The Employee Retirement System of the City of Providence

Actuarial Experience Review
July 1, 2015 through June 30, 2018

December 14, 2020 / Kathleen A. Riley, FSA, MAAA, EA

Segal

Segal

116 Huntington Avenue
8th Floor
Boston, MA 02116-5744
T 617.424.7300
F 617.904.1833
segalco.com

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Retirement Board
The Employee Retirement System of the City of Providence
City Hall
Providence, RI 02903

Dear Board Members:

We are pleased to present this report on our actuarial experience study of The Employee Retirement System of the City of Providence (System) covering the three-year period from July 1, 2015 to June 30, 2018. This experience study shows the impact of the recommended assumption changes on the July 1, 2019 valuation results. This report was prepared to review and update, as necessary, the assumptions used in the actuarial valuation.

Based on our analysis of the System's actuarial experience for the period, we offer for the Board's consideration certain changes in the actuarial assumptions. We encourage the Board's comments and input on this study.

The census information on which this study was based included the active participants, inactive participants and retired participants and beneficiaries received from the staff of the System for the June 30, 2015, 2016, 2017 and 2018 actuarial valuations. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the System. This document should not be shared, copied or quoted, in whole or in part, without the consent of Segal, except to the extent otherwise required by law. The actuarial calculations were directed under my supervision. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of my knowledge, this report is complete and accurate.

We look forward to reviewing this report with you.

Sincerely,

Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Actuary

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I. Executive Summary

Introduction

The annual actuarial valuations for The Employee Retirement System for the City of Providence ("System") provide projections of future benefit payments for all current participants based upon actuarial assumptions adopted by the Retirement Board ("Board") that are discounted to the valuation date. The actuarial valuation methods are tools that develop long-term budget patterns to assure necessary contributions are systematically deposited in the System so that funds are available to pay promised benefits as they come due. The methods and assumptions must comply with generally accepted actuarial principles and practices as well as GASB accounting standards.

The assumptions and methods used in the annual actuarial valuations are adopted by the Board, based on recommendations of the actuary and the findings of actuarial experience studies. The purpose of the study is to update current assumptions to reflect emerging experience as well as anticipated experience in future years. This study shows the impact of the recommended assumption changes on the July 1, 2019 valuation results.

This experience study is for the three-year period from July 1, 2015 through June 30, 2018. A three-year study requires four complete years of member and financial data. We have utilized data provided by the System for the July 1, 2015, July 1, 2016, July 1, 2017 and July 1, 2018 actuarial valuations in this experience review.

The experience study includes a review of key assumptions and methods used in the valuation. The assumptions can be broken down into two categories: economic and demographic assumptions. Economic assumptions include inflation, investment rate of return (or discount rate), salary scale, and payroll growth. Demographic assumptions include mortality, turnover (or withdrawal), retirement and disability.

The methods studied include the actuarial cost method for determining the allocation of liabilities to past and future years, the asset smoothing method, and the amortization of unfunded liability.

Additional sections which include detailed analysis, address specific issues and provide recommendations. The sections are:

- Economic assumptions;
- Demographic assumptions; and
- Actuarial methods.

Appendices at the end of the report detail all of the recommended assumptions. A summary of the key points of our review and our recommendations follows.

Summary of Actuarial Experience

The System has experienced actuarial losses in three of the last four years. There have been investment losses in all four years, and non-investment losses in two years. The total net loss is over the four-year period is approximately $16.6 million, which includes investment losses of $19.4 million and non-investment gains of $2.9 million. A summary of the historical experience is shown below (dollar amounts are shown in millions).

Valuation Date July 1	Actuarial Accrued Liability (AAL)	Total Actuarial Gain/(Loss)		Investment Gain/(Loss)		Non-Investment Gain/(Loss)	
		Amount (in $)	% of AAL	Amount (in $)	% of AAL	Amount (in $)	% of AAL
2016	$1,330.3	-$15.3	1.15%	-$6.2	0.47%	-$9.1	0.68%
2017	1,356.2	-4.2	0.31%	-0.9	0.07%	-3.2	0.24%
2018	1,378.2	-0.9	0.07%	-2.9	0.21%	2.0	0.15%
2019[1]	1,393.7	3.8	0.27%	-9.4	0.67%	13.2	0.95%

Findings and Recommendations

The experience review affords an opportunity for the Board and actuary to consider how specific assumptions or methods may be affecting contribution rates and the proper funding of the System. We have reviewed both the economic and demographic experience of the System as it relates to the anticipated experience based on the current plan assumptions. We believe the recommended assumption changes will more accurately reflect the future experience of the System and will help to minimize experience gains or losses that may create volatility in annual cost requirements from year to year.

We are available to provide alternative funding schedules that reflect the budgeted contributions through fiscal 2021 or fiscal 2022, followed by differing approaches to recognizing the impact of any assumption changes. If assumption changes are recognized immediately, there will be a large increase in the Actuarially Determined Contribution (ADC) in the fiscal year in which the changes are recognized and smaller annual increases thereafter. Phasing-in the effect of assumption changes over time will result in a smaller ADC in the fiscal year in which the changes are first recognized and larger year-to-year increases thereafter as each year's ADC will include the impact of both payroll increases and the gradual recognition of the assumption changes.

A brief summary of our recommendations is provided below. The detailed analysis of each economic and demographic assumption is discussed in later Sections of this report.

Economic Assumptions

Economic assumptions include inflation, investment rate of return (or discount rate), salary scale, and payroll growth.

[1] Based on July 1, 2019 valuation results.

Inflation

Inflation continues at relatively low levels from a historical perspective. Average inflation, as measured by CPI-U, over various time frames ending on June 30, 2019 is shown in the following table.

Average Annual Change in CPI-U as of June 30, 2019

Last 5 Years	1.45%
Last 10 Years	1.73%
Last 10 Years	2.19%
Last 30 Years	2.14%

The July 1, 2018 actuarial valuation included an explicit assumption for inflation of 3.5%. As the future outlook for inflation remains low, **we recommend reducing the long-term inflation assumption to 2.5%.** See *Section II, subsection A* for our detailed analysis.

We utilized the "building block" approach to develop economic assumptions. Under the "building block" approach, inflation is the basis for all economic assumptions. The investment return assumption is comprised of inflation and the expected risk premium for each asset class. The underlying salary scale assumption is composed of wage inflation and longevity increases. Finally, payroll growth is a function of wage inflation.

Investment Return

On a market value basis, the System has averaged a 5.49% investment return over the last five years. This compares to the assumption of 8.00%. Thus, the System's investment earnings have consistently fallen below the actuarial assumption over the last five years.

Based on the System's asset allocation, the current interest rate environment, and expectations of future investment returns for various asset classes, **we recommend reducing the investment return assumption to 7.00%**. This assumption is discussed in more detail in *Section II, subsection B.*

Salary Scale

The current salary increase assumption is comprised of a wage inflation assumption of 3.50% per year plus an additional increase to reflect longevity that varies by Class, years of service, and date of hire. Recent experience has been consistent with the current assumption. However, given the low level of anticipated inflation, a 3.00% wage inflation component to the salary increase assumption is also reasonable. **We recommend a salary scale increase assumption comprised of a wage inflation assumption in the 3.00% to 3.50% range, plus longevity adjustments. We do not recommend any changes to the longevity assumptions.** See *Section II, subsection C* for detailed analysis.

Payroll Growth Rate

The City's current funding policy is to make payments on the Unfunded Actuarial Accrued Liability (UAAL) that are designed to remain at a level percentage of payroll (*i.e.,* level percent of pay amortization).

The payroll growth rate of 3.50% is currently used for determining the amortization amount of the unfunded actuarial accrued liability (UAAL).

We recommend setting the payroll growth assumption equal to the wage inflation component of the salary increase assumption. See *Section II, subsection D* for detailed analysis.

Demographic Assumptions

Demographic assumptions include mortality, turnover (or withdrawal), retirement, disability, percent married, and spousal age difference.

Mortality

The current assumption for healthy lives is based on the RP-2006 mortality tables, with a blue collar adjustment for Class B members, and with a generational projection for anticipated mortality improvement. The current assumption for disabled lives is based on the RP-2006 Blue Collar Healthy Annuitant Mortality Tables set forward three years, with a generational projection for anticipated mortality improvement. **We recommend updating these tables to recently released public sector mortality tables from the Society of Actuaries.** See *Section III, subsection A* for detailed analysis.

Turnover (Withdrawal)

Current assumptions of withdrawal are unisex and based on age and Class. **We recommend increasing the turnover rates for Class A members and recommend no change for Class B members.** See *Section III, subsection B* for detailed analysis.

Retirement

For Class A members hired prior to July 1, 2009, retirement eligibility is either age 55 or 60 or the attainment of either 25 or 30 years of service. For Class A members hired on or after July 1, 2009, retirement eligibility is age 62 and ten years of service, or the attainment of 30 years of service. For Class B members, the retirement eligibility is age 55 or the attainment of either 20, 23 or 25 years of service, depending on date of hire.

The current retirement assumptions are unisex and are based on age and Class, with immediate retirement at age 75 for Class A members and at age 60 for Class B members. **We recommend reducing the retirement rates for Class A members and recommend no change for Class B members.** See *Section III, subsection C* for detailed analysis.

Disability

The current assumption is based on a table of unisex rates varying by age and Class. **We recommend reducing the disability rates for Class A members and recommend no change for Class B members.**

We do not recommend a change in the assumption that for Class A, ⅔ of future disabilities will be non-job related (ordinary) and ⅓ will be job-related (accidental) and for Class B, 10% of future disabilities will be non-job related (ordinary) and 90% will be job-related (accidental).

See *Section III, subsection D* for detailed analysis.

Actuarial Methods

Actuarial methods include the asset valuation method, actuarial cost method and amortization of the unfunded actuarial accrued liability (UAAL).

