00045	0.00001	0.00067	0.00020	0.00001
28	0.00048	0.00001	0.00067	0.00020	0.00001
29	0.00052	0.00001	0.00067	0.00020	0.00001
30	0.00055	0.00001	0.00067	0.00020	0.00001
31	0.00059	0.00001	0.00067	0.00020	0.00001
32	0.00062	0.00001	0.00067	0.00020	0.00001
33	0.00065	0.00001	0.00067	0.00020	0.00002
34	0.00069	0.00001	0.00067	0.00020	0.00002
35	0.00072	0.00001	0.00067	0.00020	0.00002
36	0.00076	0.00001	0.00078	0.00020	0.00003
37	0.00079	0.00001	0.00093	0.00020	0.00003
38	0.00082	0.00001	0.00112	0.00020	0.00004
39	0.00086	0.00001	0.00133	0.00020	0.00005
40	0.00089	0.00001	0.00152	0.00020	0.00006
41	0.00093	0.00001	0.00171	0.00020	0.00006
42	0.00096	0.00001	0.00187	0.00020	0.00007
43	0.00101	0.00001	0.00201	0.00020	0.00007
44	0.00104	0.00001	0.00214	0.00020	0.00007
45	0.00108	0.00001	0.00229	0.00020	0.00007
46	0.00114	0.00001	0.00248	0.00020	0.00007
47	0.00122	0.00001	0.00274	0.00020	0.00007
48	0.00134	0.00001	0.00308	0.00020	0.00007
49	0.00149	0.00001	0.00346	0.00020	0.00007
50	0.00164	0.00001	0.00383	0.00020	0.00007
51	0.00179	0.00001	0.00413	0.00020	0.00007
52	0.00192	0.00001	0.00435	0.00020	0.00007
53	0.00204	0.00001	0.00477	0.00020	0.00007
54	0.00214	0.00001	0.00523	0.00020	0.00007
55	0.00225	0.00001	0.00574	0.00015	0.00006
56	0.00235	0.00001	0.00630	0.00015	0.00004
57	0.00247	0.00001	0.00691	0.00015	0.00002
58	0.00261	0.00001	0.00758	0.00015	0.00002
59	0.00276	0.00001	0.00831	0.00015	0.00002
60	0.00294	0.00001	0.00911	0.00015	0.00002
61	0.00315	0.00001	0.01000	0.00015	0.00002
62	0.00341	0.00001	0.01096	0.00015	0.00002
63	0.00378	0.00001	0.01203	0.00015	0.00002
64	0.00419	0.00001	0.01319	0.00015	0.00002
65	0.00464	0.00001	0.01447	0.00015	0.00002
66	0.00514	0.00001	0.01587	0.00015	0.00002
67	0.00570	0.00001	0.01741	0.00015	0.00002
68	0.00632	0.00001	0.01909	0.00015	0.00002
69	0.00700	0.00001	0.02094	0.00015	0.00002
70	0.00000	0.00000	0.00000	0.00000	0.00000

