



Teachers' Retirement System of the State of Illinois

Actuarial Experience Review

**Analysis of Actuarial Experience During the Period
July 1, 2020, through June 30, 2023**

January 27, 2025 / Matthew Strom, FSA, MAAA, EA / David Nickerson, ASA, MAAA, EA

January 27, 2025

The Board of Trustees
Teachers' Retirement System of the State of Illinois
2815 West Washington Street
Springfield, IL 62702

Re: Actuarial Experience Review for the Period July 1, 2020, through June 30, 2023

Dear Trustees:

This report presents the results of the actuarial experience review of the demographic and economic experience of the Teachers' Retirement System of the State of Illinois (TRS) for the period July 1, 2020, to June 30, 2023. This experience review was prepared in accordance with Article 16, Section 176 of the Illinois Pension Code governing the System, which requires the actuary for TRS to make an actuarial investigation into the mortality, service, and other experience of the members, retirees and beneficiaries covered under the System at least once every three years. As recommended by the State Actuary, the economic assumptions for TRS have been reviewed on an annual basis since 2014.

All current actuarial assumptions and methods were reviewed as part of this study. This study is the basis for our recommendation of the actuarial methods and assumptions to be used beginning with the June 30, 2024, actuarial valuation.

In preparing the results presented in this report, we have relied upon data provided by TRS regarding the membership census data and financial information. While the scope of our engagement did not call for us to perform an audit or independent verification of this information, we have reviewed it for reasonableness. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information.

This review recommends assumptions to be used in the valuation to measure the System's financial condition as of a single date. Future actuarial measurements may differ significantly from the current measurements presented in this report due to other assumption sets. This report does not include an analysis of the potential range of such future measurements.

Segal valuation results and experience study analysis are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Raw experience study analysis of actual and expected decrements are generated by a model, which is used to develop recommended assumption changes. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuaries.

It is important to note that this experience study analysis is based on census data and information through June 30, 2023. Market and demographic conditions may have changed significantly since this date. TRS' actuarial funded status does not reflect short-term fluctuations in the market or plan demographics, but rather is based on asset and liability values on the last day of a Plan Year.

Our analysis was conducted in accordance with generally accepted actuarial principles as prescribed by the Actuarial Standards Board (ASB) and the American Academy of Actuaries. Additionally, the development of all assumptions contained herein is in accordance with ASB Actuarial Standard of Practice (ASOP) No. 27 (Selection of Economic Assumptions for Measuring Pension Obligations) and ASOP No. 35 (Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations).

The undersigned actuaries are independent. They are Fellow/Associate of the Society of Actuaries, Enrolled Actuaries, and members of the American Academy of Actuaries and are experienced in performing experience studies for large public retirement systems. They meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

Respectfully Submitted,



Matthew Strom, FSA, MAAA, EA
Senior Vice President, Actuary



David Nickerson, ASA, MAAA, EA
Actuary

Table of Contents

Contents

Section 1: Executive Summary

Introduction.....	5
Recommendations.....	7

Section 2: Economic Assumptions

Inflation.....	17
Investment Rate of Return.....	19
Rate of Individual Salary Increases.....	23
New Entrant Pay Increases.....	25
Tier 2 COLA / Pensionable Salary Cap Increases.....	25
Severance Pay.....	26

Section 3: Demographic Assumptions

Mortality Rates.....	27
Retirement Rates.....	41
Termination.....	47
Disability Retirement.....	52
Other Demographic Assumptions.....	55

Section 4: Appendix

Appendix A: Proposed Salary Increases.....	58
Appendix B: Proposed Mortality Rates.....	59
Appendix C: Proposed Retirement Rates.....	61
Appendix D: Proposed Termination Rates.....	62
Appendix E: Proposed Disability Retirement Rates.....	64
Appendix F: Proposed Sick Leave Service Credits.....	65
Appendix G: Proposed Optional Service Purchases.....	66

Section 1: Executive Summary

Introduction

Actuarial valuations are prepared annually to determine whether the budgeted contribution being made by members and employers are sufficient to fund the Teachers' Retirement System of the State of Illinois (TRS). Each actuarial valuation is highly dependent on the assumptions that the actuaries use to project the benefits expected to be paid in the future to all members of TRS. The projection of expected future benefit payments is based on the characteristics of members as of the valuation date, the benefit provisions in effect on that date, and assumptions of future events and conditions.

The purpose of this report is to summarize the results of the experience review of the actuarial assumptions used in the actuarial valuation of TRS. At the June 18, 2024, and the August 16, 2024, Board of Trustees meetings, the Board adopted the economic assumptions and demographic assumptions and methods, respectively, to be first used beginning with the June 30, 2024, actuarial valuation.

The assumptions used in actuarial valuations can be grouped in two categories: (1) economic assumptions – the inflation, assumed long-term rates of investment return, salary increases, new entrant pay increases, Tier 2 cost-of-living adjustments (COLA), Tier 2 pensionable salary cap, and severance pay, and (2) non-economic or demographic assumptions – the assumed rates of mortality, retirement, termination, disability, future service accrual rate, sick leave credit, optional service purchase, and buyout participation. Demographic assumptions are primarily selected based on recent experience (although a change in plan design or the employment environment may suggest otherwise), while economic assumptions rely more on a long-term perspective of expected future trends.

To determine the probability of an event occurring, we examine the “decrements” and “exposures” of that event. Using retirement from active employment, for example, we compare the number of employees (or estimated liability, in the case of liability-weighted analysis) who retired in a certain age and/or service category (i.e., the number of “decrements”) with those “who could have retired” (i.e., the number of “exposures”). For example, if there were 5,000 active employees who are age 60 at the beginning of the year and 500 of them retire during the year, we would say the probability of retirement at age 60 is $500 \div 5,000$ or 10%. Similarly, in a liability-weighted approach, if there were \$5,000,000 of active liability at age 60 and \$500,000 of this liability is released due to retirements during the year, we would arrive at the same 10% probability of retirement.

When setting the demographic assumptions (other than mortality), we typically develop proposed assumption rates by moving between the current assumption rate and the rate that the experience shows for that particular decrement. For example, if the probability of termination in the 20-24 age group is currently 8%, and the experience during the study period shows that 10% of eligible members actually terminated, we may propose adjusting the termination rate to 9%. We choose this methodology in order to smooth any changes in actual experience in case the experience during the study period is an anomaly.

Section 1: Executive Summary

Introduction continued

For the majority of the demographic assumptions, we have reviewed the experience during the study period on a benefit-weighted/liability-weighted basis. A member who is eligible to retire at any retirement age with a large pension may be more likely to retire than a member of the same age with a smaller benefit.

If actual experience exactly matches the expected experience, the actual annual cost of TRS will equal the annual cost determined by the actuarial valuation. However, this result is virtually never achieved, due to the long-term nature of the benefit projections and the numerous assumptions used in actuarial valuations. TRS recognizes actuarial gains and losses each year, reflecting the net difference between actual experience and anticipated experience. A pattern of gains or losses with respect to one or more assumptions is the basis for recommended changes to the assumptions. Each valuation measures the effectiveness of each assumption and allows for the monitoring of the assumptions.

Actuarial experience studies are undertaken periodically and serve as the basis for recommended changes in actuarial assumptions and methods. A change in assumptions is recommended when it is demonstrated that the current assumptions do not accurately reflect the current trend determined from analysis of the data or anticipated future trends based upon reasonable expectations. The data analyzed include actual experience for demographic assumptions and economic forecasts for economic assumptions. The Actuarial Standards Board (ASB) provides actuaries with standards of practice that provide guidance and recommendations on acceptable methods and techniques to be used in developing both economic and demographic assumptions. Specifically, these are the ASB Actuarial Standard of Practice (ASOP) No. 27 (“Selection of Economic Assumptions for Measuring Pension Obligations”) and ASOP No. 35 (“Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations”).

This study reviews the actuarial experience of TRS for the three-year period beginning July 1, 2020, and ending June 30, 2023, compares this experience to the current actuarial assumptions, and recommends changes to the assumptions as necessary. Economic assumption recommendations were primarily developed based on inputs related to economic forecasts and capital market expectations.

A summary of the key points of our review and our recommendations follows.

Section 1: Executive Summary

Recommendations

The experience review provides an opportunity for the Board, TRS staff, and actuary to consider how specific assumptions or methods affect the funding of the System, including the funded status and the adequacy of contributions made by members and employers (as compared to the actuarially determined contribution). We have reviewed both economic and demographic experience of the System as it relates to the expected actuarial experience based on the current plan assumptions at the time of the study. Included are recommendations for changes in assumptions that we believe will more accurately reflect the future experience of TRS.

The detailed analysis of each individual assumption is discussed later in this report.

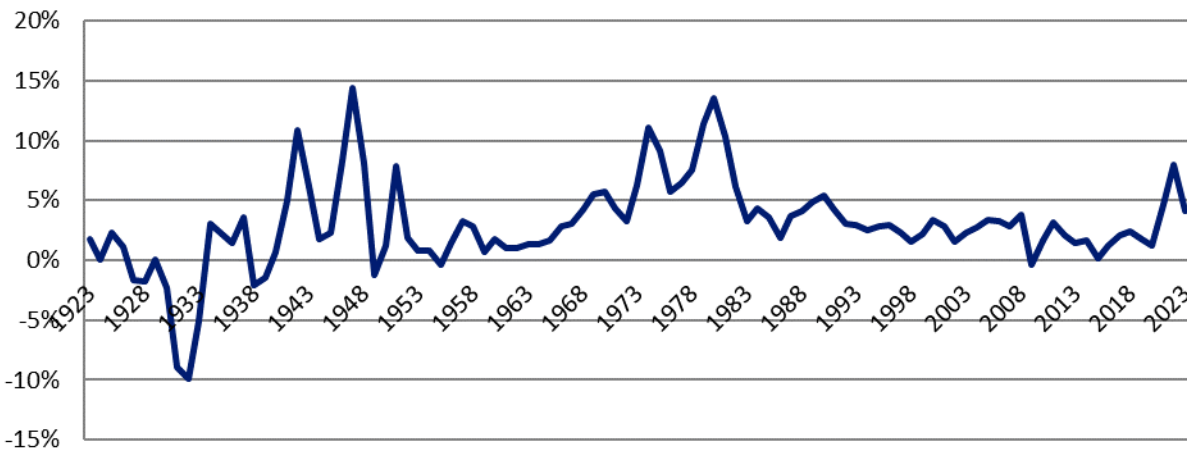
Economic Assumptions

Economic assumptions include inflation, rate of investment rate of return (or discount rate), rates of individual salary increases, new entrant pay increases, Tier 2 COLA and pensionable salary cap increases, and severance pay. At the June 18, 2024, Board of Trustees meeting, the Board elected to adopt the recommended assumptions noted below.

Inflation

Inflation recently broke from a pattern of relatively low levels from a historical perspective and resulted in rates that were the highest in the last 25 years, as shown in the graph below.

Historical Inflation, From 1923



The current inflation assumption is 2.50% per annum. The outlook for inflation is 2.46% over a 20-year time horizon, according to the Horizon Survey of Capital Market Assumptions (2023 Edition) and other professional forecasters. In light of all sources of inflation expectations reviewed in our study, **we recommend keeping the inflation assumption at 2.50%.**

Most other economic assumptions have an underlying inflation component. The investment return assumption is comprised of inflation and the real rate of return for each asset class. The assumed rates of individual salary increases are comprised of inflation, merit, and seniority increases. The new entrant pay increase assumption is generally connected to inflation without any merit component. Finally, cost-of-living adjustments and the pensionable salary cap for Tier 2 members are functions of inflation (lesser of 3% and ½ of CPI-U).

Section 1: Executive Summary

Recommendations continued

Investment Rate of Return

The System has averaged investment returns of 7.73% and 7.44% over the last 10 years and 20 years, respectively. The current assumption is 7.00%.

Based on the System's target allocation and the 10-year and 20-year composite Capital Market Assumptions (CMA) provided in the Horizon Survey of Capital Market Assumptions (2023 Edition), the net expected real rate of investment return (adjusted for implementation costs of alternative investments, expected benefit payout timing, and professionals' market outlook since early 2023) is 4.96%, compared to the current assumption of 4.50%. Since we recommend that the inflation assumption remain at 2.50%, and the investment return assumption is the combination of expected inflation plus expected real rate of return, the 50th percentile expected return over the next 20 years is 7.46%. **We recommend keeping the investment return assumption at 7.00%**, which includes a 46-basis point provision for adverse deviation and represents a 57% likelihood of achieving 7.00% over the long term.

Rates of Individual Salary Increases

We studied the merit and seniority increases separately from inflation.

Analysis of the distribution of merit and seniority increases by years of service during the study period shows that actual increases were higher than expected overall (though not at every year of service).

Based on experience, **we recommend modifying the merit and seniority portion of the individual salary increases to reduce the rates at lower years of service and increase rates at higher years of service.**

New Entrant Pay Increases

This assumption represents how starting salaries for new entrants increase in the future. Generally, this assumption is connected to the inflation assumption without any merit component.

Based on the 2.50% inflation assumption, **we recommend that the new entrant pay increase assumption remain at 2.50%.**

Tier 2 COLA and Pensionable Salary Cap Increases

The COLA and pensionable salary cap increases for Tier 2 members are based on annual inflation, as annual increases are the lesser of 3% and ½ of CPI-U.

Based on the 2.50% inflation assumption, **we recommend that the average COLA and rate of increase in the pensionable salary cap applicable to Tier 2 members to remain at 1.25%.**

Section 1: Executive Summary

Recommendations continued

Severance Pay

Analysis of the severance pay assumption during the study period shows that the percent of retirees receiving severance pay, as well as the actual severance payments, have been more than expected.

Based on experience, **we recommend increasing the percent of retirees assumed to receive severance pay from 18% to 20% and increasing the average severance payment percent from 8% to 10% of other pensionable earnings in the last year of employment**, to better reflect plan experience.

Demographic Assumptions

The demographic assumptions include mortality, retirement, termination (or withdrawal), disability incidence, spouse information, sick leave service credits, optional service purchase, future service accrual rate, and buyout election percentages. At the August 16, 2024, Board of Trustees meeting, the Board elected to adopt the recommended assumptions noted below.