Asset Valuation Method

The assets are valued using an asset-smoothing methodology that recognizes 20% of any difference between the actual and expected investment income on the market value of assets (that is, the investment gain or loss) in the valuation year and 20% of unrecognized investment gains or losses for each of the four previous valuation years. Further, the smoothed actuarial asset value cannot be less than 80% or greater than 120% of the market value of assets. Asset smoothing, as compared to using the market value as of the valuation year, results in less volatility of actuarial asset values and contribution requirements. **We recommend no change in the asset valuation method**.

Actuarial Cost Method

The actuarial cost method is a mechanism to orderly fund benefits over a participant's lifetime. The actuarial cost method allocates liability for service already accrued (i.e., Actuarial Accrued Liability) and future service (i.e., Normal Cost). The current actuarial cost method is the Entry Age Normal actuarial cost method. Under this method, a normal cost is calculated for each employee which is the level annual contribution as a percent of pay required to be made from the employee's date of hire for as long as the employee is working so that sufficient assets will be accumulated to provide the employee's benefit. **We recommend no change in the actuarial cost method.**

Amortization Period

The Board's policy is to fully fund the unfunded actuarial accrued liability (UAAL) of the system by June 30, 2040 with amortization payments that remain level as a percent of payroll. As of July 1, 2019, there were 21 years remaining on this funding schedule. The 21 year amortization schedule is reasonable from an actuarial perspective. In addition, subsequent to the release of this experience study report, we will be discussing other reasonable actuarial approaches for amortizing the UAAL that may be desirable to the Board in gradually phasing in the effect of assumption changes.

Impact of Actuarial Assumption and Method Changes on Valuation Results

To illustrate the impact of the recommended assumption changes, the following table compares the results of the July 1, 2019 actuarial valuation for the System with no assumption changes (column A) to the results with the recommended demographic assumptions (column B), and to the results with both recommended demographic changes and economic assumptions (columns C and D). Column C reflects the current 3.5% wage inflation assumption and Column D reflects a 3% wage inflation assumption.

The Total Actuarial Value of Assets (AVA) is allocated to Class A and Class B in proportion to the Class A and Class B Actuarial Accrued Liability. As a result, while the Total AVA is not impacted by actuarial assumption changes, the AVA by Class A and Class B will differ slightly with the different assumptions.

Class A – July 1, 2019 Valuation Results

Description	(A) No Assumption Changes	(B) With Recommended Demographic Assumptions	(C) With Recommended Demographic and Economic Assumptions including 3.5% wage inflation assumption	(D) With Recommended Demographic and Economic Assumptions including 3.0% wage inflation assumption
• Total Normal Cost	$9,837,911	$9,089,381	$10,603,423	$9,860,141
• Expected Employee Contributions	-$7,895,022	-$7,895,022	-$7,895,022	-$7,858,337)
• Employer Normal Cost	$1,942,889	$1,194,359	$2,708,401	$2,001,804
• Actuarial Accrued Liability	$488,009,028	$494,896,158	$547,599,733	$545,124,418
• Actuarial Value of Assets	$133,223,924	$131,170,813	$130,269,036	$130,143,511
• Unfunded Actuarial Accrued Liability (UAAL)	$354,785,104	$363,725,345	$417,330,697	$414,980,907

Class B – July 1, 2019 Valuation Results

Description	(A) With No Assumption Changes	(B) With Recommended Demographic Assumptions	(C) With Recommended Demographic and Economic Assumptions including 3.5% wage inflation assumption	(D) With Recommended Demographic and Economic Assumptions including 3.0% wage inflation assumption
• Total Normal Cost	$11,421,581	$11,683,729	$15,025,413	$14,156,030
• Expected Employee Contributions	-$4,856,874	-$4,856,874	-$4,856,874	-$4,834,464
• Employer Normal Cost	$6,564,707	$6,826,855	$10,168,539	$9,321,566
• Actuarial Accrued Liability	$905,675,188	$940,578,796	$1,051,740,184	$1,048,521,608
• Actuarial Value of Assets	$247,244,612	$249,297,723	$250,199,500	$250,325,025
• Unfunded Actuarial Accrued Liability (UAAL)	$658,430,576	$691,281,073	$801,540,684	$798,196,583

Total – July 1, 2019 Valuation Results

Description	(A) With No Assumption Changes	(B) With Recommended Demographic Assumptions	(C) With Recommended Demographic and Economic Assumptions including 3.5% wage inflation assumption	(D) With Recommended Demographic and Economic Assumptions including 3.0% wage inflation assumption
• Total Normal Cost	$21,259,492	$20,773,110	$25,628,836	$24,016,171
• Expected Employee Contributions	-$12,751,896	-$12,751,896	-$12,751,896	-$12,692,801
• Employer Normal Cost	$8,507,596	$8,021,214	$12,876,940	$11,323,370
• Actuarial Accrued Liability	$1,393,684,216	$1,435,474,954	$1,599,339,917	$1,593,646,026
• Actuarial Value of Assets	$380,468,536	$380,468,536	$380,468,536	$380,468,536
• Unfunded Actuarial Accrued Liability (UAAL)	$1,013,215,680	$1,055,006,418	$1,218,871,381	$1,213,177,490

The recommended assumption changes will have a significant impact on the determination of the Actuarially Determined Contribution (ADC). Based on the timing of this experience study and the timing of the budgeting process, the effect of these changes will first be reflected in either the fiscal 2022 or fiscal 2023 ADC. If the assumption changes are fully recognized as of fiscal 2022 or 2023, there will be a large increase in the Actuarially Determined Contribution (ADC) in the fiscal year in which the changes are recognized and smaller annual increases thereafter. Phasing-in the effect of assumption changes over time will result in a smaller ADC in the fiscal year in which the changes are first recognized and larger year-to-year increases thereafter as each year's ADC will include the impact of both payroll increases and the gradual recognition of the assumption changes.

II. Economic Assumptions

The economic assumptions have a significant impact on the development of plan liabilities. Changes to these assumptions can substantially alter the results determined by the actuary. The goal of an experience study is to produce a consistent set of economic assumptions that appropriately reflect expected future economic trends.

The primary economic assumptions that affect the System's funding are:

- Inflation;
- Investment Rate of Return (or Discount Rate);
- Salary Scale; and
- Payroll Growth Rate.

The Actuarial Standards Board (ASB) has adopted Actuarial Standard of Practice No. 27 (*Selection of Economic Assumptions for Measuring Pension Obligations*) to provide actuaries guidance in developing economic assumptions.

The inflation component is included in all economic assumptions, and therefore is key to developing a consistent set of actuarial assumptions. Under the "building block" approach, we consider the investment rate of return assumption as the combination of an inflation component and a real rate of return component. The components of the salary increase assumption are wage inflation and longevity increases.

Inflation

In developing the recommendation for the assumed inflation component, Actuarial Standards of Practice suggest the actuary review appropriate inflation data. This data may include consumer price indexes, the implicit price deflator, forecasts of inflation, and yields on government securities of various maturities. For this study, we reviewed a commonly referenced historical measure of inflation, the Consumer Price Index for all urban consumers (CPI-U).The CPI-U has shown inflation experience is below the current assumption of 3.5%.

In addition to historic inflation, other metrics to consider are current market expectations and estimates from professional forecasters and economists. The following table shows the yields on US Treasury bonds with and without inflation indexing. The difference between the two, which ranges from 1.70% to 1.78%, represents the rate of inflation that investors expect over the next 10 to 30 years.

Yields on US Treasury Bonds as of June 30, 2019

	10-Year	20-Year	30-Year
Non-inflation indexed	2.07%	2.36%	2.57%
Inflation indexed	0.37%	0.59%	0.79%
Difference	1.70%	1.77%	1.78%

As of January 2020, the Congressional Budget Office's forward-looking price inflation forecast is 2.5% over a five year period and 2.4% over a ten year period.

The Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust funds assume an ultimate long-range average annual percentage inflation change of 2.6% as of April 22, 2019 and 2.4% as of April 22, 2020.

The current assumption of 3.5% exceeds all of the forecasts above. Based on a review of this data, **we recommend reducing the inflation assumption to 2.5%.**

Investment Rate of Return

The discount rate is used to determine the present value of expected future plan payments. Generally, the appropriate discount rate is the same as the investment return assumption. The current assumption is 8.00%, net of investment fees.

The System's returns on a market value basis have been less than the current assumption for five of the past nine years and higher than the current assumption for four of the most recent nine years. The average net investment return for the five-year period ending June 30, 2019 5.49% on a market value basis, as shown below.

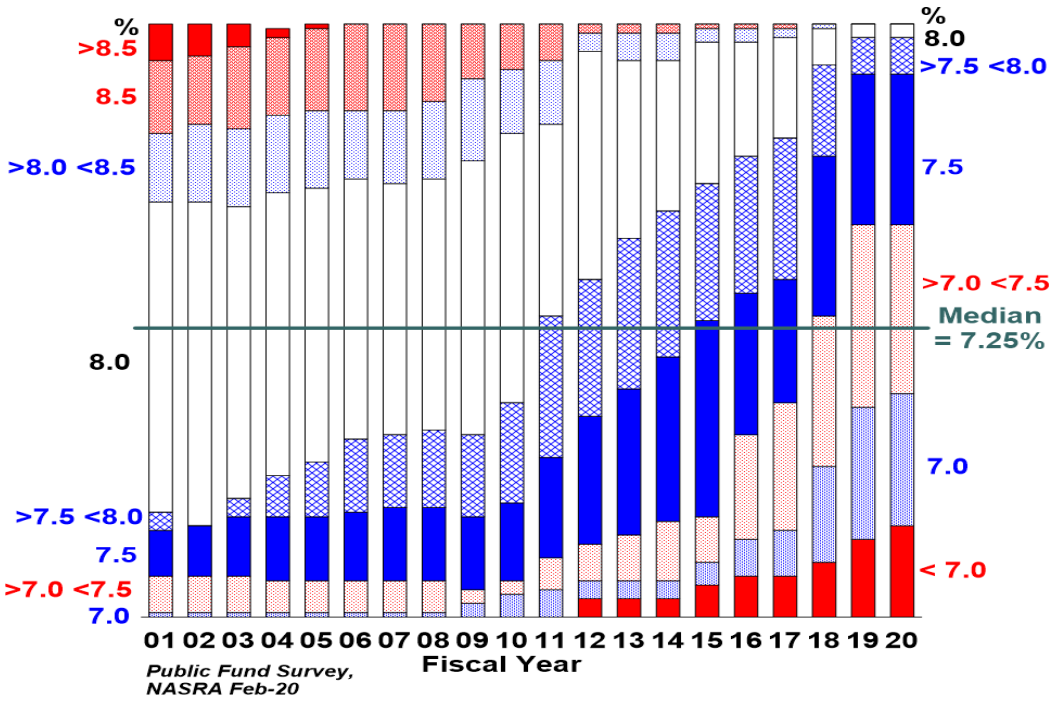
Year Ended June 30	Market Value Investment Return
2011	21.33%
2012	1.49
2013	11.35
2014	14.04
2015	3.59
2016	2.27
2017	10.70
2018	6.96
2019	4.24
5-Year Average	5.49
9-Year Average	6.69

Note: Investment returns are net of investment expenses.