TABLE 12

**EMPLOYEES RETIREMENT SYSTEM**  
**WITHDRAWAL CENTRAL RATES OF DECUREMENT**  
EFFECTIVE 4/1/2010

Age x	withdrawal N<2	withdrawal N=2-2.99	withdrawal N=3-3.99	withdrawal N=4-4.99	withdrawal N=5-9.99	withdrawal N>=10
15	0.20234	0.10857	0.07031	0.06120	0.04429	0.02765
16	0.20234	0.10857	0.07031	0.06120	0.04429	0.02765
17	0.20234	0.10857	0.07031	0.06120	0.04429	0.02765
18	0.20234	0.10857	0.07031	0.06120	0.04429	0.02765
19	0.20234	0.10857	0.07031	0.06120	0.04429	0.02765
20	0.20093	0.10857	0.07031	0.06120	0.04429	0.02765
21	0.19794	0.10857	0.07031	0.06120	0.04429	0.02765
22	0.19394	0.10857	0.07031	0.06120	0.04429	0.02765
23	0.18921	0.11476	0.08404	0.06546	0.04609	0.02765
24	0.18388	0.11909	0.09276	0.06901	0.04738	0.02765
25	0.17820	0.12171	0.09746	0.07167	0.04814	0.02765
26	0.17264	0.12305	0.09966	0.07369	0.04841	0.02765
27	0.16778	0.12338	0.10070	0.07557	0.04833	0.02765
28	0.16400	0.12279	0.10134	0.07776	0.04803	0.02725
29	0.16119	0.12130	0.10176	0.08031	0.04766	0.02678
30	0.15885	0.11894	0.10174	0.08274	0.04729	0.02622
31	0.15636	0.11588	0.10086	0.08425	0.04697	0.02554
32	0.15332	0.11243	0.09876	0.08404	0.04670	0.02477
33	0.14972	0.10888	0.09534	0.08176	0.04644	0.02397
34	0.14583	0.10543	0.09090	0.07774	0.04614	0.02317
35	0.14206	0.10208	0.08602	0.07284	0.04574	0.02240
36	0.13872	0.09871	0.08132	0.06811	0.04518	0.02163
37	0.13596	0.09518	0.07728	0.06439	0.04442	0.02084
38	0.13377	0.09147	0.07411	0.06203	0.04346	0.02002
39	0.13205	0.08774	0.07174	0.06082	0.04234	0.01922
40	0.13063	0.08421	0.06991	0.06021	0.04116	0.01847
41	0.12934	0.08109	0.06836	0.05955	0.03997	0.01784
42	0.12803	0.07849	0.06689	0.05842	0.03886	0.01734
43	0.12664	0.07641	0.06543	0.05668	0.03786	0.01697
44	0.12519	0.07478	0.06401	0.05451	0.03696	0.01667
45	0.12381	0.07349	0.06270	0.05227	0.03614	0.01633
46	0.12269	0.07248	0.06152	0.05029	0.03533	0.01584
47	0.12200	0.07174	0.06047	0.04882	0.03447	0.01515
48	0.12185	0.07125	0.05949	0.04792	0.03356	0.01429
49	0.12220	0.07099	0.05855	0.04749	0.03262	0.01338
50	0.12288	0.07092	0.05770	0.04734	0.03172	0.01258
51	0.12362	0.07097	0.05707	0.04729	0.03095	0.01196
52	0.12414	0.07109	0.05681	0.04717	0.03035	0.01155
53	0.12424	0.07122	0.05705	0.04690	0.02995	0.01131
54	0.12393	0.07137	0.05783	0.04652	0.02969	0.01118
55	0.12340	0.07162	0.05905	0.04612	0.02955	0.01111
56	0.12307	0.07206	0.06053	0.04587	0.02949	0.01109
57	0.12351	0.07287	0.06210	0.04596	0.02951	0.01111
58	0.12529	0.07420	0.06366	0.04653	0.02959	0.01116
59	0.12886	0.07618	0.06517	0.04764	0.02970	0.01122
60	0.13430	0.07888	0.06668	0.04926	0.02984	0.01130
61	0.14115	0.08218	0.06819	0.05129	0.02998	0.01138
62	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
63	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
64	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
65	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
66	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
67	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
68	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
69	0.14818	0.08576	0.06960	0.05351	0.03011	0.01145
70	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Note: to get Tier 5 withdrawal rates for N=5 to 9.99, multiply by \* .6. For N=10, multiply by 2.