Mortality

Healthy Post-Retirement Mortality

The current healthy post-retirement mortality rates are based on the PubT-2010 Healthy Retiree Mortality Table and the MP-2020 projection scale, with adjustments for credibility and sex. For females, the adjustments are 91% of the rates prior to ages 75 and 109% of the rates for ages 75 and older. For males, the adjustments are 105% of the rates prior to age 85 and 115% of the rates for ages 85 and older.

For the purposes of analyzing mortality, we included experience from July 1, 2018, through June 30, 2023, (five-year period) to help mitigate the impact of the COVID-19 pandemic (COVID) on the underlying data. Over the five-year experience period, there were fewer actual retiree, beneficiary, and disabled deaths than expected after adjusting for excess mortality due to COVID.

Based on our analysis, we recommend maintaining the current base table, with adjustments for TRS-specific experience where credible data exists. Specifically, **we recommend the PubT-2010 Healthy Retiree Mortality Table for females using 91% of the rates for ages prior to 75 and 103% of the rates for ages 75 or older and for males using 103% of the rates for ages prior to 85 and 111% of the rates for ages 85 or older.**

To reflect future improvements in mortality, **we recommend updating the mortality projection scale to MP-2021¹.**

¹ All references to the recommended mortality improvement projection scale MP-2021 are the 2024 Adjusted Scale MP-2021.

Section 1: Executive Summary

Recommendations continued

Beneficiary Mortality

The current post-retirement beneficiary mortality rates are based on the Pub-2010 Contingent Survivor Mortality Table and the MP-2020 projection scale, with adjustments for credibility and sex. For females, the adjustments are 98% of the rates for all ages. For males, the adjustments are 110% of the rates for all ages.

Over the five-year experience period, there were fewer actual beneficiary deaths than expected after adjusting for excess mortality due to COVID. Based on our analysis, we recommend maintaining the current base table with adjustments for TRS-specific experience where credible data exists. Specifically, **we recommend the Pub-2010 Contingent Survivor Mortality Table for females using 94% of the rates for all ages and for males using 106% of the rates for all ages.**

To reflect future improvements in mortality, **we recommend updating the mortality projection scale to MP-2021.**

Disabled Mortality

The current disabled mortality rates are based on the PubNS-2010 Disabled Retiree Mortality Table and the MP-2020 projection scale, with no adjustments to female or male rates.

Over the five-year experience period, there were fewer actual disabled deaths than expected after adjusting for excess mortality due to COVID; however, there was limited experience on which to base the assumption. Since plan experience is insufficient, **we recommend maintaining the current base table with no adjustments to female or male rates.**

To reflect future improvements in mortality, **we recommend updating the mortality projection scale to MP-2021.**

Pre-Retirement Mortality

The current mortality rates for active and inactive vested members are based on the PubT-2010 Employee Mortality Table and the MP-2020 projection scale, with adjustments for credibility. For females and males, the adjustments are 90% of the rates for all ages.

Over the five-year experience period, there were fewer active member deaths than expected after adjusting for excess mortality due to COVID; however, the credible experience was limited (very few members die in active service), and the liability associated with active deaths is a small percentage of the total liability. As such, we recommend maintaining the current base table, with adjustments for TRS-specific experience where credible data exists. Specifically, **we recommend the PubT-2010 Employee Mortality Table for females and males using 94% of the rates for all ages.**

To reflect future improvements in mortality, **we recommend updating the mortality projection scale to MP-2021.**

Section 1: Executive Summary

Recommendations continued

Retirement

The current retirement rates for active members are based on members' age and years of service at retirement. There are different retirement rates depending on Tier.

Analysis of Tier 1 active member retirement experience over the past three years reveals that, overall, there were more retirements than expected on a benefits-weighted basis. Therefore, **we recommend modifying the Tier 1 active retirement rates** to be more consistent with actual experience. **We recommend no changes to the Tier 2 active retirement rates** as there is very limited actual retirement experience to analyze at this point.

The current retirement assumption for inactive vested participants is 100% retirement upon attaining Unreduced Retirement eligibility (i.e., earliest age of unreduced retirement pension). Analysis of Tier 1 inactive vested retirement experience over the past three years reveals that, overall, inactive vested members retired earlier than expected. As such, **we recommend maintaining 100% assumed retirement at Unreduced Retirement eligibility, but adding retirement rates for Tier 1 inactive vested members at Early Retirement ages** to better align with recent experience. **We also recommend adding the same rates for Tier 2 inactive vested members at their applicable Early Retirement ages**, assuming Tier 2 will mimic Tier 1 behavior.

Termination

The current termination assumption uses Select and Ultimate Tables based on sex, age, and years of service. Separate rates apply to members with less than five years of service and members with five or more years of service. Termination rates for members with 5 or more years of service are offset by rehires to reflect Tier 1 members being replaced by rehired Tier 1 members.

The experience over the past three years shows that actual termination rates were higher than expected at younger ages and less than expected at older ages. Therefore, **we recommend increasing the termination rates at younger ages while decreasing rates at older ages** to better align with recent experience.

Note that our analysis excludes hourly/substitute teachers because their associated liability is a very small percent of the total liability, and their high turnover would overstate the rates of termination for full-time teachers.

Disability Retirement

The current disability incidence rates are based on members' age and sex. During the experience study period, there were fewer disability retirements than expected for females and males. As such, **we recommend reductions to the current disability retirement rates** to better align with recent experience.

Section 1: Executive Summary

Recommendations continued

Other Demographic Assumptions

Other demographic assumptions that affect the valuation are spouse information, sick leave service credits, optional service purchases, future service accrual rates, and buyout election percentages.

Spouse Information

The current spouse information assumption is that 85% of active members are married with males being three years older than females. We have limited data on spouse information. However, the current assumptions are reasonable and consistent with assumptions used for similar plans. Therefore, **we recommend no changes to the current assumption.**

Sick Leave Service Credit

The current sick leave service credit assumption is based on service at retirement. On average, experience is consistent with the current assumption, although inconsistent at individual service levels. As such, **we recommend adjusting rates of sick leave service credit** to better align with recent experience.

Optional Service Purchase

The current optional service purchase assumption is based on service at retirement. On average, experience shows fewer optional service purchases than currently assumed. Therefore, **we recommend adjusting rates of optional service purchase** to better align with recent experience.

Future Service Accrual Rate

The current future service accrual rate assumptions are that Regular Full-Time and Regular Part-Time (Full-Time) members accrue 0.98 years of service per year, and that Substitute, Part-Time, and Hourly-Paid (Hourly) members accrue 0.275 years of service per year. On average, experience shows that future service accruals are greater than the current assumption. As such, **we recommend the following:**

- **Increasing the service accrual rate to 1.00 for Full-Time members;**
- **Updating to an individual-based approach for Hourly members based on the member's actual service accrual in the prior year; and**
- **Increasing the future service accrual rate to 0.33 for future Hourly new entrants.**

Buyout Election Percentages

Public Acts 100-0587 and 101-0010 provide Tier 1 members the option to receive a lump sum at retirement in exchange for having their automatic annual increase (AAI) based on 1.5% of the originally granted annuity (instead of the current 3% compounded AAI) effective at age 67 (instead of age 61).

Section 1: Executive Summary

Recommendations continued

The current AAI buyout assumption is 20% of eligible retiring Tier 1 members will elect the buyout. Over the past three years, there were more Tier 1 members who elected the AAI buyouts than expected. Therefore, **we recommend increasing the AAI buyout election assumption to 25%** to better align with recent experience.

Public Acts 100-0587 and 101-0010 also provide Tier 1 and Tier 2 inactive vested (IV) members the option to receive an immediate lump sum in exchange for their annuity at retirement.

The current IV buyout assumption is 10% of future inactive vested members will elect the IV buyout. Over the past three years, fewer members elected the IV buyout upon termination than expected. However, buyout applications were reissued to all current inactive vested members in FY2024, which resulted in a spike of known IV buyout elections in FY2024 and anticipated IV buyout elections in FY2025. As such, **we recommend maintaining the current IV buyout election assumption for future inactive vested members but adding an assumption that 1% of all current inactive vested members will elect the buyout.**

Summary of Actuarial Experience

For the three-year period under review, TRS has experienced both actuarial gains and actuarial losses on individual decrements and economic assumptions. Investment returns on the fair value of assets have averaged 7.6% and 7.4% over the last 10 and 20 years, respectively. Experience for all other assumptions has varied between producing gains and losses on a year-by-year basis over the study period, but net experience over the entire period has generally produced actuarial losses. A summary of the non-investment historical gains and losses (dollars in millions) is shown below.

Non-Investment Gains/(Losses) 2021 to 2023

Actuarial Valuation as of June 30				
Decrement	2023	2022	2021	Total
Salary Increases	(\$237.2)	(\$32.8)	\$56.3	(\$213.7)
Retirement Experience	3.8	(12.5)	(107.0)	(115.7)
Disability experience	13.9	18.1	18.9	50.9
Termination Experience	(27.1)	(54.3)	(49.2)	(130.6)
Mortality Experience	15.6	146.3	68.2	230.1
Rehires	(45.3)	(35.4)	(41.2)	(121.9)
New Entrants	0.2	3.3	4.4	7.9
Buyout	35.5	65.2	195.5	296.2
Other	(447.4) ¹	(223.0)	88.1	(582.3)
Total	(\$688.0)	(\$125.1)	\$234.0	(\$579.1)
Actuarial Accrued Liability (AAL)	148,398.3	143,523.7	138,914.3	
Total as a % of AAL	(0.46%)	(0.09%)	0.17%	

¹ Primarily due to programming enhancements

Section 1: Executive Summary

Recommendations continued

Summary of Assumptions and Recommended Changes

The following table summarizes the actuarial assumptions used in the June 30, 2023, valuation and the changes recommended for the June 30, 2024, valuation as noted in this report.

Description	Current	Proposed
Economic Assumptions		
Inflation	2.50%	No change
Investment Return	7.00%	No change
Individual Salary Increases	Merit (including productivity) rates based on years of service plus inflation	Increases to merit (including productivity) portion of individual salary increase based on years of service plus inflation
New Entrant Salary Increases (for projections)	2.50%	No changes
Tier 2 Pensionable Salary Cap Increases	1.25% per annum	No changes
Tier 2 COLA Increase	1.25% per annum	No change
Severance Pay	18% assumed to receive severance pay, average of 8% of earnings in final year of employment	20% assumed to receive severance pay, average of 10% of earnings in final year of employment
Demographic Assumptions		
Healthy Post-Retirement Mortality	PubT-2010 Healthy Retiree Mortality Table for females using 91% of rates prior to age 75 and 109% of rates for ages 75 and older and for males using 105% of rates prior to age 85 and 115% of rates for ages 85 and older	PubT-2010 Healthy Retiree Mortality Table for females using 91% of the rates prior to age 75 and 103% of the rates for ages 75 and older and for males using 103% of the rates prior to age 85 and 111% of the rates for ages 85 and older
Beneficiary Mortality	Pub-2010 Contingent Survivor Table for females using 98% of rates for all ages and for males using 110% of rates for all ages.	Pub-2010 Contingent Survivor Table for females using 94% of rates for all ages and for males using 106% of rates for all ages.
Disabled Mortality	PubNS-2010 Disabled Retiree Table	No change
Pre-Retirement Mortality	PubT-2010 Employee Mortality Table for females and males using 90% of rates for all ages	PubT-2010 Employee Mortality Table for females and males using 94% of rates for all ages
Mortality Improvement	Generational projection using Scale MP-2020	Generational projection using 2024 Adjusted Scale MP-2021
Active Retirement	Rates based on age and service that range from 0% to 100% from age 54 to age 75, grouped for members with less than 19, 19 to 29, 30 to 33, and 34 or more years of service	Adjust rates based on plan experience.
Inactive Vested Retirement	100% at earliest unreduced retirement age	Add age-based rates for Tier 1 and Tier 2 Early Retirement ages

Section 1: Executive Summary

Recommendations continued

Description	Current	Proposed
Demographic Assumptions		
Termination	Sex-distinct rates based on age and years of service	Adjust rates based on plan experience
Disability	Sex-distinct rates based on age	Adjust rates based on plan experience
Sick Leave Service Credit	Rates based on service at retirement	Adjust rates based on plan experience
Optional Service Purchase	Rates based on service at retirement	Adjust rates based on plan experience
Spouse Information	85% of members are assumed to be married Male members are assumed to be 3 years older than spouse, female members assumed to be 3 years younger	No changes
Future Service Accrual Rate	0.98 per year for Full-Time members 0.275 per year for current and future Hourly members	1.00 per year for Full-Time members Individual basis reflecting recent experience for current Hourly members 0.33 per year for future Hourly members
Automatic Annual Increase (AAI) Buyout	20% of eligible retiring Tier 1 members assumed to elect AAI Buyout	25% of eligible retiring Tier 1 members assumed to elect AAI Buyout
Inactive Vested (IV) Buyout	10% of <u>future</u> inactive vested members are assumed to elect IV Buyout	No change for <u>future</u> inactive vested members, plus 1% of all <u>current</u> inactive vested members elect the IV Buyout
Buyout Period	Buyouts are assumed to be paid through fiscal year 2026	No change

Section 1: Executive Summary

Recommendations continued

Impact of Assumption Changes on Valuation Results

The following tables detail the impact of the recommended assumption changes, using the June 30, 2023, actuarial valuation results for illustrative purposes. When the proposed set of assumptions is used in the June 30, 2024, valuation, the relative impact is expected to be similar to the results shown below (as a percentage of the actuarial accrued liability and normal cost). However, the actual impacts may vary due to underlying changes that occur between valuation dates. The comparability may also be affected by the actual investment return and demographic experience during the year.

(\$ in Millions) Description	Current Assumptions	Proposed Economic Assumptions	Proposed Demographic and Economic Assumptions	Total Change
Actuarial Accrued Liability	\$148,398	\$148,911 +513	\$149,757 +846	+1,359
Actuarial Value of Assets	66,502	66,502	66,502	
Unfunded Actuarial Accrued Liability	81,896	82,409 +513	83,255 +846	+1,359
Funded Ratio	44.8%	44.7% -0.1%	44.4% -0.3%	-0.4%
Normal Cost	\$2,424	\$2,473 +49	\$2,439 -34	+\$15
FY2025 Actuarially Determined Contribution ¹	10,106	10,193 +87	10,228 +35	+122
FY2025 State Contribution²	\$6,204	N/A	\$6,216 +12	+\$12

¹ State's portion

² Reflects five-year phase in of effect of assumption changes.