The investment rate of return assumption is developed using the "building block" approach. Under this approach, the investment rate of return assumption is made up of two components; the inflation component and the real investment rate of return component. The reasonable range of the inflation component determined above is combined with the reasonable range of the real rate of return component. This reasonable range is then evaluated and refined. The final recommendation is a specific point in this best-estimate range.

In developing the reasonable range for the real rate of return, we consider the historical returns of the System's major asset classes as well as the expected forward-looking returns for the

System based on the current asset allocation. For your information, we have included the following chart from the NASRA study published in February 2020 that showed a distribution of investment return assumptions for public plans over a 20-year period. Only 3 plans of the 130 included in the survey had an assumption of 8.00%. The average assumption is 7.22% and the median assumption is 7.25%.



The table below shows the capital market assumptions developed by Segal Marco Advisors as of December 31, 2018 and 2019, and the System's target asset allocation as of June 30, 2019.

	Domestic Equity	International Developed Markets Equity	Core Fixed Income	Hedge Fund, GTAA, Risk Parity, etc.
Nominal Expected Return as of December 31, 2018				
5 Year Time Horizon	8.00%	8.55%	3.55%	5.41%
10 Year Time Horizon	8.23%	8.78%	3.78%	5.64%
15 Year Time Horizon	8.46%	9.01%	4.01%	5.87%
20 Year Time Horizon	8.66%	9.21%	4.21%	6.08%
Nominal Expected Return as of December 31, 2019				
5 Year Time Horizon	7.87%	8.52%	2.62%	4.78%
10 Year Time Horizon	8.19%	8.84%	2.94%	5.10%
15 Year Time Horizon	8.47%	9.12%	3.22%	5.39%
20 Year Time Horizon	8.73%	9.38%	3.48%	5.64%
Target Allocation	**45.25%**	**12.75%**	**26.00%**	**16.00%**

Based on the System's asset allocation as of June 30, 2019, we have estimated the 20-year expected returns for the System using both the December 31, 2018 and December 31, 2019 capital market assumptions to be 6.61% and 6.40%, respectively.

We recommend reducing the investment return assumption from 8.00% to 7.00%, beginning with the July 1, 2019 actuarial valuation. If capital market assumptions continue to decline, the assumption may need to be reduced further.

Salary Scale

The salary scale is used to determine participants' ultimate benefits in the plan. Generally, a participant's salary will grow over time with wage inflation and longevity increases. The actuary should review available compensation data when selecting this assumption, including: current compensation practices and any anticipated changes (including collective bargaining agreements); historical compensation increases, practices of the plan sponsor and other public plan sponsors in the same geographic area; and historical national wage and productivity increases.

The current salary increase assumption is 3.50% per year plus an additional increase to reflect longevity that varies by Class, years of service and date of hire. The actual salary experience has been consistent with the current assumption. However, given the low level of anticipated inflation, a 3.00% wage inflation component to the salary increase assumption is also reasonable. **We recommend a salary scale increase assumption comprised of a wage inflation assumption in the 3.00% to 3.50% range, plus longevity adjustments. We do not recommend any changes to the longevity adjustments.**

The tables below compare the actual experience to the current assumption for Class A, Class B Fire and Class B Police participants, over the three-year period in the study.

The Actual Salary is the total reported salaries for July 1, 2015 through June 30, 2018 for the active participants in each age band. The Expected Salary is the total reported salaries for each year in the three-year period for the active participants in each age band, increased by the assumed salary and longevity assumptions. When the Actual to Expected Ratio is greater than 1.0, the actual salary increases were greater than the expected increases based on the prior year assumptions. Similarly, when the Actual to Expected Ratio is less than 1.0, the actual salary increases were less than expected.

Salary Assumption Analysis

Class A	Age	Number of Employees	Actual Salary	Expected Salary	Actual/ Expected
	Under 20	3	$43,321	$47,264	0.92
	20 - 29	379	14,145,119	13,621,080	1.04
	30 - 39	943	39,877,173	39,094,442	1.02
	40 - 49	1715	76,880,276	76,095,424	1.01
	50 - 59	1896	83,032,201	82,636,022	1.00
	60 and over	880	37,144,566	37,348,089	0.99
	Total	5,816	$251,122,656	$248,842,321	1.01

Salary Assumption Analysis

Class B – Fire	Age	Number of Employees	Actual Salary	Expected Salary	Actual/ Expected
	Under 20	1	$34,159	$21,008	1.63
	20 - 29	186	8,861,953	8,001,987	1.11
	30 - 39	292	17,849,289	17,494,929	1.02
	40 - 49	321	23,208,039	22,970,390	1.01
	50 - 59	257	20,078,695	19,792,932	1.01
	60 and over	1	70,773	76,416	0.93
	Total	1,058	$70,102,908	$68,357,662	1.03

Salary Assumption Analysis

Class B – Police	Age	Number of Employees	Actual Salary	Expected Salary	Actual/ Expected
	Under 20	0	$0	$0	1.00
	20 - 29	129	7,229,449	7,097,466	1.02
	30 - 39	300	19,886,986	19,930,766	1.00
	40 - 49	453	32,124,680	32,206,687	1.00
	50 - 59	258	19,346,919	19,444,773	0.99
	60 and over	22	1,765,670	1,789,960	0.99
	Total	1,162	$80,353,705	$80,469,652	1.00

Payroll Growth

Payroll growth is used for determining the amortization amount of the unfunded actuarial accrued liability (UAAL), which is calculated as a level percentage of payroll. Currently the payroll growth assumption is 3.50% per year. The number of active employees is assumed to remain constant and payroll is assumed to increase at the inflation rate of 3.50%. Total payroll has grown on average 2.1% per year over the three-year study period, which is less than the 3.5% payroll growth assumption due to the decrease in the number of active employees. **We recommend setting the payroll growth assumption equal to wage inflation component of the salary increase assumption (excluding the longevity component).**

III. Demographic Assumptions

The demographic assumptions used to value the System reflect the expected occurrences of various events among participants of the System. The assumptions should reflect specific characteristics of the plan and produce reasonable results. A reasonable assumption is one that is expected to model the contingency being measured and not expected to produce significant gains or losses over time. The types of demographic assumptions used to measure pension obligations include, but are not limited to the following:

- Mortality;
- Termination of Employment (Withdrawal);
- Retirement; and
- Disability

The Actuarial Standards Board (ASB) has adopted Actuarial Standard of Practice No. 35 (*Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations*) to provide actuaries guidance in developing demographic assumptions. The standard recommends the actuary follow a general process for selecting demographic assumptions.

The first step of the general procedure is to identify the types of assumptions to use. The actuary should consider relevant plan provisions that will affect timing and value of any potential benefit payments, all contingencies that give rise to benefits or loss of benefits and the characteristics of the covered group. The next step is to identify the relevant assumption universe. The assumption universe may include prior experience studies or general studies of trends relevant to the type of demographic assumption in addition to plan experience to the extent that it is credible. The third step is to consider the assumption format. The format may include different tables for different segments of the covered population (*i.e.,* different mortality tables for males and females, or different turnover before and after a select period). The final step is to select the specific assumption and evaluate the reasonableness of each assumption.

The specific experience of the plan should be incorporated but not given undue weight to past experience if some of that experience is attributable to a phenomenon that is unlikely to continue. For example, if recent rates of termination were due to a one-time reduction in workforce it may be unreasonable to assume that such rates will continue.

Mortality Rates

One of the most basic actuarial assumptions is the probability of death. The mortality assumption takes the form of a mortality table which contains for each age in the table a probability of a person dying between that age and the next. Retirement plans often use multiple mortality tables, for employees, for nondisabled pensioners and beneficiaries, and for disabled lives. There are different sets of mortality tables for Class A and Class B members.

ASOP No. 35 also provides guidance on the actuary's responsibility to reflect and to disclose the allowance for future mortality improvement. Ways to reflect anticipated future mortality improvement include:

- Generational mortality. Each year of birth has its own mortality table that reflects the forecasted improvements. Thus, younger participants have more future mortality improvement built in than older participants do.
- Projection to a future year. The same mortality table is used for everyone, but that table is intended to be reflective of mortality at a future date, not as of today.
- Mortality of a longer-lived group. The table in use, without projection, forecasts fewer deaths than the current experience level, thus implicitly allowing for future mortality improvement.

Healthy Mortality

The mortality experience of active members is important for several reasons. First, in combination with withdrawal and disability rates, the pre-retirement mortality table enables the actuary to estimate the number of individuals who will eventually be eligible for a retirement benefit, and thereby estimate the liability for those surviving individuals. In addition, the death of a member before retirement may result in a benefit payable to a beneficiary, and the liability for these benefits must be taken into account in the valuation.