TABLE 13

**EMPLOYEES RETIREMENT SYSTEM**  
**CENTRAL RATES OF DECREMENT -- AGE 55 RETIREMENT TABLE**  
 EFFECTIVE 4/1/2010

**Tier 1**

Age x	Serv <20	Serv 20-29.99	Serv >= 30
55	0.16985	0.34977	0.77499
56	0.09286	0.13929	0.26808
57	0.07541	0.11619	0.23320
58	0.09055	0.12956	0.21587
59	0.10371	0.15469	0.21164
60	0.10331	0.17394	0.21365
61	0.13785	0.21229	0.24184
62	0.19152	0.34528	0.35390
63	0.15155	0.25017	0.23024
64	0.17236	0.29052	0.23115
65	0.22845	0.29262	0.26254
66	0.23898	0.31788	0.26292
67	0.19844	0.28362	0.22238
68	0.15865	0.31095	0.20547
69	0.19512	0.26244	0.18605
70	2.00000	2.00000	2.00000

**Tiers 2, 3 & 4**

Age x	Serv <20	Serv 20-29.99	Serv >= 30
55	0.06104	0.08557	0.52920
56	0.03934	0.04906	0.22003
57	0.03914	0.05009	0.20460
58	0.04074	0.05577	0.20046
59	0.04432	0.06675	0.20753
60	0.05010	0.08128	0.22153
61	0.08517	0.17608	0.27655
62	0.16114	0.38328	0.43853
63	0.11587	0.24354	0.27483
64	0.12806	0.23489	0.26645
65	0.17112	0.29605	0.32224
66	0.16638	0.29648	0.33716
67	0.13248	0.22934	0.25711
68	0.13195	0.21522	0.27720
69	0.14120	0.22938	0.26998
70	2.00000	2.00000	2.00000

## Service Age

< 20	<62	Tiers 2, 3 & 4 Serv < 20 rate * .8
	=62	Tiers 2, 3 & 4 Serv < 20 rate + 0.2
	>62	Tiers 2, 3 & 4 Serv < 20 rate as is
20-29.99	<62	Tiers 2, 3 & 4 Serv 20-29.99 rate * .8
	=62	Tiers 2, 3 & 4 Serv 20-29.99 rate + 0.1
	>62	Tiers 2, 3 & 4 Serv 20-29.99 rate as is
>= 30	<62	Tiers 2, 3 & 4 Serv 20-29.99 rate as is
	=62	Tiers 2, 3 & 4 Serv 20-29.99 rate + 0.8
	>62	Tiers 2, 3 & 4 Serv 20-29.99 rate as is

TABLE 14

**EMPLOYEES RETIREMENT SYSTEM  
CENTRAL RATES OF DECREMENT -- RETIREMENT TABLE  
EFFECTIVE 4/1/2010**

Service	State Corr Offc 25 Yr Plan Tiers 1&2	State Corr Offc 25 Yr Plan Tier 3	County Corr Offc 25 Yr Plan
25	0.20915	0.32263	0.22036
26	0.22135	0.20498	0.13555
27	0.22418	0.13916	0.09858
28	0.21834	0.12099	0.09148
29	0.20314	0.12864	0.10532
30	0.18023	0.14713	0.12636
31	0.15638	0.15638	0.14255
32	0.15787	0.15787	0.15483
33	0.18173	0.18173	0.16662
34	0.20559	0.20559	0.18240
35	0.23067	0.23067	0.20417
36	0.27093	0.27093	0.23391
37	0.33205	0.33205	0.27661
38	0.38247	0.38247	0.32697
39	0.39053	0.39053	0.39140
40	0.39053	0.39053	0.39140
41	0.39053	0.39053	0.39140
42	0.39053	0.39053	0.39140
43	0.39053	0.39053	0.39140
44	0.39053	0.39053	0.39140
45	0.39053	0.39053	0.39140
46	0.39053	0.39053	0.39140
47	0.39053	0.39053	0.39140
48	0.39053	0.39053	0.39140
49	0.39053	0.39053	0.39140
50	2.00000	2.00000	2.00000