Section 2: Economic Assumptions

The economic assumptions have a significant impact on the development of plan liabilities. Changes to these assumptions can substantially alter the actuarial valuation results. 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 TRS' valuation results are:

- Inflation;
- Investment Rate of Return;
- Rate of Individual Salary Increases;
- New Entrant Pay Increases;
- Tier 2 COLA / Pensionable Salary Cap Increases; and
- Rate of Severance Pay

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 (except for severance pay), and therefore is key to developing a consistent set of actuarial assumptions. The investment rate of return assumption includes an inflation component and a real rate of return component. The components of the salary increase assumption are inflation and merit and seniority increases (including productivity). The new entrant pay increase assumption is generally connected to the inflation assumption without any merit component. The Tier 2 COLA and pensionable salary cap increases are directly tied to actual inflation during the year.

At the June 18, 2024, Board of Trustees meeting, the Board elected to adopt the recommended economic assumptions discussed in this section.

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 referred to commonly referenced historical measures of inflation via the National Consumer Price Index for all urban consumers (CPI-U).

The table on the next page shows that recent inflation experience has been significantly higher than longer-term averages.

Section 2: Economic Assumptions

Inflation continued

Historical Consumer Price Index – Averages (U.S. City Average - All Urban Consumers)

Average Annual Change as of April 30, 2024	CPI-U
5-Year Average	4.18%
10-Year Average	2.84%
20-Year Average	2.59%
30-Year Average	2.55%

As can be seen in the table above, the average annual inflation rates have gradually increased over the last 30 years due to a relatively high inflationary period over the past several years. Historical trend is a less important consideration for the assumed rate of inflation but assists in determining the reasonable bounds of expected inflation.

Since 2012, Horizon Actuarial Services, LLC has published survey results that summarize the capital market assumptions of various investment firms. Based on the survey results from the 2023 Edition of the Survey of Capital Market Assumptions, the average 10-year inflation assumption across 42 survey respondents was 2.52% and the average 20-year inflation assumption across a subset of 27 survey respondents that provided assumptions was 2.46%.

The table below compares the 2023 Horizon Survey results to other sources.

Source	10-Year	20-Year
Federal Reserve Bank of Philadelphia Third Quarter 2024 Survey of Professional Forecasters	2.33%	N/A
RVK ¹	2.50%	2.50%
Segal Marco Advisors	2.40%	2.40%
2023 Horizon Survey of Capital Market Assumptions	2.52%	2.46%

Next, we consider the measure of future inflation expectation; an indication of which is a market-based forecast. Treasury Inflation Protection Securities (TIPS) are government bonds, which, in addition to a fixed yield, add the actual percentage change in CPI to the principal value. Therefore, the spread between the TIPS and the Conventional Treasury note/bond of the same maturity is an indication of the market's forecast for inflation.

The table below compares the yields on US Treasury Bonds as of May 24, 2024, with and without inflation indexing.

¹ TRS' investment consultant

Section 2: Economic Assumptions

Inflation continued

US Treasury Bonds as of May 24, 2024	10-Year Yield	20-Year Yield	30-Year Yield
Non-Inflation Indexed	4.46%	4.65%	4.57%
Inflation Indexed	2.16%	2.19%	2.25%
Difference	2.30%	2.46%	2.32%

Because of the inflation protection, TIPS' yields are considerably lower than those of regular Treasury securities of similar maturities. As of May 24, 2024, 30-year Treasuries yielded 4.57% while 30-year TIPS yielded 2.25%. For 30-year TIPS to match the return of the conventional 30-year Treasury for a buy-and-hold income investor, inflation would have to measure 2.32% per year over the next 30 years.

The market's expectation of inflation alone is not a definitive basis for an inflation assumption due to other factors that affect the yields of those securities but is useful as one indicator of future trend. In addition, it is also important to note that the market's view of inflation over 20 years is approximately 15 basis points greater than the 10-year horizon and 30-year horizon.

We also referred to the 2024 report on the financial status of the Social Security program¹. The projected average increase in price inflation over the next 75 years under the intermediate cost assumptions used in that report was 2.40%. The price inflation measure used in this report is the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W)². Besides projecting the results under the intermediate cost assumptions using an inflation assumption of 2.40%, alternative projections were also made using a lower and a higher inflation assumption of 1.80% and 3.00%, respectively.

Considering all of this information, **we recommend that the inflation assumption remain at 2.50%.**

Investment Rate of Return

The investment rate of return is used to estimate annual investment return and to determine the present value of expected future plan payments. The selection of an investment return assumption considers capital market outlook, TRS' portfolio mix, and, to a lesser extent, historical returns.

¹ Source: Social Security Administration – The 2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds

² The CPI-W is a more specialized index relative to CPI-U and seeks to track retail prices as they affect urban hourly wage earners and clerical workers. It encompasses about 32 percent of the United States' population and is a subset of the CPI-U group. The CPI-W places a slightly higher weight on food, apparel, transportation, and other goods and services. It places a slightly lower weight on housing, medical care, and recreation. The CPI-U is a more general index and seeks to track retail prices as they affect all urban consumers. It encompasses about 87 percent of the United States' population.

Section 2: Economic Assumptions

Investment Rate of Return continued

The current assumption is 7.00%, which is comprised of the following components:

- Inflation: 2.50%
- Real Rate of Return: 4.50%

The table below shows TRS' actual investment returns on a fair value basis as well as an actuarial value basis.

Average Annual Return as of June 30, 2023	Fair Value of Assets	Actuarial Value of Assets
Past 5 Years	6.96%	7.07%
Past 10 Years	7.56%	8.09%
Past 15 Years	6.38%	6.31%
Past 20 Years	7.38%	7.30%

The average annual rate of return over the past 10 and 20 years has been above the current assumption of 7.00% on both an actuarial value of assets basis and fair value of assets basis, whereas the average annual rate of return over the past 5 and 15 years has been lower than the current assumption of 7.00% (with the exception of the 5-year average return on an actuarial value of assets basis). Historical trend is a less important consideration for the assumed rate of investment return but assists in determining the reasonable bounds of expected investment return.

Our analysis of the expected real rate of return was based on the Horizon Survey of Capital Market Assumptions (2023 Edition). This survey compiles and averages the capital market assumptions of 42 investment consultants (including RVK and Segal Marco Advisors). All investment consultants provided assumptions for a 10-year period and 27 respondents provided assumptions for 20-year periods. The expected arithmetic returns are used to determine the expected return by asset class. The 10-year and 20-year expected geometric real rate of return was generated from the 50th percentile of 10,000 simulated portfolio return trials.

The 10-year and 20-year real return assumptions for the asset classes and the portfolio's expected real return are shown on the following page.

Section 2: Economic Assumptions

Investment Rate of Return continued

Horizon Study Asset Classes	Horizon Study 10-Year Annual Arithmetic Real Return	Target Allocation ¹	Weighted Real Return
US Equity Large Cap	5.63%	20.5%	1.15%
US Equity Small/Mid Cap	6.77%	1.9%	0.13%
Non-US Equity Developed	6.49%	10.7%	0.69%
Emerging Markets Equities	8.30%	3.9%	0.32%
US Corporate Bonds Core	2.32%	7.0%	0.16%
US Bonds High Yield	4.35%	3.9%	0.17%
Non-US Debt Developed	1.15%	1.2%	0.01%
Non-US Debt Emerging	4.30%	3.6%	0.15%
US Treasuries (Cash Equivalent)	0.83%	1.8%	0.01%
TIPS (Inflation Protected)	1.71%	0.5%	0.01%
Real Estate	4.78%	16.0%	0.76%
Hedge Funds	3.73%	4.0%	0.15%
Infrastructure	6.00%	2.0%	0.12%
Private Equity	9.36%	15.0%	1.40%
Private Debt	6.28%	8.0%	0.50%
Total		100.0%	5.73%
Adjustment to Geometric ²			(0.88%)
10-Year Geometric Real Rate of Return			4.87%

Horizon Study Asset Classes	Horizon Study 20-Year Annual Arithmetic Real Return	Target Allocation ⁸	Weighted Real Return
US Equity Large Cap	6.20%	20.5%	1.27%
US Equity Small/Mid Cap	7.25%	1.9%	0.14%
Non-US Equity Developed	6.91%	10.7%	0.74%
Emerging Markets Equities	8.92%	3.9%	0.35%
US Corporate Bonds Core	2.46%	7.0%	0.17%
US Bonds High Yield	4.56%	3.9%	0.18%
Non-US Debt Developed	1.34%	1.2%	0.02%
Non-US Debt Emerging	4.53%	3.6%	0.16%
US Treasuries (Cash Equivalent)	0.76%	1.8%	0.01%
TIPS (Inflation Protected)	1.82%	0.5%	0.01%
Real Estate	5.01%	16.0%	0.80%
Hedge Funds	4.07%	4.0%	0.16%
Infrastructure	5.91%	2.0%	0.12%
Private Equity	10.30%	15.0%	1.55%
Private Debt	6.42%	8.0%	0.51%
Total		100.0%	6.19%
Adjustment to Geometric ⁹			(0.82%)
20-Year Geometric Real Rate of Return			5.37%

¹ Target allocation breakouts were determined with assistance from TRS staff.

² Includes 11 basis point adjustment for TRS' higher cost implementation style compared to peer systems, based on analysis from CEM Benchmarking Inc.

Section 2: Economic Assumptions

Investment Rate of Return continued

Adjustment for Expected Benefit Payout Timing

The total present value of projected TRS benefits (excluding projected buyout amounts) is \$167.1 billion, as reported in the June 30, 2023, actuarial valuation report dated January 10, 2024. Expected benefit payouts for fiscal 2024 are \$8.4 billion. The expected benefit payments are projected to increase gradually each year to \$15.1 billion per year by fiscal 2043. On a present value basis, TRS is expected to pay out approximately 42% of liabilities over the next 10-year period:

Time Horizon	Total Present Value of Projected Benefit Payouts (in \$B)	% of Total Liability
Next 5 years	\$37.9	22.6%
Next 10 years	69.8	41.8%
Next 15 years	96.6	57.8%
Next 20 years	118.7	71.1%
All years	167.1	100.0%

Based on the capital market assumptions from the 2023 Horizon Survey, adjusted for TRS' higher cost implementation style, and the TRS target asset allocation, the median 10-year and 20-year annual real rates of return (i.e., excess return over inflation) are 4.87% and 5.37%, respectively. Given that a large portion of liability is expected to be settled in the near term (i.e., the next 10-years), Segal believes it is appropriate to weight return expectations between the 10-year and 20-year median real rates of return.

The expected real rate of return, weighted by the present value of projected benefits over the next 10 years, is 5.16%. In other words, there is a 50% likelihood of earning an annual real rate of return of at least 5.16% based on Horizon's 10-year and 20-year capital market assumptions, weighted by the present value of projected benefits.

Adjustment for Current Market Outlook

Capital market assumptions from the Horizon Survey are aggregated based on investment consultant expectations from the first quarter of 2023. From 2023 to 2024, the investment market outlook has changed, and many investment consultants slightly lowered their expectations. For example, using TRS' target asset allocation and weighting the 10-year and 20-year capital market assumptions for the present value of projected benefits over the next 10 years, the change in the 50th percentile return based on RVK and Segal Marco Advisors capital market assumptions between January 2023 and January 2024 is a decrease 17 basis points and 14 basis points, respectively. Taking a conservative approach, a current market outlook adjustment of 20 basis points is applied to the net weighted median real rate of return of 5.16% which results in a modified weighted median real rate of return of 4.96%.

Section 2: Economic Assumptions

Investment Rate of Return continued

The following table summarizes the components of the current investment return assumption:

Component	Current Assumption
Inflation	2.50%
Weighted Median Real Rate of Return	4.96%
Total Expected Rate of Return	7.46%
Adjustment ¹	(0.46%)
Total Return Assumption	7.00%
Confidence Level	57%

Based on this analysis, **we recommend no change to the 7.00% investment return assumption.**

Rate of Individual Salary Increases

The rate of individual salary increase is used to determine members' benefits provided by TRS. Generally, a member's salary will change over the long term in accordance with inflation, productivity, and merit and seniority increases. The actuary should review available compensation data when selecting this assumption, including the school districts' current compensation practices and any anticipated changes, historical compensation increases and practices of the school districts and other employers in the same industry or geographic area, and historical national wage increases and productivity growth.

The estimated rate of individual salary increases consists of the following components:

- Inflation;
- Productivity; and
- Merit and seniority increases.

The inflation component represents the "across the board" average annual increase in salaries shown in the experience data. The merit and seniority component includes productivity and the additional increases in salary due to performance, seniority, promotions, etc.

Since merit and seniority increases are unique to each retirement system, it is appropriate to base this assumption on recent experience. We study the merit and seniority increases (plus productivity) separately from inflation, which represents "non-inflation" increases in individual salaries.

The current salary increase assumption (including inflation) uses service-based rates that range from 8.75% at one year of service to 3.75% at 20 or more years of service. The historical compensation data, adjusted by inflation during the study period, was evaluated based on age and service. The strongest relationship continues to be based on members' service.

¹ Adjusting the real rate of return for adverse deviation increases the likelihood of meeting the expectation over a 20-year period.