The mortality experience among retirees and beneficiaries determines the durations over which retirement benefits are paid. Lower mortality rates mean longer benefit payment periods and, therefore, higher benefit costs. The current assumption for healthy lives is based on mortality rates from the sex-distinct RP-2006 Employee and Healthy Annuitant Mortality Tables with generational projection using Scale BB2D for Class A members and the sex-distinct RP-2006 Employee and Healthy Blue Collar Annuitant Mortality Tables with generational projection using Scale BB2D set forward 1 year post-retirement for Class B members.

In 2019, the Society of Actuaries published a series of mortality tables derived from public plan experience. The Pub-2010 Public Retirement Plans Mortality Tables include separate tables for teachers, public safety, and general employees. In addition to tables by gender and status (active employees, retirees, disabled retirees and contingent survivors) there are tables by benefit amount.

The experience analysis for the study period reveals that the actual rates of mortality for all active employees and healthy Class B pensioners were less than expected, and the actual rates of mortality for healthy Class A pensioners were greater than expected. Overall, there were fewer deaths than expected. However, the number of deaths was too small to be fully credible. **We recommend adopting the recently released public sector mortality tables as specified below, and updating the generational projection scale**.

The recommended Healthy Mortality tables are:

- Pre-Retirement Class A - Pub-2010 General Employee Amount-Weighted Mortality Tables projected generationally using Scale MP-2019
- Pre-Retirement Class B - Pub-2010 Safety Employee Amount-Weighted Mortality Tables projected generationally using Scale MP-2019
- Post-Retirement Class A Retiree - Pub-2010 General Healthy Retiree Amount-Weighted Mortality Tables projected generationally using Scale MP-2019
- Post-Retirement Class B Retiree - Pub-2010 Safety Healthy Retiree Amount-Weighted Mortality Tables projected generationally using Scale MP-2019
- Post-Retirement Class A Beneficiary - Pub-2010 General Contingent Survivor Amount-Weighted Mortality Tables projected generationally using Scale MP-2019
- Post-Retirement Class B Beneficiary - Pub-2010 Safety Contingent Survivor Amount-Weighted Mortality Tables projected generationally using Scale MP-2019

The tables below provide a summary of healthy employee and retiree mortality experience by Class for the study period. When the Actual to Expected Ratio is greater than 1.0, the actual number of deaths was greater than the expected based on the prior year assumptions. Similarly, when the Actual to Expected Ratio is less than 1.0, the actual number of deaths was less than expected.

Studies have shown that pensioner mortality is consistently lower for participants with higher benefit. The mortality tables selected are amount-weighted and will typically result in slightly higher actual deaths than projected using the amount-weighted tables.

Pre-Retirement Mortality Analysis

Class A	Age	Exposed Number of Employees	Expected Number of Deaths	Actual Number of Deaths[1]	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	399	0.13	0	0.00033	0.00000	0.00
	30 - 34	483	0.16	0	0.00033	0.00000	0.00
	35 - 39	535	0.23	0	0.00043	0.00000	0.00
	40 - 44	738	0.46	0	0.00062	0.00000	0.00
	45 - 49	1,047	1.05	0	0.00100	0.00000	0.00
	50 - 54	1,141	1.87	0	0.00164	0.00000	0.00
	55 - 59	936	2.27	0	0.00243	0.00000	0.00
	60 and over	1,109	6.64	3	0.00599	0.00271	0.45
	Total	6,388	12.81	3			0.23

Pre-Retirement Mortality Analysis

Class B Fire	Age	Exposed Number of Employees	Expected Number of Deaths	Actual Number of Deaths[1]	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	187	0.12	0	0.00064	0.00000	0.00
	30 - 34	176	0.11	0	0.00060	0.00000	0.00
	35 - 39	128	0.09	0	0.00070	0.00000	0.00
	40 - 44	120	0.13	0	0.00104	0.00000	0.00
	45 - 49	215	0.36	1	0.00166	0.00465	2.81
	50 - 54	218	0.61	0	0.00278	0.00000	0.00
	55 - 59	132	0.54	0	0.00406	0.00000	0.00
	60 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	1,176	1.94	1			0.52

[1] Complete pre-retirement death information was not received with the valuation data. We will work with the System to capture this information in the future.

Pre-Retirement Mortality Analysis

Class B Police	Age	Exposed Number of Employees	Expected Number of Deaths	Actual Number of Deaths[1]	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	122	0.07	0	0.00057	0.00000	0.00
	30 - 34	114	0.07	0	0.00061	0.00000	0.00
	35 - 39	180	0.13	0	0.00072	0.00000	0.00
	40 - 44	166	0.16	0	0.00096	0.00000	0.00
	45 - 49	295	0.48	0	0.00163	0.00000	0.00
	50 - 54	202	0.53	1	0.00262	0.00495	1.89
	55 - 59	107	0.45	0	0.00421	0.00000	0.00
	60 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	1,186	1.89	1			0.53

Healthy Retiree Mortality Analysis

Class A	Age	Exposed Number of Retirees	Expected Number of Deaths	Actual Number of Deaths	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	6	0.02	0	0.00333	0.00000	0.00
	50 - 54	48	0.21	0	0.00438	0.00000	0.00
	55 - 59	333	1.94	3	0.00583	0.00901	1.55
	60 - 64	738	6.17	9	0.00836	0.01220	1.46
	65 - 69	830	10.68	15	0.01287	0.01807	1.40
	70 - 74	735	14.48	19	0.01970	0.02585	1.31
	75 - 79	638	20.73	23	0.03249	0.03605	1.11
	80 - 84	502	29.26	35	0.05829	0.06972	1.20
	85 - 89	381	38.96	29	0.10226	0.07612	0.74
	90 - 94	182	30.31	30	0.16654	0.16484	0.99
	95 and over	56	14.27	18	0.25482	0.32143	1.26
	Total	4,449	167.03	181			1.08

[1] Complete pre-retirement death information was not received with the valuation data. We will work with the System to capture this information in the future.

Healthy Retiree Mortality Analysis

Class B Fire	Age	Exposed Number of Retirees	Expected Number of Deaths	Actual Number of Deaths	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	29	0.12	0	0.00414	0.00000	0.00
	50 - 54	143	0.74	0	0.00517	0.00000	0.00
	55 - 59	193	1.42	0	0.00736	0.00000	0.00
	60 - 64	183	1.86	2	0.01016	0.01093	1.08
	65 - 69	148	2.55	1	0.01723	0.00676	0.39
	70 - 74	95	2.42	0	0.02547	0.00000	0.00
	75 - 79	48	2.08	2	0.04333	0.04167	0.96
	80 - 84	28	2.08	0	0.07429	0.00000	0.00
	85 - 89	24	3.05	0	0.12708	0.00000	0.00
	90 - 94	17	3.13	4	0.18412	0.23529	1.28
	95 and over	7	1.79	1	0.25571	0.14286	0.56
	Total	915	21.24	10			0.47

Healthy Retiree Mortality Analysis

Class B Police	Age	Exposed Number of Retirees	Expected Number of Deaths	Actual Number of Deaths	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	48	0.19	0	0.00396	0.00000	0.00
	50 - 54	130	0.66	0	0.00508	0.00000	0.00
	55 - 59	151	1.07	0	0.00709	0.00000	0.00
	60 - 64	195	2.10	1	0.01077	0.00513	0.48
	65 - 69	180	3.01	5	0.01672	0.02778	1.66
	70 - 74	123	3.22	0	0.02618	0.00000	0.00
	75 - 79	70	3.20	6	0.04571	0.08571	1.88
	80 - 84	89	6.57	2	0.07382	0.02247	0.30
	85 - 89	65	7.62	4	0.11723	0.06154	0.52
	90 - 94	21	4.02	5	0.19143	0.23810	1.24
	95 and over	3	0.79	0	0.26333	0.00000	0.00
	Total	1,075	32.45	23			0.71

Disabled Annuitant Mortality

Mortality experience among disabled annuitants is studied separately from other retirees because of characteristically higher levels of mortality exhibited by disabled retirees. The current

assumption for disabled lives is based on mortality rates from the sex- RP 2006 Blue Collar Healthy Annuitant Mortality Table set forward three years, and projected generationally with Scale BB2D.

Among disabled lives in pay status, there were more deaths than expected for Class A retirees, fewer deaths than expected for Class B Fire retirees, and approximately the expected number of deaths for Class B Police retirees over the three-year study period.

As with the Healthy Mortality assumption, **we recommend adopting one of the recently released public sector mortality tables as specified below, and updating the generational projection scale**.

Our recommended mortality assumption for disabled lives is:

- Disabled Class A - Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Tables projected generationally using Scale MP-2019
- Disabled Class B - Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Tables projected generationally using Scale MP-2019

The following tables summarize the disabled annuitant mortality experience.