TABLE 15

**POLICE & FIRE RETIREMENT SYSTEM**  
**DEATH AND DISABILITY CENTRAL RATES OF DECREMENT**  
 EFFECTIVE 4/1/2010

Age x	ord dth	acc dth	ord dis	pod dis	acc dis
15	0.00035	0.00008	0.00023	0.00023	0.00044
16	0.00035	0.00008	0.00023	0.00023	0.00044
17	0.00035	0.00008	0.00023	0.00023	0.00044
18	0.00035	0.00008	0.00023	0.00023	0.00044
19	0.00035	0.00008	0.00023	0.00023	0.00044
20	0.00035	0.00008	0.00023	0.00023	0.00044
21	0.00035	0.00008	0.00023	0.00023	0.00044
22	0.00035	0.00008	0.00023	0.00023	0.00044
23	0.00035	0.00008	0.00023	0.00023	0.00044
24	0.00035	0.00008	0.00023	0.00023	0.00044
25	0.00035	0.00008	0.00023	0.00023	0.00044
26	0.00035	0.00008	0.00023	0.00023	0.00044
27	0.00035	0.00008	0.00023	0.00023	0.00044
28	0.00035	0.00008	0.00023	0.00023	0.00044
29	0.00035	0.00008	0.00023	0.00023	0.00044
30	0.00035	0.00008	0.00023	0.00023	0.00044
31	0.00036	0.00008	0.00023	0.00023	0.00064
32	0.00038	0.00008	0.00023	0.00023	0.00088
33	0.00038	0.00008	0.00023	0.00047	0.00115
34	0.00038	0.00008	0.00023	0.00075	0.00145
35	0.00038	0.00008	0.00023	0.00104	0.00175
36	0.00038	0.00008	0.00023	0.00132	0.00208
37	0.00038	0.00008	0.00023	0.00157	0.00244
38	0.00038	0.00008	0.00023	0.00181	0.00286
39	0.00038	0.00008	0.00023	0.00203	0.00331
40	0.00038	0.00008	0.00023	0.00222	0.00375
41	0.00038	0.00008	0.00023	0.00239	0.00414
42	0.00041	0.00008	0.00023	0.00250	0.00444
43	0.00045	0.00008	0.00028	0.00250	0.00463
44	0.00053	0.00008	0.00038	0.00250	0.00472
45	0.00062	0.00008	0.00055	0.00250	0.00474
46	0.00071	0.00008	0.00078	0.00250	0.00472
47	0.00080	0.00008	0.00106	0.00250	0.00467
48	0.00087	0.00008	0.00134	0.00260	0.00458
49	0.00091	0.00008	0.00156	0.00278	0.00447
50	0.00093	0.00008	0.00170	0.00301	0.00433
51	0.00097	0.00008	0.00175	0.00325	0.00416
52	0.00106	0.00008	0.00169	0.00347	0.00399
53	0.00123	0.00006	0.00219	0.00361	0.00384
54	0.00151	0.00006	0.00269	0.00364	0.00370
55	0.00188	0.00006	0.00319	0.00364	0.00357
56	0.00234	0.00006	0.00369	0.00364	0.00345
57	0.00286	0.00006	0.00419	0.00364	0.00334
58	0.00344	0.00006	0.00469	0.00364	0.00327
59	0.00416	0.00006	0.00519	0.00364	0.00327
60	0.00515	0.00006	0.00569	0.00364	0.00327
61	0.00525	0.00006	0.00619	0.00364	0.00327
62	0.00570	0.00006	0.00669	0.00364	0.00327
63	0.00621	0.00006	0.00719	0.00364	0.00327
64	0.00682	0.00006	0.00769	0.00364	0.00327
65	0.00757	0.00006	0.00819	0.00364	0.00327
66	0.00849	0.00006	0.00869	0.00364	0.00327
67	0.00956	0.00006	0.00919	0.00364	0.00327
68	0.01071	0.00006	0.00969	0.00364	0.00327
69	0.01189	0.00006	0.01019	0.00364	0.00327
70	0.00000	0.00000	0.00000	0.00000	0.00000