Section 2: Economic Assumptions

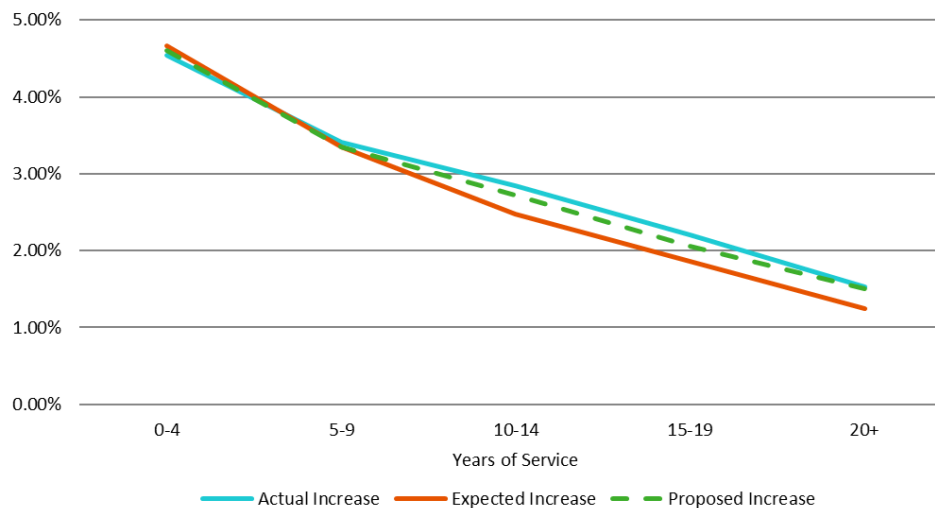
Rate of Individual Salary Increases continued

The historical compensation data for the experience period (shown in the following table) have been adjusted by approximately 2.56% to account for actual inflation during the study period. The expected salary increase rates have been adjusted by 2.50% to account for the current assumed rate of inflation. The proposed salary increase rates reflect the proposed assumption for inflation of 2.50%. Proposed non-inflationary increases have been developed based on weighting the current assumption (i.e., historical experience) and recent experience by 50%.

The following table and graph compare the actual, expected and proposed individual salary increases during the period of the experience study, adjusted to remove inflation (which averaged approximately 2.56% over the experience period).

Years of Service	Prior Actual Salaries (in \$000s)	Current Actual Salaries (in \$000s)	Actual Salary Increase Rate	Expected Salaries (in \$000s)	Expected Salary Increase Rate	Proposed Salary Increase Rate
0 – 4	\$3,680,289	\$3,847,512	4.54%	\$3,851,993	4.67%	4.61%
5 – 9	4,894,194	5,061,399	3.42%	5,057,918	3.35%	3.34%
10 – 14	5,264,976	5,414,915	2.85%	5,395,356	2.48%	2.73%
15 – 19	6,499,974	6,642,887	2.20%	6,620,857	1.86%	2.06%
20+	10,256,826	10,413,758	1.53%	10,385,049	1.25%	1.50%
Total	\$30,596,259	\$31,380,470	2.56%	\$31,311,173	2.34%	2.50%

Salary Increase Experience, in Excess of Inflation



As shown above, the actual rate of individual salary increases, in excess of inflation, was less than the expected rate for members with less than 5 years of service and was higher for members with 5 or more years of service. Based on this experience, **we recommend slight decreases for lower service members and slight increases for higher service members to the non-inflationary component of the individual salary increases.** The table showing the proposed total rates of individual salary increases is included in Appendix A.

Section 2: Economic Assumptions

New Entrant Pay Increases

The new entrant pay increases are used to project the starting salary for new entrants for future years for projection purposes. Generally, this assumption is equal to the inflation assumption and does not include any merit component.

The current assumption is that new entrant pay will increase by 2.50% per year. **We recommend that the new entrant pay increase assumption be maintained at 2.50%**, which continues to be consistent with the inflation assumption.

Tier 2 COLA / Pensionable Salary Cap Increases

The COLA and Pensionable Salary Cap increases for Tier 2 members are based on annual inflation, as annual increases are the lesser of 3% and ½ of CPI-U. The table below shows a history of the COLA and Pensionable Salary Cap increases since its inception in 2011.

Fiscal Year Ending June 30	Prior Year CPI-U	½ CPI-U	Tier 2 COLA Increase	Tier 2 Pensionable Salary Cap
2011				\$106,800
2012	3.90%	1.95%	1.95%	108,883
2013	2.00%	1.00%	1.00%	109,971
2014	1.20%	0.60%	0.60%	110,631
2015	1.70%	0.85%	0.85%	111,572
2016	0.00%	0.00%	0.00%	111,572
2017	1.50%	0.75%	0.75%	112,408
2018	2.20%	1.10%	1.10%	113,645
2019	2.30%	1.15%	1.15%	114,952
2020	1.70%	0.85%	0.85%	115,929
2021	1.40%	0.70%	0.70%	116,740
2022	5.40%	2.70%	2.70%	119,892
2023	8.20%	4.10%	3.00%	123,489
2024	3.70%	1.85%	1.85%	125,774

Since we recommend maintaining the current inflation assumption of 2.50%, **we recommend that the Tier 2 COLA and Pensionable Salary Cap increases remain the same at 1.25%**.

Section 2: Economic Assumptions

Severance Pay

Additional compensation in the final year of employment prior to retirement is referred to as “severance pay.” This may include payment for unused vacation days, unused sick or personal leave, retirement incentives, 403(b) or 457(b) contributions, and bonuses for performance, good attendance, longevity, etc.

The current assumption is that 18% of retirees will receive, on average, 8% of pensionable earnings in the last year of employment prior to retirement.

The following table compares the actual versus expected plan experience of severance pay during the period of the experience study.

Percent of Retirees Receiving Severance Pay

Total Retirements Paid Severance	Actual % of Retirees Paid Severance	Expected % of Retirees Paid Severance	Ratio of Actual to Expected	Proposed % of Retirees Paid Severance	Ratio of Actual to Proposed
9,625	22.87%	18.00%	127%	20.00%	114%

Rate of Average Severance Pay

Total Severance Pay	Actual Severance Pay Rate	Expected Severance Pay Rate	Ratio of Actual to Expected	Proposed Severance Pay Rate	Ratio of Actual to Proposed
\$17,239,600	9.55%	8.00%	119%	10.00%	96%

As shown above, 9,625 members retired from active status during the study period, of which 2,201 received severance pay (or 22.9% of active retirements). Given that recent plan experience is higher with the current assumption, **we recommend increasing the percent of retirees expected to receive severance pay from 18% to 20%.**

In addition, the current assumption of the average severance payment (8% of other pensionable earnings in the last year of employment) produces an assumed severance payment of approximately \$14.4 million, compared to an actual severance payment of approximately \$17.2 million, during the study period. Therefore, **we recommend increasing the average severance payment from 8% to 10% of other pensionable earnings in the last year of employment.**

Section 3: Demographic Assumptions

The demographic assumptions used to value TRS reflect the expected occurrences of various events among TRS members. The assumptions should reflect specific characteristics of TRS 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 and losses. The types of demographic assumptions used to measure pension obligations include, but are not limited to, the following:

- Mortality;
- Retirement;
- Termination;
- Disability incidence; and
- Other assumptions such as spouse information, sick leave service credit, optional service purchase, future service accrual rate, and buyout election percentages.

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 procedure for selecting demographic assumptions. The first step 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 termination rate tables for females and males). The final step is to select the specific assumption and evaluate the reasonableness of each assumption. The specific experience of the System should be incorporated but not given undue weight to past experience if recent 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 significant actuarial assumptions is the probability of death, which drives expectations of annuitant longevity and, therefore, the duration of pension payments. The mortality assumption takes the form of a mortality table that contains for each age in the table a probability of a person dying between that age and the next. TRS currently uses four sets of mortality tables for its population: post-retirement mortality, beneficiary mortality, disabled mortality, and pre-retirement mortality.

Section 3: Demographic Assumptions

Mortality Rates *continued*

In 2019, the Society of Actuaries (SOA) published a series of mortality tables derived from public plan experience, referred to as Pub-2010. The published mortality tables are based on three broad categories: teachers, public safety, and general employees. In addition, the study concluded that surviving annuitants demonstrated worse mortality than the primary annuitants. As a result, separate contingent survivor tables were developed.

We analyzed the experience by weighting the probability of death with each annuitant's pension benefit amount. This methodology takes into consideration the correlation between the annuitant mortality and the level of benefit.

In 2008, the SOA published an article recommending that mortality assumptions include an adjustment for credibility. Under this approach, the number of actual deaths in a sub-group needed for "full credibility" is 1,082. Full credibility in this context means 90% confidence that the actual experience will be within 5% of the expected value. Partial credibility can be assigned where actual deaths in a group or sub-group are less than 1,082. Partially credible results can be blended with an appropriate, unadjusted published base table. In some instances, we combine male and female experience of a particular group to improve credibility. While in these instances we show the results of the analysis in this report using male and female experience combined, the actual proposed tables to be used in the actuarial valuations will rely on sex-distinct mortality tables with the same adjustment applied to males and females.

When reviewing the actual experience under each of the four categories below, we compared actual experience with the current mortality table and with the applicable Pub-2010 mortality table. We recommend continuing to use the base tables of the appropriate Pub-2010 mortality tables, with adjustments, where applicable, for TRS-specific experience where credible data exists.

To reflect future improvements in mortality, we recommend updating the mortality projection scale to the 2024 Adjusted MP-2021.

Adjusting for Pandemic-Related Mortality

The experience study period of July 1, 2020, through June 30, 2023, intersects with the timing of the global COVID-19 pandemic. The pandemic created a level of "excess mortality" for a period that we must evaluate in this experience study. In general, to use all mortality data from the experience study as-is with no adjustment – and then fit that data to a recommended mortality assumption – would inherently assume that a pandemic-level event would occur every three years and as a result the level of mortality would be higher than typical pre-pandemic levels.

There are several approaches available to manage the mortality experience in this study to avoid developing an assumption that overstates future mortality. The two options we evaluated in detail for purposes of this experience study were 1) using publicly available information regarding excess mortality to adjust the TRS experience; and 2) ignoring the periods of mortality experience data that were impacted by the pandemic and back-fill with data from the prior experience study.

Section 3: Demographic Assumptions

Mortality Rates continued

Given that this report is typically a study of experience over a three-year period, the inertia is to utilize this experience to the extent possible. Various outlets (e.g., the US Center for Disease Control) collected data on excess mortality experienced during the height of the COVID-19 pandemic. We have used this data to generate adjustment factors to apply to the observed mortality experience of TRS over the experience period. Specifically, we developed adjustment factors based on excess mortality observed in Illinois for males and females between ages 50-84 and 85+. For purposes of our study (and based on available data), we developed and applied adjustment factors for fiscal years ending June 30, 2020, through June 30, 2023, with the factor for fiscal year ending June 30, 2020, reflecting approximately 3 ½ months of excess mortality. The adjustment factors developed and applied to the data are as follows:

Member Status	Fiscal Year Ending June 30, 2020	Fiscal Year Ending June 30, 2021	Fiscal Year Ending June 30, 2022
Active / Inactive	94.5%	89.6%	88.5%
Disabled Retiree	94.1%	86.0%	90.1%
Healthy Beneficiary			
• Male	93.5%	85.5%	88.8%
• Female	94.6%	87.4%	90.7%
Healthy Retiree			
• Male Age 50 – 84	93.2%	86.0%	88.4%
• Male Age 85+	94.5%	84.3%	90.0%
• Female Age 50 – 74	94.8%	88.1%	88.6%
• Female Age 75+	94.6%	87.1%	91.7%

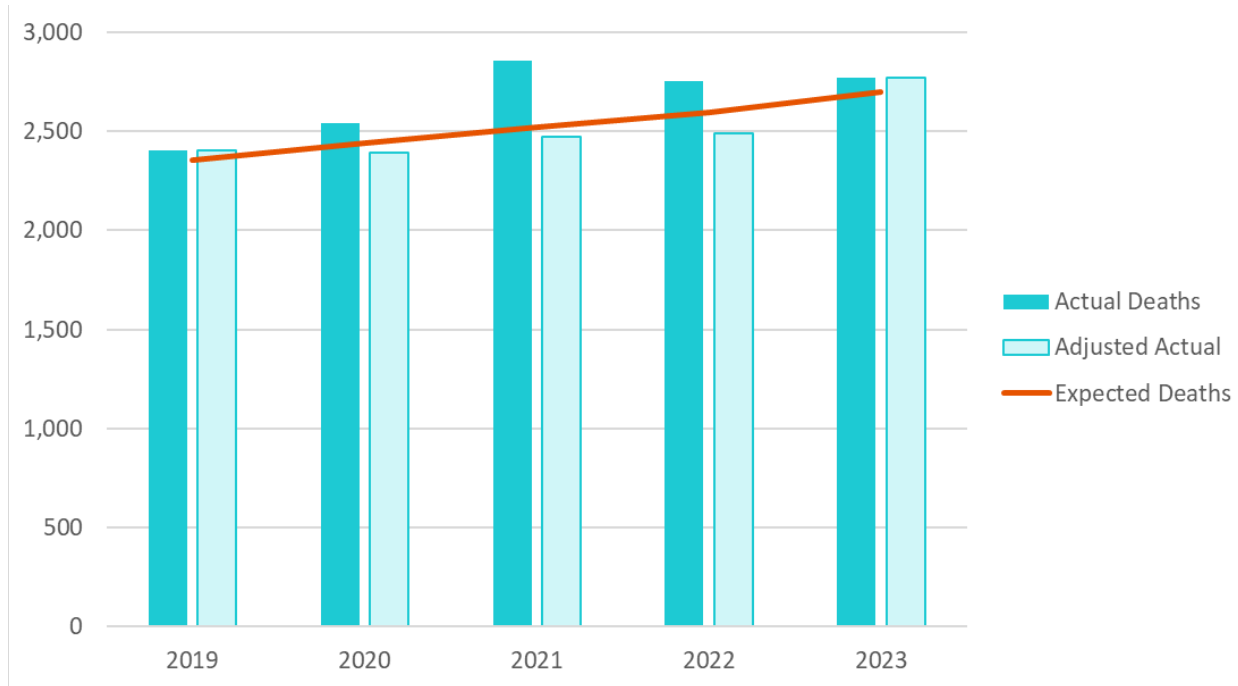
For example, where excess mortality started to spike by the middle of March 2020, the 93.2% factor above for males between the ages of 50 and 84 in 2020 represents an “annualized” adjustment for an effective level of excess mortality of approximately 125% for this cohort from late March 2020 through June 2020. The 84.5% factor for the same cohort in 2021 represents an effective level of excess mortality of approximately 116%.

The chart on the following page illustrates the level of expected, actual and “adjusted actual” retiree mortality over the prior five calendar years. Expected deaths are estimated based on the current mortality assumptions; all values have been adjusted from the benefit-weighted tables to show comparable values on a headcount basis for illustrative purposes.

Section 3: Demographic Assumptions

Mortality Rates continued

Actual Retiree Deaths Relative to Expected
Headcount Basis – Total



Adjusted actual deaths for FY 2020 through FY 2022, fall under the expected line. In aggregate from FY 2020 through FY 2023, total adjusted actual deaths are within 2.7% of expected.