Disabled Mortality Analysis

Class A	Age	Exposed Number of Disabled Retirees	Expected Number of Deaths	Actual Number of Deaths	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	8	0.03	1	0.00375	0.12500	33.33
	50 - 54	21	0.11	1	0.00524	0.04762	9.09
	55 - 59	27	0.20	1	0.00741	0.03704	5.00
	60 - 64	34	0.44	3	0.01294	0.08824	6.82
	65 - 69	36	0.69	2	0.01917	0.05556	2.90
	70 - 74	42	1.28	1	0.03048	0.02381	0.78
	75 - 79	50	2.33	2	0.04660	0.04000	0.86
	80 - 84	22	1.62	0	0.07364	0.00000	0.00
	85 - 89	13	1.72	3	0.13231	0.23077	1.74
	90 - 94	2	0.50	0	0.25000	0.00000	0.00
	95 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	255	8.92	14			1.57

Disabled Mortality Analysis

Class B Fire	Age	Exposed Number of Disabled Retirees	Expected Number of Deaths	Actual Number of Deaths	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	39	0.15	0	0.00385	0.00000	0.00
	50 - 54	60	0.36	0	0.00600	0.00000	0.00
	55 - 59	96	0.81	0	0.00844	0.00000	0.00
	60 - 64	70	0.90	0	0.01286	0.00000	0.00
	65 - 69	146	3.06	2	0.02096	0.01370	0.65
	70 - 74	151	4.87	6	0.03225	0.03974	1.23
	75 - 79	98	5.13	3	0.05235	0.03061	0.58
	80 - 84	52	4.67	4	0.08981	0.07692	0.86
	85 - 89	29	4.20	1	0.14483	0.03448	0.24
	90 - 94	5	1.03	1	0.20600	0.20000	0.97
	95 and over	3	1.19	0	0.39667	0.00000	0.00
	Total	749	26.37	17			0.64

Disabled Mortality Analysis

Class B Police	Age	Exposed Number of Disabled Retirees	Expected Number of Deaths	Actual Number of Deaths	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	48	0.19	0	0.00396	0.00000	0.00
	50 - 54	43	0.24	0	0.00558	0.00000	0.00
	55 - 59	66	0.53	0	0.00803	0.00000	0.00
	60 - 64	90	1.08	2	0.01200	0.02222	1.85
	65 - 69	77	1.59	2	0.02065	0.02597	1.26
	70 - 74	51	1.63	1	0.03196	0.01961	0.61
	75 - 79	37	1.91	1	0.05162	0.02703	0.52
	80 - 84	22	1.99	3	0.09045	0.13636	1.51
	85 - 89	12	1.73	0	0.14417	0.00000	0.00
	90 - 94	5	1.01	2	0.20200	0.40000	1.98
	95 and over	2	0.49	1	0.24500	0.50000	2.04
	Total	453	12.39	12			0.97

Turnover Rates

The assumed turnover rates used in annual actuarial valuations project the percentage of employees at each age or service duration who will terminate employment prior to retirement. These rates take into account possible terminations from all causes other than retirement, death, or disability. They include both voluntary and involuntary withdrawals from service.

Terminations before retirement give rise to some benefit rights, but may also involve the forfeiture of a portion of previously accrued benefits. Forfeitures resulting from turnover are anticipated in advance and help finance benefits which become payable to other employees.

Current assumptions of withdrawal are unisex and based on age and Class. During the three-year study period, actual withdrawals were higher than expected. In addition, experience for the plan years ending June 30, 2019 and 2020 shows higher than expected withdrawal rates. **We recommend increasing the turnover rates for Class A employees.**

Due to changes in staffing for Class B employees, particularly Fire employees, the turnover experience in recent years was difficult to evaluate in the context of setting long-term assumptions. **We recommend no change in the turnover assumption for Class B employees at this time.** We will continue to monitor Class B experience and may revise with the next experience study.

The following tables summarize the turnover experience. When the Actual to Expected Ratio is greater than 1.0, the actual number of withdrawals was greater than the expected based on the prior year assumptions. Similarly, when the Actual to Expected Ratio is less than 1.0, the actual number of withdrawals was less than expected.

Turnover Assumption Analysis

Class A	Age	Exposed Number of Employees	Expected Number of Withdrawals	Actual Number of Withdrawals	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	399	42.99	61	0.10774	0.15288	1.42
	30 - 34	483	38.52	53	0.07975	0.10973	1.38
	35 - 39	535	31.28	42	0.05847	0.07850	1.34
	40 - 44	736	32.85	54	0.04463	0.07337	1.64
	45 - 49	978	31.67	55	0.03238	0.05624	1.74
	50 - 54	997	19.79	51	0.01985	0.05115	2.58
	55 - 59	344	2.59	29	0.00753	0.08430	11.20
	60 - 64	147	0.00	20	0.00000	0.13605	N/A
	65 and over	73	0.00	18	0.00000	0.24658	N/A
	Total	4,692	199.69	383			1.92

Turnover Assumption Analysis

Class B Fire	Age	Exposed Number of Employees	Expected Number of Withdrawals	Actual Number of Withdrawals	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	187	3.42	11	0.01829	0.05882	3.22
	30 - 34	176	2.11	7	0.01199	0.03977	3.32
	35 - 39	128	0.96	2	0.00750	0.01563	2.08
	40 - 44	111	0.52	2	0.00468	0.01802	3.85
	45 - 49	86	0.25	3	0.00291	0.03488	12.00
	50 - 54	32	0.03	2	0.00094	0.06250	66.67
	55 - 59	0	0.00	0	0.00000	0.00000	N/A
	60 - 64	0	0.00	0	0.00000	0.00000	N/A
	65 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	720	7.29	27			3.70

Turnover Assumption Analysis

Class B Police	Age	Exposed Number of Employees	Expected Number of Withdrawals	Actual Number of Withdrawals	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	122	2.14	2	0.01754	0.01639	0.93
	30 - 34	114	1.35	1	0.01184	0.00877	0.74
	35 - 39	180	1.29	1	0.00717	0.00556	0.78
	40 - 44	151	0.72	2	0.00477	0.01325	2.78
	45 - 49	135	0.38	2	0.00281	0.01481	5.26
	50 - 54	36	0.04	1	0.00111	0.02778	25.00
	55 - 59	0	0.00	0	0.00000	0.00000	N/A
	60 - 64	0	0.00	0	0.00000	0.00000	N/A
	65 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	738	5.92	9			1.52

Retirement Rates

For Class A members hired prior to July 1, 2009, the retirement eligibility is either age 55 or 60 or the attainment of either 25 or 30 years of service. For Class A members hired on or after July 1, 2009, ten years of service are required in addition to attaining age 62. For Class B members, the retirement eligibility is age 55 or the attainment of either 20, 23 or 25 years of service, depending on date of hire.

The current assumptions are unisex and are based on age and Class, with immediate retirement at age 75 for Class A members and 60 for Class B members. For Class A members, there are different retirement rates for employees with more than ten years of service.

An accurate prediction of the ages at which members will retire is essential in order to obtain a realistic assessment of the System's liabilities for retirement benefits. Because retirement accounts for most of the System's liability, it is important to review this assumption thoroughly in order to predict the relative value of retirement benefits versus ancillary (*i.e.,* death and disability) benefits, and to properly measure the overall magnitude of retirement liabilities.

The total number of actual service requirements during the period in the study was less than expected overall for Class A members and Class B Police. However, the experience for Class B Fire was more than expected**. We recommend reducing the retirement rates for Class A members.**

Due to changes in staffing for Class B employees, particularly Fire employees, the retirement experience in recent years was difficult to evaluate in the context of setting long-term assumptions. **We recommend no change in the retirement assumption for Class B employees at this time.** We will continue to monitor Class B experience and may revise with the next experience study.

The following tables summarize the retirement experience. When the Actual to Expected Ratio is greater than 1.0, the actual number of retirements was greater than the expected based on the prior year assumptions. Similarly, when the Actual to Expected Ratio is less than 1.0, the actual number of retirements was less than expected.

Retirement Assumption Analysis

Class A - Less Than 10 Years Of Service	Age	Exposed Number of Employees	Expected Number of Retirements	Actual Number of Retirements	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	0	0.00	0	0.00000	0.00000	N/A
	50	0	0.00	0	0.00000	0.00000	N/A
	51	0	0.00	0	0.00000	0.00000	N/A
	52	1	0.06	0	0.05500	0.00000	0.00
	5	1	0.06	0	0.06000	0.00000	0.00
	54	2	0.13	0	0.06500	0.00000	0.00
	55	1	0.07	0	0.07000	0.00000	0.00
	56	0	0.00	0	0.00000	0.00000	N/A
	57	0	0.00	0	0.00000	0.00000	N/A
	58	0	0.00	0	0.00000	0.00000	N/A
	59	0	0.00	0	0.00000	0.00000	N/A
	60	14	1.40	0	0.10000	0.00000	0.00
	61	17	1.87	0	0.11000	0.00000	0.00
	62	9	1.08	0	0.12000	0.00000	0.00
	63	14	1.82	0	0.13000	0.00000	0.00
	64	13	1.86	0	0.14269	0.00000	0.00
	65	8	1.20	0	0.15000	0.00000	0.00
	66	8	1.20	0	0.15000	0.00000	0.00
	67	4	0.60	1	0.15000	0.25000	1.67
	68	5	0.75	0	0.15000	0.00000	0.00
	69	1	0.15	0	0.15000	0.00000	0.00
	70	1	0.15	0	0.15000	0.00000	0.00
	71	1	0.15	0	0.15000	0.00000	0.00
	72	0	0.00	0	0.00000	0.00000	N/A
	73	1	0.15	0	0.15000	0.00000	0.00
	74	1	0.15	0	0.15000	0.00000	0.00
	75 and over	3	3.00	0	1.00000	0.00000	0.00
	Total	105	15.84	1			0.06

Retirement Assumption Analysis

Class A 10 Years Or More Of Service	Age	Exposed Number of Employees	Expected Number of Retirements	Actual Number of Retirements	Expected Rate	Actual Rate	Actual/ Expected
	Under 50	72	5.72	7	0.07944	0.09722	1.22
	50	23	2.04	3	0.08848	0.13043	1.47
	51	31	3.05	1	0.09839	0.03226	0.33
	52	32	3.26	3	0.10188	0.09375	0.92
	53	28	2.98	3	0.10643	0.10714	1.01
	54	27	2.81	7	0.10389	0.25926	2.50
	55	126	14.77	11	0.11722	0.08730	0.74
	56	122	14.44	7	0.11836	0.05738	0.48
	57	117	13.49	12	0.11530	0.10256	0.89
	58	128	14.86	10	0.11609	0.07813	0.67
	59	114	13.53	4	0.11868	0.03509	0.30
	60	123	15.23	7	0.12378	0.05691	0.46
	61	107	14.32	8	0.13383	0.07477	0.56
	62	95	13.45	16	0.14158	0.16842	1.19
	63	85	13.39	8	0.15753	0.09412	0.60
	64	73	12.43	13	0.17021	0.17808	1.05
	65	74	14.40	14	0.19459	0.18919	0.97
	66	52	10.10	9	0.19423	0.17308	0.89
	67	38	7.40	5	0.19474	0.13158	0.68
	68	35	6.75	5	0.19286	0.14286	0.74
	69	23	4.50	4	0.19565	0.17391	0.89
	70	18	3.55	3	0.19722	0.16667	0.85
	71	13	2.50	1	0.19231	0.07692	0.40
	72	14	2.75	1	0.19643	0.07143	0.36
	73	13	2.60	1	0.20000	0.07692	0.38
	74	7	1.35	1	0.19286	0.14286	0.74
	75 and over	39	39.00	6	1.00000	0.15385	0.15
	Total	1,629	254.65	170			0.67