TABLE 16

**POLICE & FIRE RETIREMENT SYSTEM**  
**WITHDRAWAL CENTRAL RATES OF DECREMENT**  
EFFECTIVE 4/1/2010

Service	withdrawal
0	0.07713
1	0.04314
2	0.02352
3	0.01521
4	0.01285
5	0.01218
6	0.01111
7	0.00963
8	0.00809
9	0.00664
10	0.00547
11	0.00448
12	0.00393
13	0.00396
14	0.00418
15	0.00428
16	0.00406
17	0.00338
18	0.00264
19	0.00215
20	0.00215
21	0.00260
22	0.00345
23	0.00345
24	0.00345
25	0.00345
26	0.00345
27	0.00345
28	0.00345
29	0.00345
30	0.00345
31	0.00345
32	0.00345
33	0.00345
34	0.00345
35	0.00345
36	0.00345
37	0.00345
38	0.00345
39	0.00345
40	0.00345
41	0.00345
42	0.00345
43	0.00345
44	0.00345
45	0.00345
46	0.00345
47	0.00345
48	0.00345
49	0.00345
50	0.00345

TABLE 17

**POLICE & FIRE RETIREMENT SYSTEM**  
**CENTRAL RATES OF DECREMENT -- AGE 55 RETIREMENT TABLE**  
 EFFECTIVE 4/1/2010

**Tier 1**

Age x	Serv <20	Serv 20-29.99	Serv >= 30
55	0.16985	0.34977	0.77499
56	0.09286	0.13929	0.26808
57	0.07541	0.11619	0.23320
58	0.09055	0.12956	0.21587
59	0.10371	0.15469	0.21164
60	0.10331	0.17394	0.21365
61	0.13785	0.21229	0.24184
62	0.19152	0.34528	0.35390
63	0.15155	0.25017	0.23024
64	0.17236	0.29052	0.23115
65	0.22845	0.29262	0.26254
66	0.23898	0.31788	0.26292
67	0.19844	0.28362	0.22238
68	0.15865	0.31095	0.20547
69	0.19512	0.26244	0.18605
70	2.00000	2.00000	2.00000

**Tier 2**

Age x	Serv <20	Serv 20-29.99	Serv >= 30
55	0.06104	0.08557	0.08557
56	0.03934	0.04906	0.04906
57	0.03914	0.05009	0.05009
58	0.04074	0.05577	0.05577
59	0.04432	0.06675	0.06675
60	0.05010	0.08128	0.08128
61	0.08517	0.17608	0.17608
62	0.16114	0.38328	0.38328
63	0.11587	0.24354	0.24354
64	0.12806	0.23489	0.23489
65	0.17112	0.29605	0.29605
66	0.16638	0.29648	0.29648
67	0.13248	0.22934	0.22934
68	0.13195	0.21522	0.21522
69	0.14120	0.22938	0.22938
70	2.00000	2.00000	2.00000

Service	Age	
< 20	<62	Tiers 2, 3 & 4 Serv < 20 rate * .8
	=62	Tiers 2, 3 & 4 Serv < 20 rate + 0.2
	>62	Tiers 2, 3 & 4 Serv < 20 rate as is
20-29.99	<62	Tiers 2, 3 & 4 Serv 20-29.99 rate * .8
	=62	Tiers 2, 3 & 4 Serv 20-29.99 rate + 0.1
	>62	Tiers 2, 3 & 4 Serv 20-29.99 rate as is
>= 30	<62	Tiers 2, 3 & 4 Serv 20-29.99 rate as is
	=62	Tiers 2, 3 & 4 Serv 20-29.99 rate + 0.8
	>62	Tiers 2, 3 & 4 Serv 20-29.99 rate as is