Without relying on any adjustments to the data, but excluding FY 2020 through FY 2022, total actual deaths for FY 2019 and FY 2023 are within 2.4% of expected. Given that either approach will yield a similar outcome, we have based our analysis on the FY 2019 through FY 2023 experience data and applying the adjustments for FY 2020 through FY 2022 as outlined. **Data related to actual mortality during the experience period shown throughout the rest of this section reflects these adjustments.**

Post-Retirement Healthy Mortality

The mortality experience among retirees determines the durations over which retirement benefits are paid. Lower mortality rates mean longer benefit payment periods and, therefore, higher benefit costs.

Currently, TRS uses healthy post-retirement mortality rates based on the PubT-2010 Healthy Retiree Mortality Table and the MP-2020 projection scale. For females, the mortality rates are multiplied by 91% for ages under 75 and 109% for ages 75 and older. For males, the mortality rates are multiplied by 105% for ages under 85 and 115% for ages 85 and older.

Section 3: Demographic Assumptions

Mortality Rates continued

The experience during the five-year study period shows that, for both females and males, fewer members in pay status have died (based on adjusted data) than expected. On a benefit-weighted basis, the adjusted-actual amount of benefits released due to mortality was 97% of expected for females and 95% for males. When compared to the unadjusted PubT-2010 mortality tables, we continue to see a difference in mortality rates between newer and older retirees (ages 75 and 85 were selected as the bifurcation point for females and males, respectively) in the experience for females, where the adjusted-actual amount of benefits released due to mortality prior to age 75 is 91% of expected based on that table yet the adjusted-actual amount of benefits released for ages 75 and later is 103% of expected. For males, the adjusted-actual amount of benefits released due to mortality prior to age 85 is 103% of expected based on that table yet the adjusted-actual amount of benefits released for ages 78 and later is 111% of expected.

Over the five-year experience period and after applying adjustments for excess mortality, there were 7,714 female deaths and 4,817 male deaths, broken out as follows:

Sex	Deaths	Credibility
Female	7,714	N/A
<75	1,615	100.0%
75+	6,099	100.0%
Male	4,817	N/A
<85	2,694	100.0%
85+	2,123	100.0%
Total	12,531	N/A

We used these credibility adjustments to develop the recommended mortality assumption on a sex-distinct basis for rates before and after age 75 for females and age 85 for males. The following table provides a summary of mortality experience (on the basis of annual benefits, in thousands) for healthy annuitants by sex for the study period:

Sex	Exposures	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
Female	\$22,461,390	\$352,097	\$369,867	95%
<75	15,572,809	88,429	89,164	99%
75+	6,888,581	263,668	280,703	94%
Male	\$11,695,117	\$321,137	\$330,237	97%
<85	10,632,864	192,381	196,931	98%
85+	1,062,253	128,756	133,306	97%
Total	\$34,156,507	\$673,234	\$700,104	96%

Section 3: Demographic Assumptions

Mortality Rates continued

The total adjusted amount of benefits released due to healthy post-retirement mortality among the retiree population was approximately \$673,234,000. Applying the exposures to the unadjusted PubT-2010 Healthy Retiree Mortality Table (reflecting the proposed mortality projection scale) results in \$657,282,000 (\$354,360,000 for females and \$302,922,000 for males) in benefits released due to mortality, for an aggregate actual-to-proposed ratio of 102%. When compared to the unadjusted PubT-2010 mortality tables, we continue to see a difference in mortality rates before and after age 75 for females and age 85 for males. Applying credibility-weighted adjustments by sex and age (pre and post age 75 for females and 85 for males) results in a better fit of the published table to this group's own experience, as shown in the table on the following page (on the basis on annual benefits, in thousands):

Sex	Actual Deaths	Unadjusted PubT-2010 Deaths	Ratio of Actual to Unadjusted	Credibility Applied to Actual	Credibility Weighted Deaths	Ratio of Actual to Weighted
Female	\$352,097	\$354,360	99%	N/A	\$352,097	100%
<75	88,429	97,550	91%	100.0%	88,429	100%
75+	263,668	256,810	103%	100.0%	263,668	100%
Male	\$321,137	\$302,922	106%	N/A	\$321,137	100%
<85	192,381	187,090	103%	100.0%	192,381	100%
85+	128,756	115,832	111%	100.0%	128,756	100%
Total	\$673,234	\$657,282	102%	N/A	\$673,234	100%

The adjustments applied to the mortality rates are calculated using Ratio of Actual to Unadjusted and Credibility Applied to Actual. For example, for females below age 75, the adjustment is 91% = (91% x 100.0% + 100% x 0.0%).

The credibility weightings as outlined above applied to the exposures would result in \$673,234,000 in benefits released due to mortality, for an aggregate actual-to weighted rate of 100%. Therefore, **we recommend continued use of the PubT-2010 Healthy Retiree Mortality Table for healthy retirees for females using 91% of the rates prior to age 75 and 103% of the rates for ages 75 and older, and for males using 103% of the rates prior to age 85 and 111% of rates for ages 85 and older.** In aggregate, this assumption would result in \$674,561,000 in benefits released due to mortality and is close to the number of credibility-weighted deaths during the study period.

To reflect future improvements in life expectancy, **we recommend updating the mortality projection scale to MP-2021.**

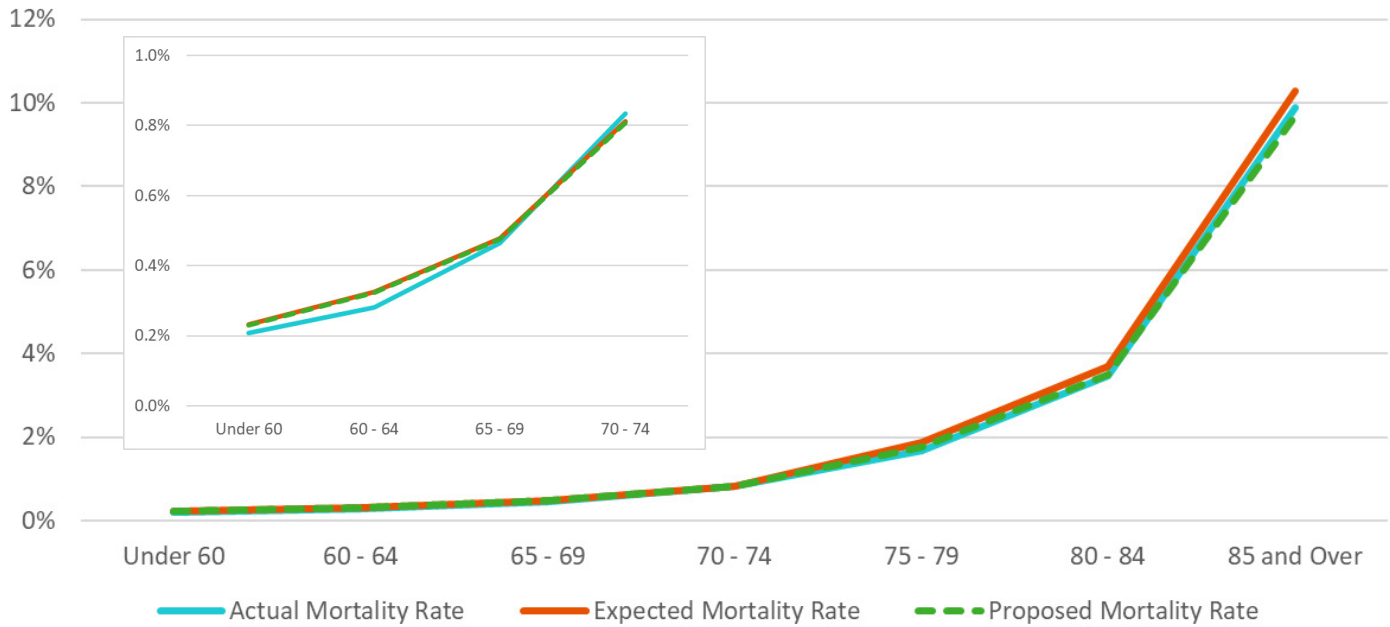
The proposed healthy post-retirement mortality rates are included in Appendix B.

The graphs on the following page show the actual mortality rate, expected mortality rate, and proposed mortality rates by female and male.

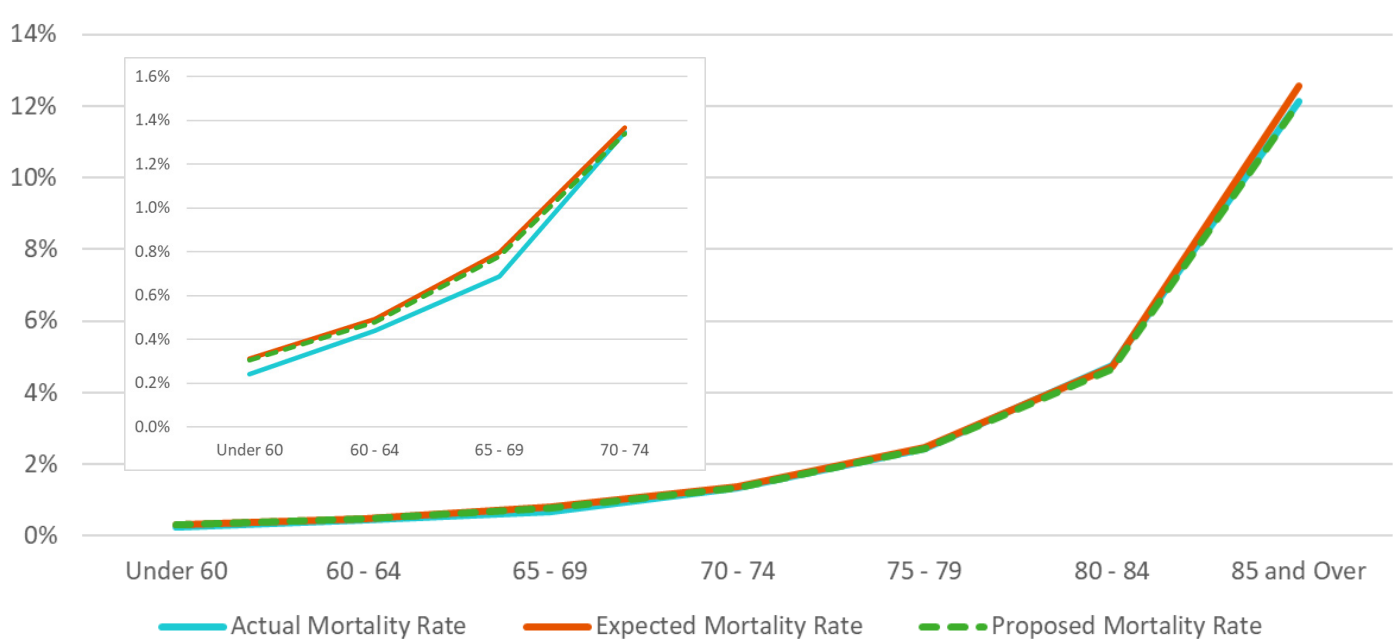
Section 3: Demographic Assumptions

Mortality Rates continued

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis
Healthy Post-Retirement Mortality – Female



Actual, Expected, and Proposed Experience, Benefits-Weighted Basis
Healthy Post-Retirement Mortality – Male



Section 3: Demographic Assumptions

Mortality Rates continued

Beneficiary Mortality

Mortality experience among beneficiaries in pay status is studied separately from retirees. The post-retirement beneficiary mortality table is the Pub-2010 Contingent Survivor Mortality Table, with adjustments for credibility and ex, with generational projection using scale MP-2020. For females, the mortality rates are multiplied by 98% for all ages. For males, the mortality rates are multiplied by 110% for all ages.

The experience during the study period shows that, for both females and males, fewer beneficiaries have died (based on adjusted data) than expected. On a benefit-weighted basis, the adjusted-actual amount of benefits released due to mortality was slightly lower than expected. For females, on a benefit-weighted basis, the adjusted-actual number of deaths was 96% of expected. For males, on a benefit-weighted basis, the adjusted-actual number of deaths was 97% of expected. We believe that the Pub-2010 Contingent Survivor mortality table continues to represent the appropriate base table.

Over the five-year experience period and after applying adjustments for excess mortality, there were 2,110 female and 1,412 male beneficiary deaths, broken out as follows:

Sex	Deaths	Credibility
Female	2,110	100.0%
Male	1,412	100.0%
Total	3,522	N/A

We used these credibility adjustments to develop the recommended mortality assumption on a sex-distinct basis. The following table summarizes the beneficiary annuitant mortality experience (on the basis of annual benefits, in thousands) by sex for the study period:

Sex	Exposures	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
Male	\$485,253	\$29,867	\$30,897	97%
Female	1,204,982	56,626	58,936	96%
Total	\$1,690,235	\$86,493	\$89,833	96%

The total adjusted amount of benefits released due to healthy post-retirement mortality among the beneficiary population was \$86,493,000. Applying the TRS beneficiary exposures to the unadjusted Pub-2010 Contingent Survivor Table (reflecting the proposed mortality projection scale) results in \$88,010,000 in benefits released due to mortality, for an aggregate actual-to-proposed ratio of 98%. Applying credibility-weighted adjustments by gender results in a better fit of the published table to this group's own experience, as shown in the table on the following page:

Section 3: Demographic Assumptions

Mortality Rates continued

Sex	Actual Deaths	Unadjusted Pub-2010 Contingent Survivor Deaths	Ratio of Actual to Unadjusted	Credibility Applied to Actual	Credibility Weighted Deaths	Ratio of Actual to Weighted
Female	\$56,626	\$59,956	94%	100.0%	\$56,626	100%
Male	29,867	28,054	106%	100.0%	29,867	100%
Total	\$86,493	\$88,010	98%	N/A	\$86,493	100%

The adjustments applied to the mortality rates are calculated using Ratio of Actual to Unadjusted and Credibility Applied to Actual. For example, for females, the adjustment is 94% = (94% x 100.0% + 100% x 0.0%).