Retirement Assumption Analysis

Class B Fire	Age	Exposed Number of Employees	Expected Number of Retirements	Actual Number of Retirements	Expected Rate	Actual Rate	Actual/ Expected
	Under 45	9	0.50	3	0.05556	0.33333	6.00
	45	19	1.09	0	0.05750	0.00000	0.00
	46	27	1.62	1	0.06000	0.03704	0.62
	47	29	1.81	2	0.06250	0.06897	1.10
	48	24	1.56	3	0.06500	0.12500	1.92
	49	30	2.03	3	0.06750	0.10000	1.48
	50	32	2.24	7	0.07000	0.21875	3.13
	51	35	2.54	9	0.07250	0.25714	3.55
	52	39	2.93	8	0.07500	0.20513	2.74
	53	40	3.10	5	0.07750	0.12500	1.61
	54	42	3.36	4	0.08000	0.09524	1.19
	55	46	4.60	9	0.10000	0.19565	1.96
	56	36	4.50	5	0.12500	0.13889	1.11
	57	24	3.60	5	0.15000	0.20833	1.39
	58	16	2.80	6	0.17500	0.37500	2.14
	59	10	2.50	5	0.25000	0.50000	2.00
	60	6	6.00	5	1.00000	0.83333	0.83
	61	1	1.00	1	1.00000	1.00000	1.00
	62	0	0.00	0	0.00000	0.00000	N/A
	63	0	0.00	0	0.00000	0.00000	N/A
	64	0	0.00	0	0.00000	0.00000	N/A
	65 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	465	47.77	81			1.70

Retirement Assumption Analysis

Class B Police	Age	Exposed Number of Retirees	Expected Number of Retirements	Actual Number of Retirements	Expected Rate	Actual Rate	Actual/ Expected
	Under 45	15	0.83	3	0.05533	0.20000	3.61
	45	20	1.15	1	0.05750	0.05000	0.87
	46	25	1.50	1	0.06000	0.04000	0.67
	47	35	2.19	0	0.06250	0.00000	0.00
	48	41	2.67	2	0.06500	0.04878	0.75
	49	41	2.77	1	0.06750	0.02439	0.36
	50	47	3.29	3	0.07000	0.06383	0.91
	51	33	2.39	2	0.07250	0.06061	0.84
	52	34	2.55	1	0.07500	0.02941	0.39
	53	30	2.33	5	0.07750	0.16667	2.15
	54	23	1.84	0	0.08000	0.00000	0.00
	55	26	2.60	4	0.10000	0.15385	1.54
	56	23	2.88	3	0.12500	0.13043	1.04
	57	22	3.30	2	0.15000	0.09091	0.61
	58	18	3.15	4	0.17500	0.22222	1.27
	59	18	4.50	2	0.25000	0.11111	0.44
	60	15	15.00	2	1.00000	0.13333	0.13
	61	11	11.00	1	1.00000	0.09091	0.09
	62	4	4.00	0	1.00000	0.00000	0.00
	63	5	5.00	5	1.00000	1.00000	1.00
	64	0	0.00	0	0.00000	0.00000	N/A
	65 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	486	74.92	42			0.56

Disability Rates

Disability rate tables function in the same way as mortality tables. The rate at each age indicates the probability of becoming disabled before the next age. Disability rates add liability for the value of the disability benefits, but lessen the value of retirement benefits ultimately payable. The disability liability may be greater than the retirement liability depending on the participant's age and disability and whether the disability is an ordinary or accidental disability.

Plan participants are eligible for accidental disability benefits at any age and ordinary disability benefits with 10 years of service. The assumption is based on a table of unisex rates varying by age and Class.

During the study period, the actual number of disability retirements was less than the expected number for Class A members and Class B Police and more than expected for Class B Fire. **We recommend lowering the disability rates for Class A members.**

Due to changes in staffing for Class B employees, particularly Fire employees, the disability experience in recent years was difficult to evaluate in the context of setting long-term assumptions. **We recommend no change in the disability assumption for Class B employees at this time.** We will continue to monitor Class B experience and may revise with the next experience study.

We are not recommending a change in the assumption that for Class A members, ⅔ of future disabilities will be non-job related (ordinary) and ⅓ will be job-related (accidental) and for Class B members, 10% of future disabilities will be non-job related (ordinary) and 90% will be job-related (accidental). We will continue to monitor this experience.

The following tables summarize the disability experience. When the Actual to Expected Ratio is greater than 1.0, the actual number of disabilities was greater than the expected based on the prior year assumptions. Similarly, when the Actual to Expected Ratio is less than 1.0, the actual number of disabilities was less than expected.

Disability Assumption Analysis

Class A	Age	Exposed Number of Employees	Expected Number of Disabilities	Actual Number of Disabilities	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	399	0.12	0	0.00030	0.00000	0.00
	30 - 34	483	0.27	0	0.00056	0.00000	0.00
	35 - 39	535	0.46	0	0.00086	0.00000	0.00
	40 - 44	738	0.98	1	0.00133	0.00136	1.02
	45 - 49	1047	2.06	0	0.00197	0.00000	0.00
	50 - 54	1141	2.74	1	0.00240	0.00088	0.36
	55 - 59	936	2.84	2	0.00303	0.00214	0.70
	60 - 64	686	2.79	1	0.00407	0.00146	0.36
	65 and over	423	1.89	1	0.00447	0.00236	0.53
	Total	6,388	14.15	6			0.42

Disability Assumption Analysis

Class B Fire	Age	Exposed Number of Employees	Expected Number of Disabilities	Actual Number of Disabilities	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	187	0.25	0	0.00134	0.00000	0.00
	30 - 34	176	0.37	0	0.00210	0.00000	0.00
	35 - 39	128	0.37	1	0.00289	0.00781	2.70
	40 - 44	120	0.58	2	0.00483	0.01667	3.45
	45 - 49	215	1.81	2	0.00842	0.00930	1.10
	50 - 54	218	2.95	5	0.01353	0.02294	1.69
	55 - 59	132	2.36	6	0.01788	0.04545	2.54
	60 - 64	0	0.00	0	0.00000	0.00000	N/A
	65 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	1,176	8.69	16			1.84

Disability Assumption Analysis

Class B Police	Age	Exposed Number of Employees	Expected Number of Disabilities	Actual Number of Disabilities	Expected Rate	Actual Rate	Actual/ Expected
	Under 30	122	0.17	0	0.00139	0.00000	0.00
	30 - 34	114	0.24	0	0.00211	0.00000	0.00
	35 - 39	180	0.54	1	0.00300	0.00556	1.85
	40 - 44	166	0.77	2	0.00464	0.01205	2.60
	45 - 49	295	2.53	0	0.00858	0.00000	0.00
	50 - 54	202	2.64	1	0.01307	0.00495	0.38
	55 - 59	107	1.98	0	0.01850	0.00000	0.00
	60 - 64	0	0.00	0	0.00000	0.00000	N/A
	65 and over	0	0.00	0	0.00000	0.00000	N/A
	Total	1,186	8.87	4			0.45

IV. Actuarial Methods

Asset Valuation Method

Most ongoing plans use some form of asset smoothing with a corridor around the market value of assets. The most common smoothing period is five years and the most common corridor is 20%. The Actuarial Standards Board (ASB) has adopted Actuarial Standards of Practice No. 44 (*Selection and Use of Asset Valuation Methods for Pension Valuations*) to provide actuaries guidance in developing asset valuation methods. This ASOP provides guidance in helping the actuary determine a "reasonable" smoothing period and corridor. The current asset valuation method aligns with ASOP No. 44 and is designed to mitigate volatility in the recommended contribution amounts due to large market swings. **We recommend no change in the asset valuation method**.

Actuarial Cost Method

Actuarial cost methods are the means by which the present value of future benefits are allocated over the working lifetime of plan participants. The most commonly used method for public sector plans is the Entry Age Normal cost method.

Under the Entry Age Normal cost method the annual normal cost is a function of the member's plan entry age and represents the share of the cost of the expected retirement benefit that is allocated to each year. The allocation is designed to produce a normal cost that remains level as a percentage of payroll for the working career of the member. **We recommend no change in the actuarial cost method.**

Amortization of Unfunded Actuarial Accrued Liability

The Board adopted a policy to fully fund the unfunded actuarial accrued liability (UAAL) of the System by June 30, 2040 with amortization payments that remain level as a percent of payroll. As of July 1, 2019, there were 21 years remaining on this funding schedule. The 21 year amortization schedule is reasonable from an actuarial perspective. In addition, subsequent to the release of this experience study report, we will be discussing other reasonable actuarial approaches for amortizing the UAAL that may be desirable to the Board in gradually phasing in the effect of assumption changes.