TABLE 18

**POLICE & FIRE RETIREMENT SYSTEM**  
**CENTRAL RATES OF DECUREMENT -- RETIREMENT TABLE**  
 EFFECTIVE 4/1/2010

Service	20 Year Plan (no add'l 60th's)	20 Year Plan (add'l 60th's)	20 Year Plan State Police	20 Year Plan Article 14
20	0.24275	0.08846	0.08286	0.02000
21	0.11632	0.05687	0.05825	0.02000
22	0.10380	0.03811	0.05984	0.02000
23	0.08663	0.05078	0.03074	0.02000
24	0.09699	0.06104	0.05031	0.02000
25	0.12628	0.05559	0.06867	0.80000
26	0.09270	0.08049	0.09104	0.50000
27	0.07771	0.08974	0.10256	0.50000
28	0.08874	0.07594	0.07299	0.50000
29	0.09936	0.12189	0.11138	0.50000
30	0.09917	0.18352	0.19375	0.50000
31	0.09695	0.14378	0.13793	0.50000
32	0.08721	0.24205	0.34211	0.50000
33	0.11579	0.14729	0.09524	0.50000
34	0.13870	0.24925	0.09524	0.50000
35	0.23333	0.36066	0.09524	0.50000
36	0.31858	0.36066	0.09524	0.50000
37	0.31858	0.36066	0.09524	0.50000
38	0.31858	0.36066	0.09524	0.50000
39	0.31858	0.36066	0.09524	0.50000
40	0.31858	0.36066	0.09524	0.50000
41	0.31858	0.36066	0.09524	0.50000
42	0.31858	0.36066	0.09524	0.50000
43	0.31858	0.36066	0.09524	0.50000
44	0.31858	0.36066	0.09524	0.50000
45	0.31858	0.36066	0.09524	0.50000
46	0.31858	0.36066	0.09524	0.50000
47	0.31858	0.36066	0.09524	0.50000
48	0.31858	0.36066	0.09524	0.50000
49	0.31858	0.36066	0.09524	0.50000
50	2.00000	2.00000	2.00000	2.00000

TABLE 19

**EMPLOYEES RETIREMENT SYSTEM**  
**SALARY SCALE**  
 EFFECTIVE 4/1/2010

Service	Increase	Service	Increase
0	1.1030	28	1.0374
1	1.0868	29	1.0371
2	1.0749	30	1.0368
3	1.0669	31	1.0366
4	1.0621	32	1.0363
5	1.0592	33	1.0361
6	1.0570	34	1.0358
7	1.0549	35	1.0356
8	1.0527	36	1.0353
9	1.0505	37	1.0351
10	1.0486	38	1.0347
11	1.0472	39	1.0343
12	1.0460	40	1.0336
13	1.0452	41	1.0336
14	1.0448	42	1.0336
15	1.0440	43	1.0336
16	1.0431	44	1.0336
17	1.0424	45	1.0336
18	1.0419	46	1.0336
19	1.0414	47	1.0336
20	1.0406	48	1.0336
21	1.0395	49	1.0336
22	1.0386	50	1.0336
23	1.0381	51	1.0336
24	1.0381	52	1.0336
25	1.0381	53	1.0336
26	1.0379	54	1.0336
27	1.0377	55	1.0336

TABLE 20

**POLICE & FIRE RETIREMENT SYSTEM**  
**SALARY SCALE**  
 EFFECTIVE 4/1/2010

Service	Increase	Service	Increase
0	1.2976	28	1.0454
1	1.2976	29	1.0441
2	1.1833	30	1.0424
3	1.1219	31	1.0412
4	1.0911	32	1.0408
5	1.0741	33	1.0408
6	1.0634	34	1.0408
7	1.0573	35	1.0408
8	1.0536	36	1.0408
9	1.0509	37	1.0408
10	1.0485	38	1.0408
11	1.0462	39	1.0408
12	1.0446	40	1.0408
13	1.0433	41	1.0408
14	1.0432	42	1.0408
15	1.0441	43	1.0408
16	1.0457	44	1.0408
17	1.0474	45	1.0408
18	1.0482	46	1.0408
19	1.0468	47	1.0408
20	1.0442	48	1.0408
21	1.0428	49	1.0408
22	1.0424	50	1.0408
23	1.0418	51	1.0408
24	1.0415	52	1.0408
25	1.0422	53	1.0408
26	1.0436	54	1.0408
27	1.0450	55	1.0408