The credibility weightings as outlined above applied to the TRS beneficiary exposures would result in \$86,493,000 in benefits released due to mortality, for an aggregate actual-to-weighted rate of 100%. Therefore, **we recommend continued use of the Pub-2010 Contingent Survivor Table for female healthy beneficiaries using 94% of the rates for all ages, and for male healthy beneficiaries using 106% of the rates for all ages.** In aggregate, this assumption would result in \$86,097,000 in benefits released due to mortality and is close to the number of credibility-weighted deaths during the study period.

To reflect future improvements in life expectancy, **we recommend updating the mortality projection scale to MP-2021.**

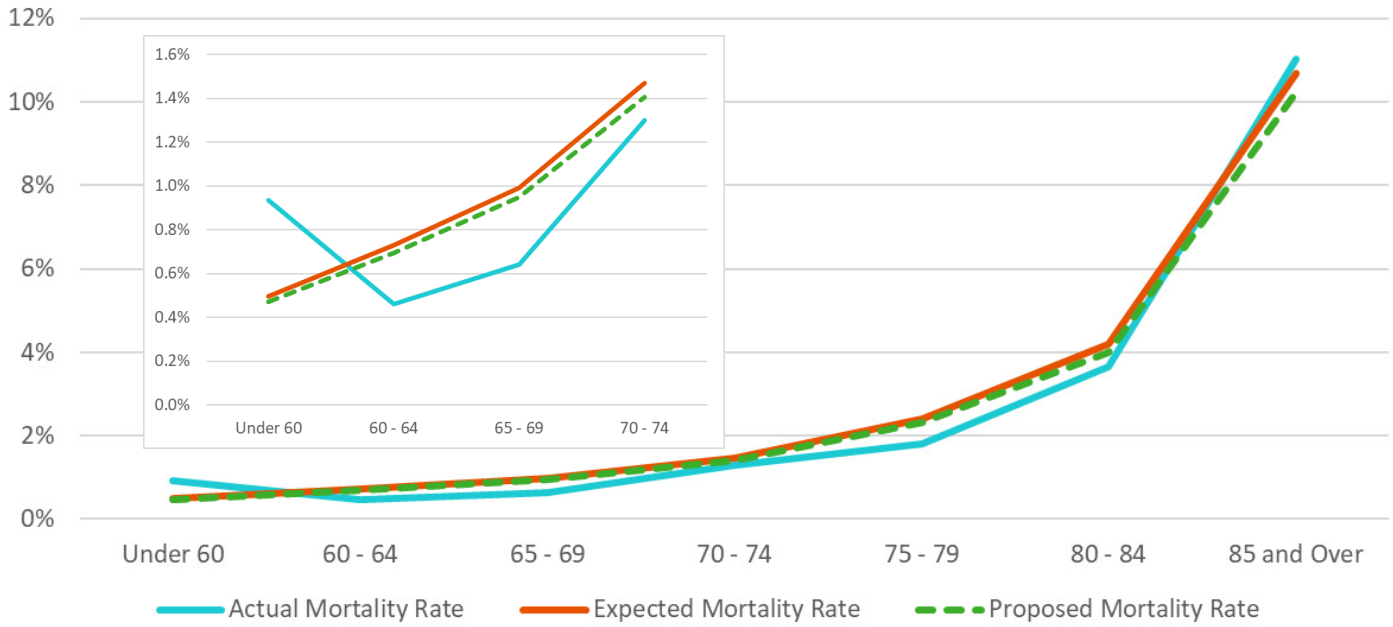
The proposed beneficiary post-retirement mortality rates are included in Appendix B.

The graphs on the following page show the actual mortality rate, expected mortality rate, and proposed mortality rates by female and male.

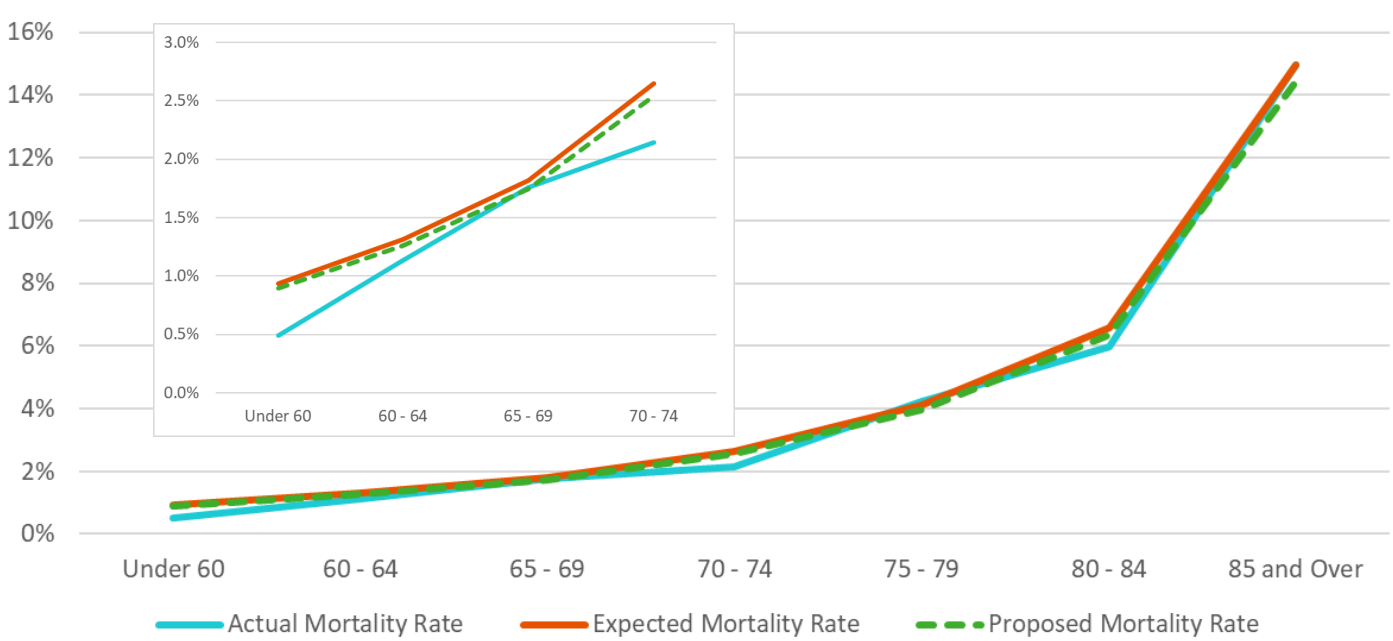
Section 3: Demographic Assumptions

Mortality Rates continued

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis
Healthy Beneficiary Mortality – Female



Actual, Expected, and Proposed Experience, Benefits-Weighted Basis
Healthy Beneficiary Mortality – Male



Section 3: Demographic Assumptions

Mortality Rates continued

Disabled Mortality

Mortality experience among disabled annuitants is studied separately from healthy retirees because of characteristically high levels of mortality exhibited by disability retirees. The current mortality table for all disabled lives is the PubNS-2010 Non-Safety Disabled Retiree Mortality Table for females and males. To reflect future improvements in mortality, rates are projected on a generational basis using the MP-2020 projection scale.

Experience for disabled annuitants (based on adjusted data) has been different than the current assumptions, as the ratio of actual to expected deaths on a benefit-weighted basis is 117% for females and 85% for males. However, we still believe that the Pub-2010 Non-Safety Disabled Lives mortality table continues to represent the appropriate base table.

Over the five-year experience period and after applying the adjustment for excess mortality, there were 130 female and 22 male disabled deaths, broken out as follows:

Sex	Deaths	Credibility
Female	130	34.7%
Male	22	14.4%
Total	152	37.6%

Due to limited experience during the study period, we believe the data is not sufficiently credible to apply any adjustment to the base table. The following table provides a summary of the mortality experience (on the basis of annual benefits, in thousands) for disabled annuitants in total for the study period:

Sex	Exposures	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
Total	\$135,133	\$4,206	\$3,847	109%

The total adjusted amount of benefits released due to mortality among the disability retiree population was \$4,206,000. Applying the TRS disability retiree exposures to the unadjusted PubNS-2010 Disabled Retiree Table (reflecting the proposed mortality projection scale) results in \$3,826,000 in benefits released due to mortality, for an aggregate actual-to-proposed ratio of 110%, as shown in the following table:

Sex	Actual Deaths	Unadjusted PubNS-2010 Contingent Survivor Deaths	Ratio of Actual to Unadjusted	Credibility Applied to Actual	Credibility Weighted Deaths	Ratio of Actual to Weighted
Total	\$4,206	\$3,826	110%	N/A	N/A	N/A

As such, **we recommend continued use of the Pub-2010 Non-Safety Disabled Retiree Mortality Table for female and male disability retirees with no adjustments to rates.**

To reflect future improvements in mortality, **we recommend updating the mortality projection scale to MP-2021.**

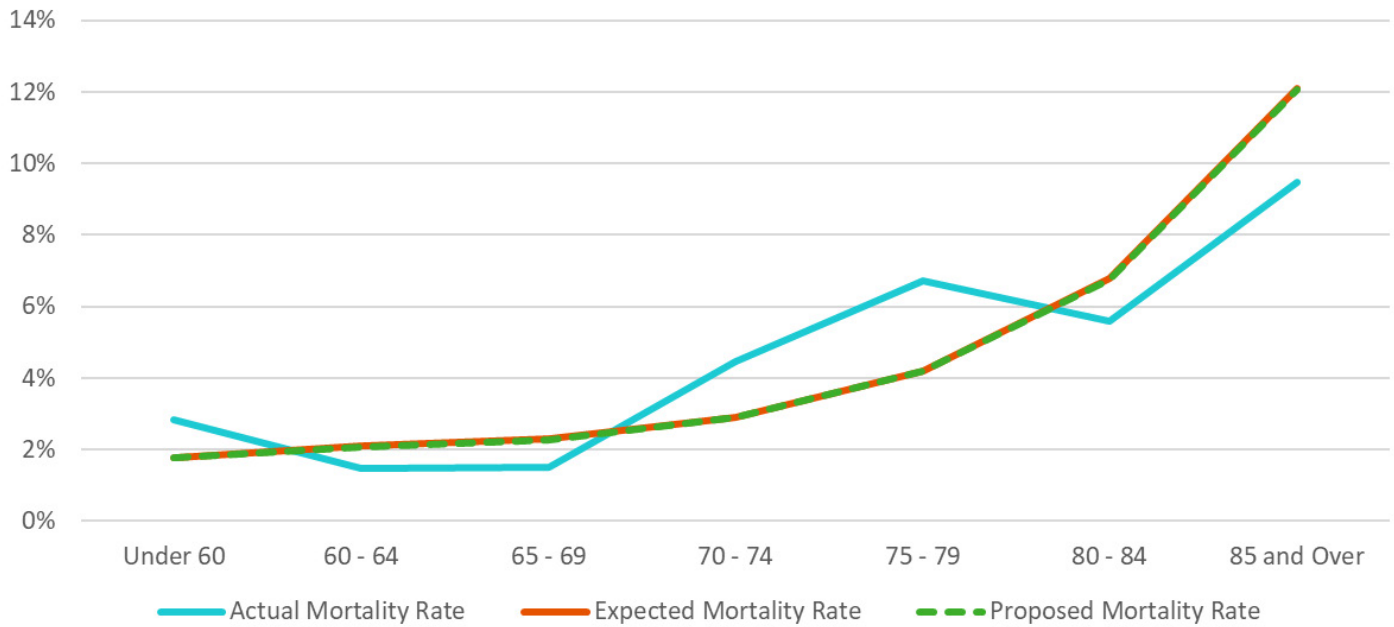
The proposed disabled post-retirement mortality rates are included in Appendix B.

The graphs on the next page show the actual mortality rate, expected mortality rate, and proposed mortality rates by female and male.

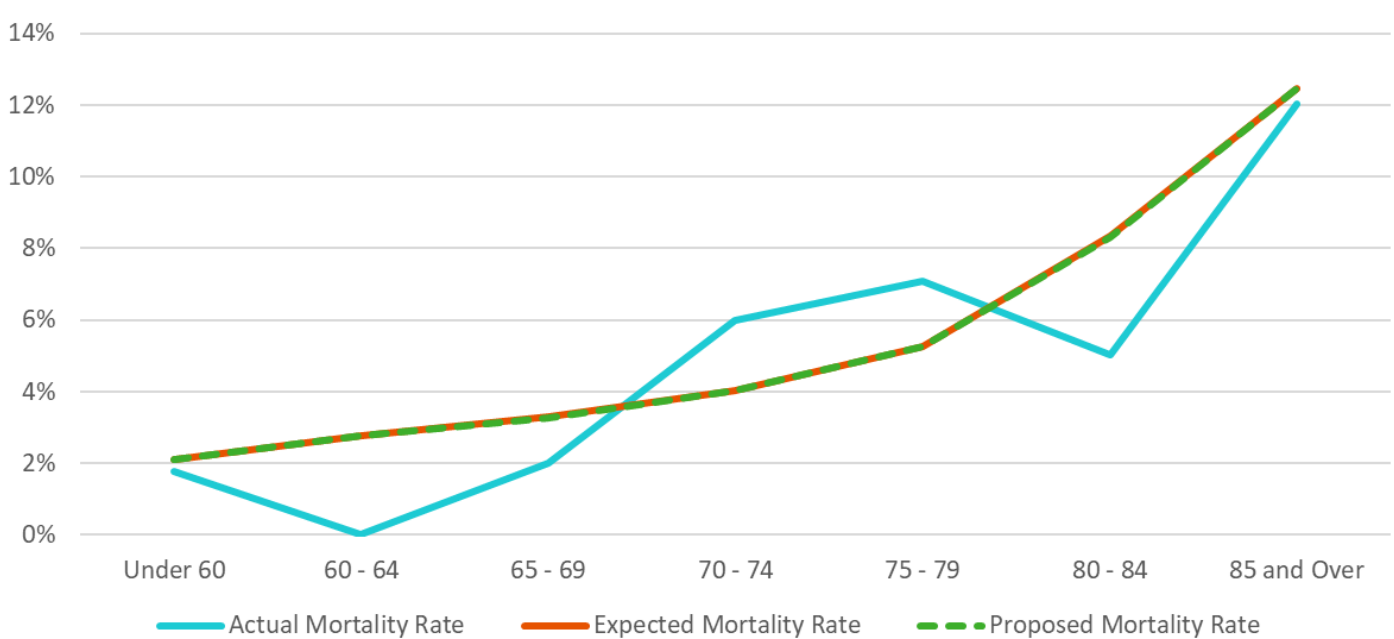
Section 3: Demographic Assumptions

Mortality Rates continued

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis
Disabled Retiree Mortality – Female



Actual, Expected, and Proposed Experience, Benefits-Weighted Basis
Disabled Retiree Mortality – Male



Section 3: Demographic Assumptions

Mortality Rates continued

Pre-Retirement Mortality

The mortality experience of active and terminated vested members should be considered for several reasons. First, in combination with termination and disability rates, the pre-retirement mortality table enables the actuary to estimate the number of individuals who will eventually be eligible for a service retirement benefit, and thereby estimate the liability for those 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 considered in the valuation.