Appendices

Recommended Employee Mortality Tables Class A

Class A		
Age	Male	Female
20	0.00037	0.00013
21	0.00036	0.00012
22	0.00033	0.00011
23	0.00031	0.00010
24	0.00029	0.00009
25	0.00028	0.00009
26	0.00030	0.00010
27	0.00031	0.00011
28	0.00033	0.00012
29	0.00034	0.00013
30	0.00036	0.00015
31	0.00038	0.00016
32	0.00040	0.00018
33	0.00042	0.00019
34	0.00044	0.00021
35	0.00047	0.00023
36	0.00050	0.00025
37	0.00053	0.00028
38	0.00057	0.00030
39	0.00061	0.00033
40	0.00066	0.00036
41	0.00071	0.00040
42	0.00077	0.00043
43	0.00083	0.00047
44	0.00090	0.00051
45	0.00098	0.00056
46	0.00107	0.00061
47	0.00116	0.00066
48	0.00127	0.00071
49	0.00138	0.00077
50	0.00149	0.00083

Class A		
Age	Male	Female
51	0.00162	0.00090
52	0.00175	0.00097
53	0.00189	0.00105
54	0.00203	0.00113
55	0.00219	0.00123
56	0.00236	0.00133
57	0.00255	0.00144
58	0.00275	0.00156
59	0.00296	0.00170
60	0.00319	0.00186
61	0.00344	0.00203
62	0.00371	0.00222
63	0.00401	0.00244
64	0.00433	0.00269
65	0.00468	0.00296
66	0.00506	0.00327
67	0.00548	0.00362
68	0.00594	0.00400
69	0.00646	0.00442
70	0.00703	0.00489
71	0.00767	0.00541
72	0.00837	0.00598
73	0.00915	0.00661
74	0.01001	0.00731
75	0.01096	0.00808
76	0.01200	0.00893
77	0.01315	0.00986
78	0.01440	0.01090
79	0.01578	0.01204
80	0.01730	0.01330

Recommended Employee Mortality Tables Class B

Class B		
Age	Male	Female
20	0.00041	0.00016
21	0.00041	0.00017
22	0.00040	0.00017
23	0.00039	0.00018
24	0.00038	0.00019
25	0.00037	0.00020
26	0.00038	0.00021
27	0.00039	0.00022
28	0.00040	0.00024
29	0.00041	0.00025
30	0.00041	0.00027
31	0.00042	0.00028
32	0.00043	0.00030
33	0.00044	0.00032
34	0.00045	0.00034
35	0.00047	0.00036
36	0.00049	0.00038
37	0.00050	0.00041
38	0.00053	0.00043
39	0.00056	0.00046
40	0.00059	0.00049
41	0.00062	0.00052
42	0.00067	0.00056
43	0.00071	0.00059
44	0.00076	0.00063
45	0.00082	0.00067
46	0.00088	0.00071
47	0.00095	0.00076
48	0.00102	0.00080
49	0.00111	0.00085
50	0.00120	0.00091

Class B		
Age	Male	Female
51	0.00129	0.00097
52	0.00140	0.00103
53	0.00151	0.00109
54	0.00162	0.00116
55	0.00175	0.00123
56	0.00190	0.00131
57	0.00205	0.00140
58	0.00223	0.00148
59	0.00243	0.00158
60	0.00264	0.00168
61	0.00288	0.00178
62	0.00315	0.00190
63	0.00344	0.00202
64	0.00375	0.00215
65	0.00410	0.00228
66	0.00465	0.00262
67	0.00526	0.00300
68	0.00597	0.00345
69	0.00676	0.00396
70	0.00766	0.00454
71	0.00868	0.00521
72	0.00984	0.00598
73	0.01115	0.00686
74	0.01263	0.00787
75	0.01432	0.00903
76	0.01622	0.01036
77	0.01838	0.01189
78	0.02083	0.01365
79	0.02361	0.01566
80	0.02675	0.01797

Recommended Healthy Annuitant Mortality Tables Class A

Class A		
Age	Male	Female
50	0.00298	0.00222
51	0.00321	0.00233
52	0.00346	0.00246
53	0.00372	0.00259
54	0.00401	0.00272
55	0.00431	0.00286
56	0.00463	0.00301
57	0.00497	0.00318
58	0.00533	0.00336
59	0.00573	0.00358
60	0.00615	0.00384
61	0.00661	0.00416
62	0.00713	0.00454
63	0.00770	0.00500
64	0.00836	0.00552
65	0.00913	0.00613
66	0.01003	0.00682
67	0.01108	0.00760
68	0.01229	0.00849
69	0.01368	0.00950
70	0.01526	0.01063
71	0.01703	0.01191
72	0.01904	0.01335
73	0.02129	0.01497
74	0.02384	0.01679
75	0.02671	0.01883
76	0.02995	0.02111
77	0.03361	0.02368
78	0.03775	0.02658
79	0.04243	0.02986
80	0.04774	0.03360

Class A		
Age	Male	Female
81	0.05374	0.03787
82	0.06052	0.04276
83	0.06811	0.04834
84	0.07656	0.05474
85	0.08591	0.06205
86	0.09615	0.07041
87	0.10733	0.07987
88	0.11947	0.09046
89	0.13260	0.10216
90	0.14672	0.11487
91	0.16170	0.12833
92	0.17745	0.14239
93	0.19392	0.15702
94	0.21107	0.17228
95	0.22888	0.18825
96	0.24731	0.20505
97	0.26634	0.22278
98	0.28589	0.24147
99	0.30586	0.26113
100	0.32609	0.28160
101	0.34636	0.30265
102	0.36640	0.32382
103	0.38604	0.34494
104	0.40512	0.36581
105	0.42352	0.38625
106	0.44113	0.40609
107	0.45786	0.42519
108	0.47364	0.44341
109	0.48843	0.46067
110	0.50000	0.47690

Recommended Healthy Annuitant Mortality Tables Class B

Class B		
Age	Male	Female
50	0.00192	0.00149
51	0.00211	0.00167
52	0.00231	0.00186
53	0.00253	0.00207
54	0.00278	0.00231
55	0.00306	0.00258
56	0.00337	0.00288
57	0.00372	0.00321
58	0.00412	0.00358
59	0.00457	0.00399
60	0.00508	0.00446
61	0.00566	0.00497
62	0.00631	0.00554
63	0.00704	0.00618
64	0.00787	0.00690
65	0.00881	0.00770
66	0.00987	0.00858
67	0.01107	0.00957
68	0.01242	0.01068
69	0.01395	0.01191
70	0.01568	0.01329
71	0.01764	0.01482
72	0.01984	0.01653
73	0.02232	0.01844
74	0.02512	0.02057
75	0.02826	0.02295
76	0.03180	0.02560
77	0.03578	0.02855
78	0.04027	0.03185
79	0.04533	0.03552
80	0.05103	0.03962

Class B		
Age	Male	Female
81	0.05743	0.04420
82	0.06460	0.04930
83	0.07259	0.05499
84	0.08149	0.06134
85	0.09135	0.06842
86	0.10227	0.07632
87	0.11434	0.08513
88	0.12767	0.09496
89	0.14238	0.10592
90	0.15860	0.11815
91	0.17521	0.13123
92	0.19159	0.14494
93	0.20752	0.15919
94	0.22306	0.17403
95	0.23848	0.18957
96	0.25417	0.20595
97	0.27053	0.22331
98	0.28791	0.24172
99	0.30645	0.26120
100	0.32609	0.28160
101	0.34636	0.30265
102	0.36640	0.32382
103	0.38604	0.34494
104	0.40512	0.36581
105	0.42352	0.38625
106	0.44113	0.40609
107	0.45786	0.42519
108	0.47364	0.44341
109	0.48843	0.46067
110	0.50000	0.47690

Recommended Disabled Annuitant Mortality Tables-Class A

Age	Disability Male	Disability Female
50	0.01605	0.01483
51	0.01712	0.01535
52	0.01818	0.01587
53	0.01921	0.01640
54	0.02020	0.01692
55	0.02114	0.01742
56	0.02201	0.01789
57	0.02280	0.01833
58	0.02355	0.01874
59	0.02428	0.01914
60	0.02503	0.01956
61	0.02584	0.02000
62	0.02677	0.02051
63	0.02785	0.02110
64	0.02908	0.02178
65	0.03044	0.02256
66	0.03193	0.02346
67	0.03353	0.02450
68	0.03524	0.02569
69	0.03706	0.02706
70	0.03901	0.02862
71	0.04113	0.03039
72	0.04344	0.03239
73	0.04599	0.03464
74	0.04880	0.03718
75	0.05192	0.04003
76	0.05537	0.04322
77	0.05921	0.04678
78	0.06347	0.05075
79	0.06822	0.05517
80	0.07348	0.06007
81	0.07929	0.06550
82	0.08565	0.07150
83	0.09259	0.07811
84	0.10010	0.08536
85	0.10815	0.09331

Age	Disability Male	Disability Female
86	0.11678	0.10163
87	0.12605	0.11014
88	0.13603	0.11878
89	0.14861	0.12757
90	0.16253	0.13665
91	0.17681	0.14617
92	0.19126	0.15635
93	0.20588	0.16740
94	0.22078	0.17955
95	0.23617	0.19298
96	0.25226	0.20784
97	0.26924	0.22444
98	0.28723	0.24226
99	0.30624	0.26135
100	0.32609	0.28160
101	0.34636	0.30265
102	0.36640	0.32382
103	0.38604	0.34494
104	0.40512	0.36581
105	0.42352	0.38625
106	0.44113	0.40609
107	0.45786	0.42519
108	0.47364	0.44341
109	0.48843	0.46067
110	0.50000	0.47690