The current mortality assumption for active and terminated vested members is the PubT-2010 Employee Mortality Table using 90% of the rates for females and males for all ages. To reflect future improvements in mortality, rates are projected on a generational basis using the MP-2020 projection scale.

Over the five-year experience period and after applying the adjustment for excess mortality, there were 390 female and 209 male pre-retirement deaths, broken out as follows:

Sex	Deaths	Credibility
Female	390	60.1%
Male	209	43.9%
Total	599	74.4%

To improve the overall credibility of the group, we developed the credibility adjustment used to develop the recommended mortality assumption on a unisex basis. The following table provides a summary of mortality experience (on the basis of annual benefits, in thousands) for active and terminated vested members in total for the study period:

Sex	Exposures	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
Total	\$16,969,655	\$13,903	\$13,664	102%

The total adjusted amount of benefits released due to mortality among the disability retiree population was \$13,903,000. Applying the TRS active and inactive vested member exposures to the unadjusted PubT-2010 Employee Mortality Table results in \$15,078,000 in benefits released due to mortality, for an aggregate actual-to-proposed ratio of 92%. Applying the credibility-weighted adjustment results in a better fit of the published table to this group's own experience, as shown in the following table (on the basis of annual benefits, in thousands):

Sex	Actual Deaths	Unadjusted PubT-2010 Deaths	Ratio of Actual to Unadjusted	Credibility Applied to Actual	Credibility Weighted Deaths	Ratio of Actual to Weighted
Total	\$13,903	\$15,078	92%	74.4%	\$14,204	98%

The adjustments applied to the mortality rates are calculated using Ratio of Actual to Unadjusted and Credibility Applied to Actual. For example, the total adjustment is $94\% = (92\% \times 74.4\% + 100\% \times 25.6\%)$.

Section 3: Demographic Assumptions

Mortality Rates continued

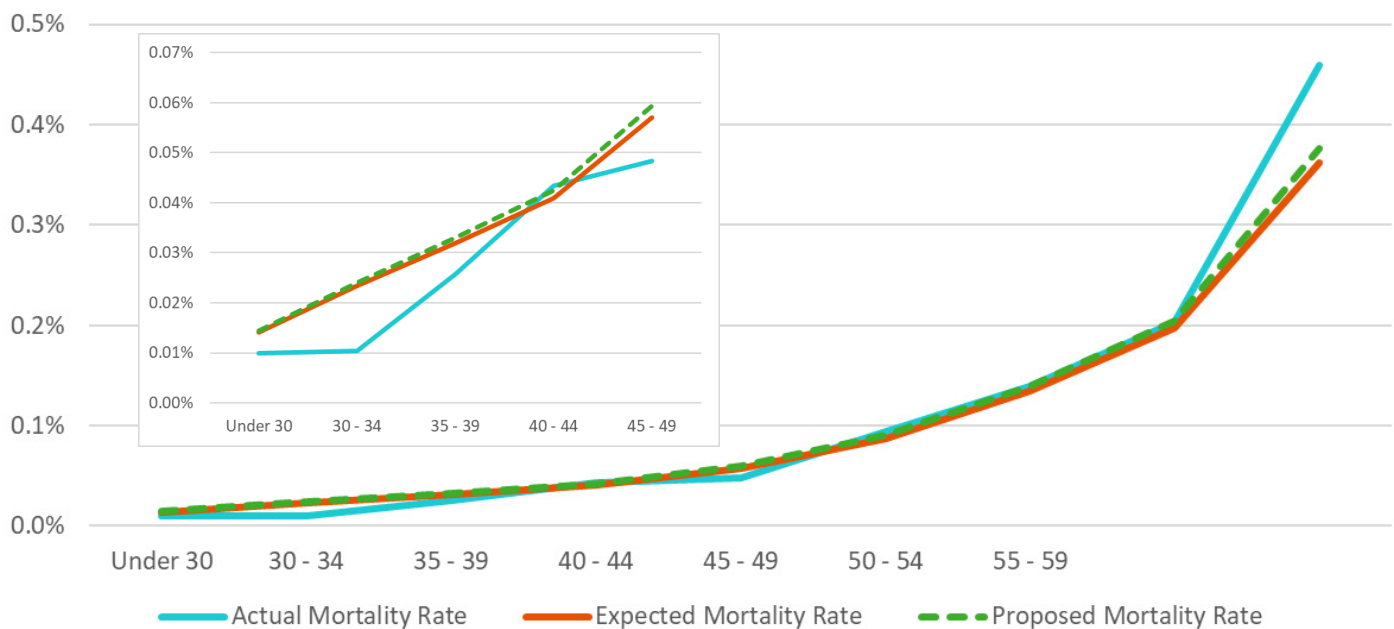
As such, **we recommend continued use of the PubT-2010 Employee Mortality Table for female and male active and inactive vested members using 94% of the rates for all ages.**

To reflect future improvements in mortality, **we recommend updating the mortality projection scale to MP-2021.**

The proposed healthy pre-retirement mortality rates are included in Appendix B.

The following graph shows the actual mortality rate, expected mortality rate, and proposed mortality rate males and females combined (although as noted earlier, the mortality table will be applied on a sex-distinct basis for valuation purposes).

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis
Pre-Retirement Mortality – Unisex



Section 3: Demographic Assumptions

Retirement Rates

Active Retirement

Under the plan, members are eligible to retire following attainment of various eligibilities. The Unreduced Retirement eligibility conditions for the various tiers are:

- Tier 1: Age 60 with 10 years of service or Age 62 with 5 years of service
- Tier 2: Age 67 with 10 years of service

Participants are allowed to retire early with a reduced benefit if they meet the following eligibility:

- Tier 1: Age 55 with 20 years of service (unreduced for members who retire prior to age 60 with 35 years of service)
- Tier 2: Age 62 with 10 years of service

Currently, the retirement assumption used in the valuation is based on the member's age and service. We examined experience by gender to determine whether there is enough difference in male and female experience to warrant using separate sex-distinct tables for the retirement assumption. However, we did not see a notable difference in the experience data to recommend a change in this regard.

The current assumption for Tier 1 retirement uses four unisex tables of age-based rates for members from age 54 to 70, based on the following service bands:

- Less than 19 years of service
- 19 – 29 years of service
- 30 – 33 years of service
- 34 or more years of service

The current assumption for Tier 2 retirement uses a similar set of unisex, age-based tables for members, except that the 30 – 33 years of service band is split into two bands, one for 30 – 31 years of service and the other for 32 – 33 years of service (based on the original assumption used when Tier 2 was first implemented).

We have analyzed retirement experience on a benefit-weighted basis. On average, the actual experience for Tier 1 members under each service band was slightly greater than expected. Therefore, **we recommend adjusting the Tier 1 active retirement rates** to reflect recent plan experience.

There has been very limited experience for Tier 2 members, so **we recommend continued use of the current Tier 2 active retirement assumption**. We believe the current assumed pattern of retirement for Tier 2 members is not unreasonable, and we will continue to track actual Tier 2 retirement experience as it emerges.

Section 3: Demographic Assumptions

Retirement Rates continued

The following tables and graphs show the actual active retirement experience for the study period compared to the current and proposed assumptions. The proposed Tier 1 active retirement rates for all ages and service bands are included in Appendix C.

Tier 1 Active Member Retirement, Less Than 19 Years of Service – Unisex

Age	Exposures (Benefits in 000s)	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
60	\$32,532	23.63%	21.00%	113%	23.00%	103%
61	24,284	15.78%	17.00%	93%	16.00%	99%
62	21,932	16.83%	17.00%	99%	17.00%	99%
63	17,312	16.54%	16.00%	103%	16.00%	103%
64	14,035	26.37%	26.00%	101%	26.00%	102%
65	10,122	30.54%	27.00%	113%	28.00%	108%
66	7,389	27.00%	23.00%	117%	25.00%	109%
67	4,731	25.12%	25.00%	100%	25.00%	100%
68	3,265	23.62%	23.00%	103%	23.00%	103%
69	2,086	30.85%	28.00%	110%	29.00%	106%
Total	\$137,688	21.40%	20.38%	105%	20.86%	103%

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis Tier 1 Active Member Retirement, Less Than 19 Years of Service – Unisex



Section 3: Demographic Assumptions

Retirement Rates continued

Tier 1 Active Member Retirement, 19 – 29 Years of Service – Unisex

Age	Exposures (Benefits in 000s)	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
55	\$200,508	7.16%	6.00%	119%	7.00%	102%
56	161,061	6.97%	6.00%	116%	7.00%	100%
57	140,135	10.11%	7.00%	144%	9.00%	112%
58	123,837	12.09%	8.00%	151%	10.00%	121%
59	116,177	36.52%	33.00%	111%	35.00%	104%
60	85,931	36.72%	33.00%	111%	35.00%	105%
61	59,281	25.76%	28.00%	92%	27.00%	95%
62	45,819	26.04%	28.00%	93%	27.00%	96%
63	39,146	27.30%	29.00%	94%	28.00%	94%
64	31,757	39.50%	40.00%	99%	40.00%	99%
65	21,598	41.18%	40.00%	103%	41.00%	100%
66	13,901	34.80%	42.00%	83%	38.00%	89%
67	10,953	39.35%	39.00%	101%	39.00%	101%
68	7,112	32.05%	39.00%	82%	35.00%	92%
69	4,764	41.13%	38.00%	108%	40.00%	100%
Total	\$1,061,979	18.97%	17.41%	109%	18.25%	103%

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis Tier 1 Active Member Retirement, 19 – 29 Years of Service – Unisex



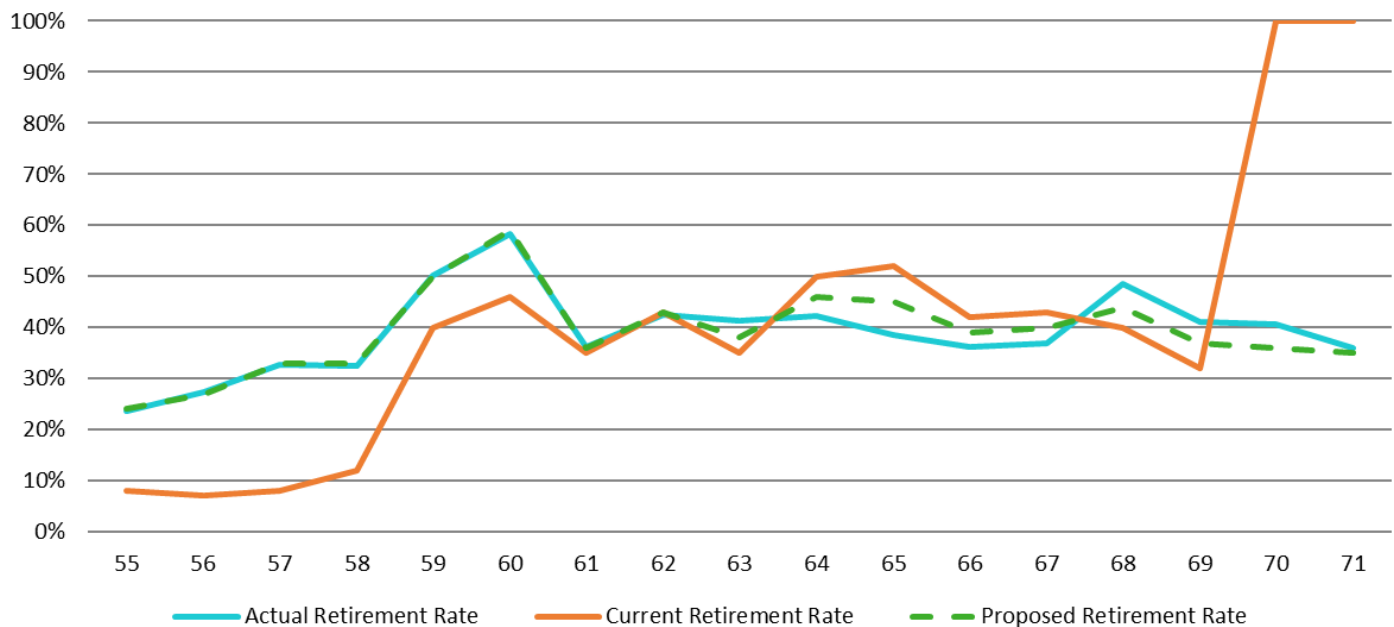
Section 3: Demographic Assumptions

Retirement Rates continued

Tier 1 Active Member Retirement, 30 – 33 Years of Service – Unisex

Age	Exposures (Benefits in 000s)	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
55	\$195,944	23.67%	8.00%	296%	24.00%	99%
56	156,988	27.24%	7.00%	389%	27.00%	101%
57	109,450	32.63%	8.00%	408%	33.00%	97%
58	80,561	32.57%	12.00%	271%	33.00%	99%
59	58,500	50.29%	40.00%	126%	50.00%	101%
60	33,463	58.39%	46.00%	127%	59.00%	99%
61	14,950	36.27%	35.00%	104%	36.00%	101%
62	12,457	42.53%	43.00%	99%	43.00%	100%
63	9,115	41.27%	35.00%	118%	38.00%	107%
64	6,467	42.24%	50.00%	84%	46.00%	92%
65	4,677	38.43%	52.00%	74%	45.00%	85%
66	2,494	36.32%	42.00%	86%	39.00%	94%
67	1,538	36.90%	43.00%	86%	40.00%	93%
68	1,878	48.44%	40.00%	121%	44.00%	108%
69	897	41.05%	32.00%	128%	37.00%	111%
70	1,195	40.65%	100.00%	41%	36.00%	113%
71	798	35.92%	100.00%	36%	35.00%	103%
Total	\$691,372	32.19%	15.63%	206%	32.46%	99%