Recommended Disabled Annuitant Mortality Tables-Class B

Age	Disability Male	Disability Female
50	0.00353	0.00304
51	0.00373	0.00330
52	0.00395	0.00359
53	0.00420	0.00390
54	0.00448	0.00424
55	0.00480	0.00461
56	0.00517	0.00501
57	0.00561	0.00544
58	0.00612	0.00592
59	0.00670	0.00643
60	0.00735	0.00699
61	0.00809	0.00760
62	0.00890	0.00826
63	0.00980	0.00898
64	0.01078	0.00976
65	0.01186	0.01061
66	0.01304	0.01153
67	0.01434	0.01254
68	0.01576	0.01363
69	0.01732	0.01481
70	0.01907	0.01610
71	0.02103	0.01750
72	0.02329	0.01902
73	0.02590	0.02068
74	0.02893	0.02248
75	0.03241	0.02443
76	0.03634	0.02658
77	0.04072	0.02896
78	0.04548	0.03185
79	0.05057	0.03552
80	0.05598	0.03962

Age	Disability Male	Disability Female
81	0.06179	0.04420
82	0.06813	0.04930
83	0.07516	0.05499
84	0.08308	0.06134
85	0.09213	0.06842
86	0.10227	0.07632
87	0.11434	0.08513
88	0.12767	0.09496
89	0.14238	0.10592
90	0.15860	0.11815
91	0.17521	0.13123
92	0.19159	0.14494
93	0.20752	0.15919
94	0.22306	0.17403
95	0.23848	0.18957
96	0.25417	0.20595
97	0.27053	0.22331
98	0.28791	0.24172
99	0.30645	0.26120
100	0.32609	0.28160
101	0.34636	0.30265
102	0.36640	0.32382
103	0.38604	0.34494
104	0.40512	0.36581
105	0.42352	0.38625
106	0.44113	0.40609
107	0.45786	0.42519
108	0.47364	0.44341
109	0.48843	0.46067
110	0.50000	0.47690

Recommended Contingent Survivor Mortality Tables- Class A

Contingent Survivor		
Age	Male	Female
50	0.00701	0.00320
51	0.00724	0.00342
52	0.00747	0.00366
53	0.00771	0.00391
54	0.00797	0.00417
55	0.00824	0.00446
56	0.00854	0.00476
57	0.00887	0.00508
58	0.00924	0.00543
59	0.00965	0.00581
60	0.01012	0.00622
61	0.01067	0.00667
62	0.01130	0.00717
63	0.01202	0.00772
64	0.01286	0.00833
65	0.01384	0.00899
66	0.01497	0.00973
67	0.01628	0.01053
68	0.01776	0.01143
69	0.01943	0.01242
70	0.02129	0.01353
71	0.02335	0.01478
72	0.02562	0.01619
73	0.02811	0.01777
74	0.03084	0.01953
75	0.03382	0.02151
76	0.03706	0.02371
77	0.04060	0.02619
78	0.04450	0.02898
79	0.04880	0.03214
80	0.05360	0.03573

Contingent Survivor		
Age	Male	Female
81	0.05897	0.03985
82	0.06498	0.04455
83	0.07169	0.04994
84	0.07915	0.05611
85	0.08743	0.06316
86	0.09658	0.07122
87	0.10665	0.08030
88	0.11768	0.09041
89	0.12978	0.10146
90	0.14418	0.11329
91	0.15947	0.12596
92	0.17555	0.13952
93	0.19236	0.15401
94	0.20986	0.16946
95	0.22800	0.18590
96	0.24674	0.20332
97	0.26601	0.22169
98	0.28574	0.24094
99	0.30581	0.26097
100	0.32609	0.28160
101	0.34636	0.30265
102	0.36640	0.32382
103	0.38604	0.34494
104	0.40512	0.36581
105	0.42352	0.38625
106	0.44113	0.40609
107	0.45786	0.42519
108	0.47364	0.44341
109	0.48843	0.46067
110	0.50000	0.47690

Recommended Contingent Survivor Mortality Tables- Class B

Contingent Survivor		
Age	Male	Female
50	0.00701	0.00320
51	0.00724	0.00342
52	0.00747	0.00366
53	0.00771	0.00391
54	0.00797	0.00417
55	0.00824	0.00446
56	0.00854	0.00476
57	0.00887	0.00508
58	0.00924	0.00543
59	0.00965	0.00581
60	0.01012	0.00622
61	0.01067	0.00667
62	0.01130	0.00717
63	0.01202	0.00772
64	0.01286	0.00833
65	0.01384	0.00899
66	0.01497	0.00973
67	0.01628	0.01053
68	0.01776	0.01143
69	0.01943	0.01242
70	0.02129	0.01353
71	0.02335	0.01478
72	0.02562	0.01619
73	0.02811	0.01777
74	0.03084	0.01953
75	0.03382	0.02151
76	0.03706	0.02371
77	0.04060	0.02619
78	0.04450	0.02898
79	0.04880	0.03214
80	0.05360	0.03573

Contingent Survivor		
Age	Male	Female
81	0.05897	0.03985
82	0.06498	0.04455
83	0.07169	0.04994
84	0.07915	0.05611
85	0.08743	0.06316
86	0.09658	0.07122
87	0.10665	0.08030
88	0.11768	0.09041
89	0.12978	0.10146
90	0.14418	0.11329
91	0.15947	0.12596
92	0.17555	0.13952
93	0.19236	0.15401
94	0.20986	0.16946
95	0.22800	0.18590
96	0.24674	0.20332
97	0.26601	0.22169
98	0.28574	0.24094
99	0.30581	0.26097
100	0.32609	0.28160
101	0.34636	0.30265
102	0.36640	0.32382
103	0.38604	0.34494
104	0.40512	0.36581
105	0.42352	0.38625
106	0.44113	0.40609
107	0.45786	0.42519
108	0.47364	0.44341
109	0.48843	0.46067
110	0.50000	0.47690

Recommended Retirement Tables-Class A

Retirement	
Age	Rate
40	0.025
41	0.025
42	0.025
43	0.025
44	0.025
45	0.075
46	0.075
47	0.075
48	0.075
49	0.075
50	0.075
51	0.100
52	0.100
53	0.100
54	0.100
55	0.100
56	0.100
57	0.100
58	0.100
59	0.100
60	0.075

Retirement	
Age	Rate
61	0.075
62	0.150
63	0.150
64	0.150
65	0.200
66	0.200
67	0.200
68	0.200
69	0.200
70	0.200
71	0.200
72	0.200
73	0.200
74	0.200
75	1.000
76	1.000
77	1.000
78	1.000
79	1.000
80	1.000

Current Retirement Tables-Class B

Retirement	
Age	Rate
40	0.0550
41	0.0550
42	0.0550
43	0.0550
44	0.0550
45	0.0575
46	0.0600
47	0.0625
48	0.0650
49	0.0675
50	0.0700
51	0.0725
52	0.0750
53	0.0775
54	0.0800
55	0.1000
56	0.1250
57	0.1500
58	0.1750
59	0.2500
60	1.0000

Recommended Disability Tables-Class A

Disability	
Age	Rate
19	0.00015
20	0.00015
21	0.00015
22	0.00015
23	0.00015
24	0.00015
25	0.00019
26	0.00023
27	0.00026
28	0.00030
29	0.00034
30	0.00038
31	0.00041
32	0.00045
33	0.00049
34	0.00053
35	0.00056
36	0.00060
37	0.00064
38	0.00068
39	0.00071
40	0.00075
41	0.00090
42	0.00098

Disability	
Age	Rate
43	0.00109
44	0.00120
45	0.00131
46	0.00143
47	0.00150
48	0.00154
49	0.00158
50	0.00165
51	0.00173
52	0.00180
53	0.00188
54	0.00195
55	0.00206
56	0.00218
57	0.00225
58	0.00240
59	0.00255
60	0.00270
61	0.00285
62	0.00300
63	0.00338
64	0.00360
65	0.00375

Current Disability Tables-Class B

Disability	
Age	Rate
19	0.00083
20	0.00083
21	0.00083
22	0.00104
23	0.00104
24	0.00104
25	0.00125
26	0.00125
27	0.00145
28	0.00145
29	0.00166
30	0.00187
31	0.00187
32	0.00208
33	0.00228
34	0.00249
35	0.00249
36	0.00270
37	0.00290
38	0.00311
39	0.00353
40	0.00373
41	0.00415

Disability	
Age	Rate
42	0.00456
43	0.00519
44	0.00581
45	0.00664
46	0.00768
47	0.00851
48	0.00954
49	0.01037
50	0.01141
51	0.01245
52	0.01349
53	0.01432
54	0.01536
55	0.01639
56	0.01743
57	0.01867
58	0.01971
59	0.02137
60	0.02282
61	0.02449
62	0.02614
63	0.02780
64	0.02967

Recommended Turnover Tables-Class A

Turnover	
Age	Rate
19	0.200
20	0.200
21	0.190
22	0.180
23	0.170
24	0.160
25	0.150
26	0.145
27	0.140
28	0.135
29	0.130
30	0.125
31	0.120
32	0.115
33	0.110
34	0.105
35	0.100
36	0.097
37	0.095
38	0.092
39	0.090
40	0.087
41	0.085
42	0.082

Turnover	
Age	Rate
43	0.080
44	0.077
45	0.075
46	0.072
47	0.070
48	0.067
49	0.065
50	0.062
51	0.060
52	0.057
53	0.055
54	0.052
55	0.050
56	0.050
57	0.050
58	0.050
59	0.050
60	0.050
61	0.050
62	0.050
63	0.050
64	0.050
65	0.000

Current Turnover Tables-Class B

Turnover	
Age	Rate
19	0.0300
20	0.0250
21	0.0250
22	0.0250
23	0.0250
24	0.0200
25	0.0190
26	0.0180
27	0.0170
28	0.0160
29	0.0150
30	0.0140
31	0.0130
32	0.0120
33	0.0110
34	0.0100
35	0.0090
36	0.0080

Turnover	
Age	Rate
37	0.0070
38	0.0065
39	0.0060
40	0.0055
41	0.0051
42	0.0047
43	0.0043
44	0.0039
45	0.0035
46	0.0031
47	0.0027
48	0.0023
49	0.0019
50	0.0015
51	0.0012
52	0.0009
53	0.0006
54	0.0003