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis Tier 1 Active Member Retirement, 30 – 33 Years of Service – Unisex



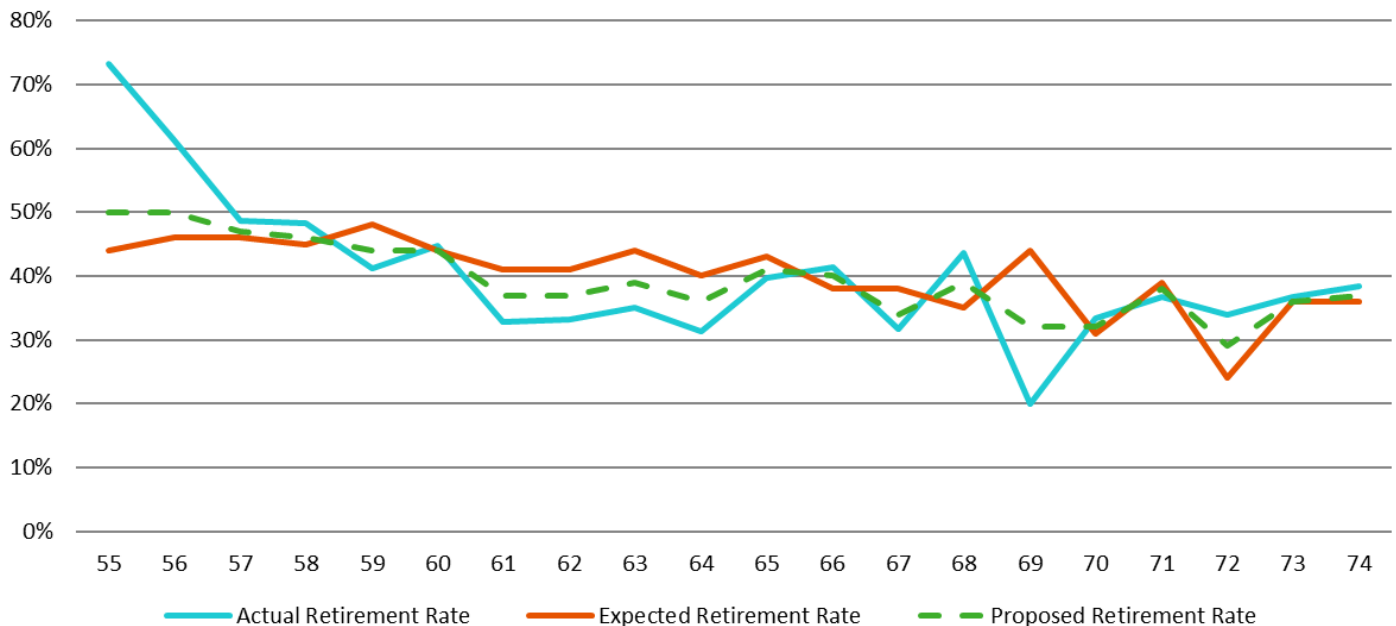
Section 3: Demographic Assumptions

Retirement Rates continued

Tier 1 Active Member Retirement, 34 or More Years of Service – Unisex

Age	Exposures (Benefits in 000s)	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
55	\$657	73.20%	44.00%	166%	50.00%	146%
56	16,973	61.23%	46.00%	133%	50.00%	122%
57	23,659	48.64%	46.00%	106%	47.00%	104%
58	24,735	48.27%	45.00%	107%	46.00%	105%
59	21,920	41.24%	48.00%	86%	44.00%	94%
60	16,951	44.72%	44.00%	102%	44.00%	101%
61	11,778	32.77%	41.00%	80%	37.00%	89%
62	8,347	33.25%	41.00%	81%	37.00%	90%
63	8,592	35.05%	44.00%	80%	39.00%	89%
64	5,453	31.38%	40.00%	78%	36.00%	86%
65	4,398	39.74%	43.00%	92%	41.00%	97%
66	2,964	41.42%	38.00%	109%	40.00%	103%
67	2,727	31.74%	38.00%	84%	34.00%	93%
68	2,430	43.64%	35.00%	125%	39.00%	110%
69	2,821	19.98%	44.00%	45%	32.00%	62%
70	2,715	33.43%	31.00%	108%	32.00%	104%
71	1,650	36.66%	39.00%	94%	38.00%	96%
72	764	33.88%	24.00%	141%	29.00%	112%
73	437	36.76%	36.00%	102%	36.00%	99%
74	262	38.46%	36.00%	107%	37.00%	93%
Total	\$160,233	43.56%	43.92%	99%	43.04%	101%

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis Tier 1 Active Member Retirement, 34 or More Years of Service – Unisex



Section 3: Demographic Assumptions

Retirement Rates continued

Inactive Vested Retirement

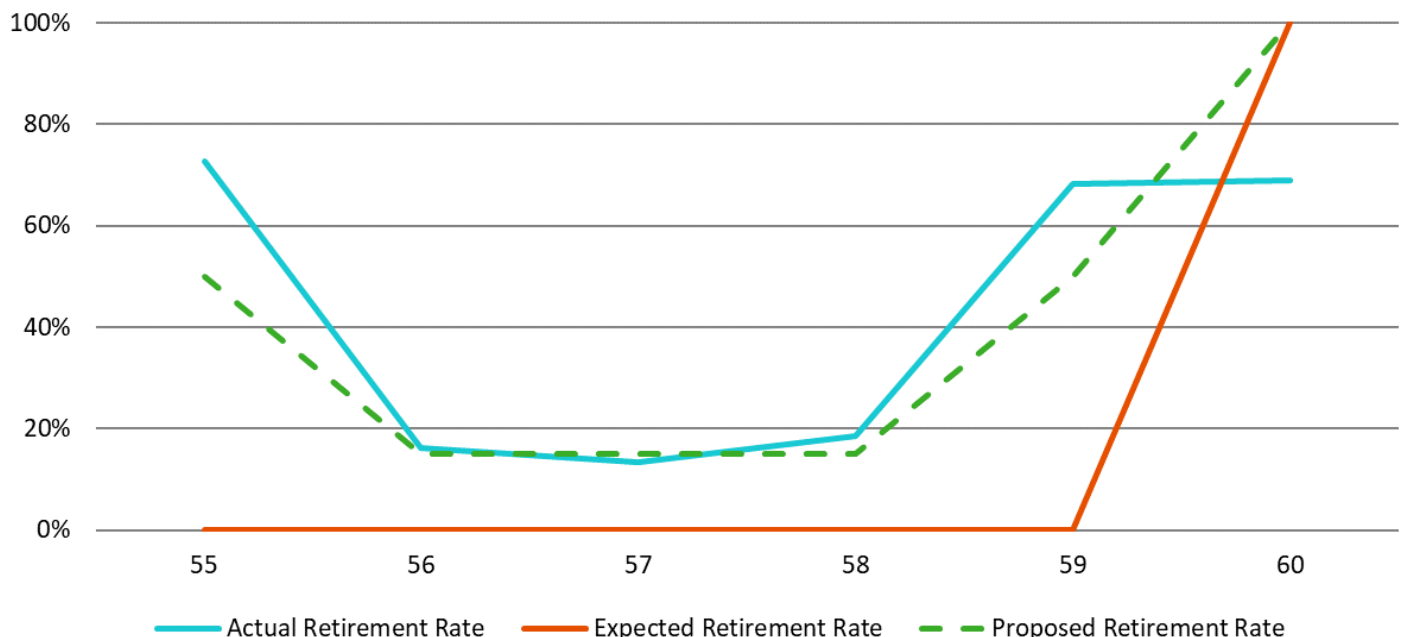
The current assumption is that 100% of inactive members who terminated employer with less than five years of service elect to withdraw their contributions. Current inactive members who are assumed to leave their contributions in the plan to be eligible for a benefit at their retirement date are assumed to retire at first eligibility for an unreduced pension benefit.

We reviewed actual experience related to inactive vested members. Actual experience shows that members retired earlier than expected. Based on the Tier 1 experience over the three-year study period, **we recommend maintaining the current assumption but adding retirement rates at Early Retirement ages for Tier 1 members.** While there has been very limited Tier 2 inactive vested retirement experience, **we also recommend adding the same rates for Tier 2 inactive vested members at their applicable Early Retirement ages,** assuming Tier 2 will mimic Tier 1 behavior.

Tier 1 Inactive Vested Retirement, 10 or More Years of Service – Unisex

Age	Exposures (Benefits in 000s)	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
55	\$6,383	72.74%	N/A	N/A	50.00%	145%
56	5,080	16.17%	N/A	N/A	15.00%	108%
57	4,806	13.37%	N/A	N/A	15.00%	89%
58	4,780	18.57%	N/A	N/A	15.00%	124%
59	9,484	68.18%	N/A	N/A	50.00%	136%
60	13,201	68.91%	100.00%	69%	100.00%	69%
Total	\$43,733	51.58%	30.19%	171%	53.36%	97%

Actual, Expected, and Proposed Experience, Benefits-Weighted Basis Tier 1 Inactive Vested Retirement, 10 or More Years of Service – Unisex



Section 3: Demographic Assumptions

Termination

The termination rates used in annual actuarial valuations project the percentage of employees at each age or service duration that are expected to terminate membership before retirement. These rates take account of possible terminations for 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 that become payable to other members. In some cases, members who leave the plan with five or more years of service and are eligible for deferred vested benefits withdraw their deposits, thus forfeiting the portion of their accrued benefit rights based on employer contributions.

The termination experience studied includes all terminations of active employment for members not vested at termination (since such members are not eligible for other benefits, termination of employment will, most likely, result in a withdrawal of employee contributions), and terminations of membership for members who were vested and either withdrew their contributions or are eligible for future benefits. Rehired members offset the vested terminations in order to determine the “net” terminations for each year of the study period. Note that this analysis excludes hourly and substitute teachers due to their high turnover rate that would overstate the probability of turnover for full-time teachers.

The current assumption for termination uses sex-distinct “select and ultimate” tables based on the members’ age and service. The current assumption has separate age-based rates for members with less than five years of service and for members with five or more years of service.

We have analyzed the ultimate period to determine if the select period should be extended or eliminated and recommend that the current select period be retained. Proposed rates of termination have been developed based on weighting the current assumption (i.e., historical experience) and recent experience by 50%.

Select Termination Rates

The current select termination assumptions are sex-distinct and based on members’ age. Based on our analysis, **we recommend that the sex-distinct basis be retained and that the select termination rates be modified** (primarily increased for younger ages and decreased for older ages) to reflect recent plan experience.

The tables and graphs on the following pages show the actual, expected, and proposed select termination rates based on age and sex.

Section 3: Demographic Assumptions

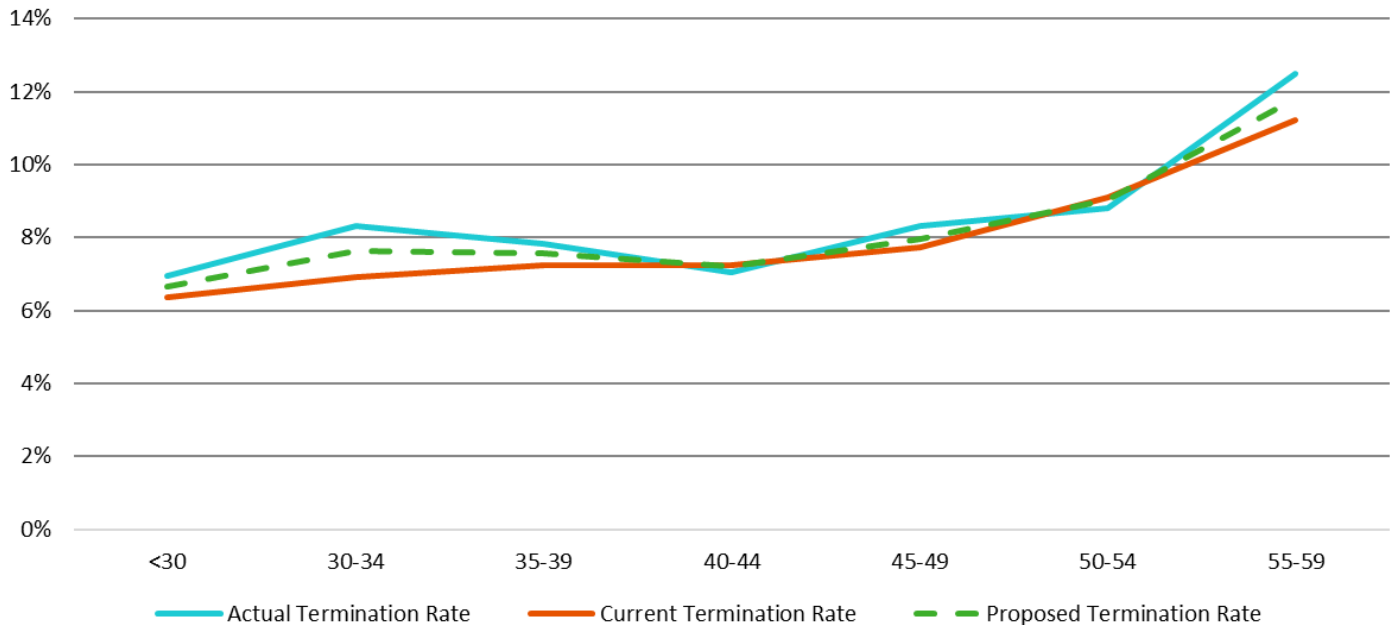
Termination continued

Select Period Termination, Less Than Five Years of Service – Females

Age	Exposures	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
Less Than 30	32,648	6.96%	6.37%	109%	6.65%	105%
30 – 34	10,563	8.33%	6.93%	120%	7.63%	109%
35 – 39	6,986	7.84%	7.25%	108%	7.56%	104%
40 – 44	6,148	7.06%	7.25%	97%	7.21%	98%
45 – 49	4,374	8.32%	7.72%	108%	7.97%	104%
50 – 54	3,012	8.80%	9.11%	97%	9.03%	97%
55 – 59	1,520	12.50%	11.21%	112%	11.79%	106%
Total	65,251	7.59%	6.97%	109%	7.28%	104%

Actual, Expected, and Proposed Experience

Select Period Termination, Less Than Five Years of Service – Females



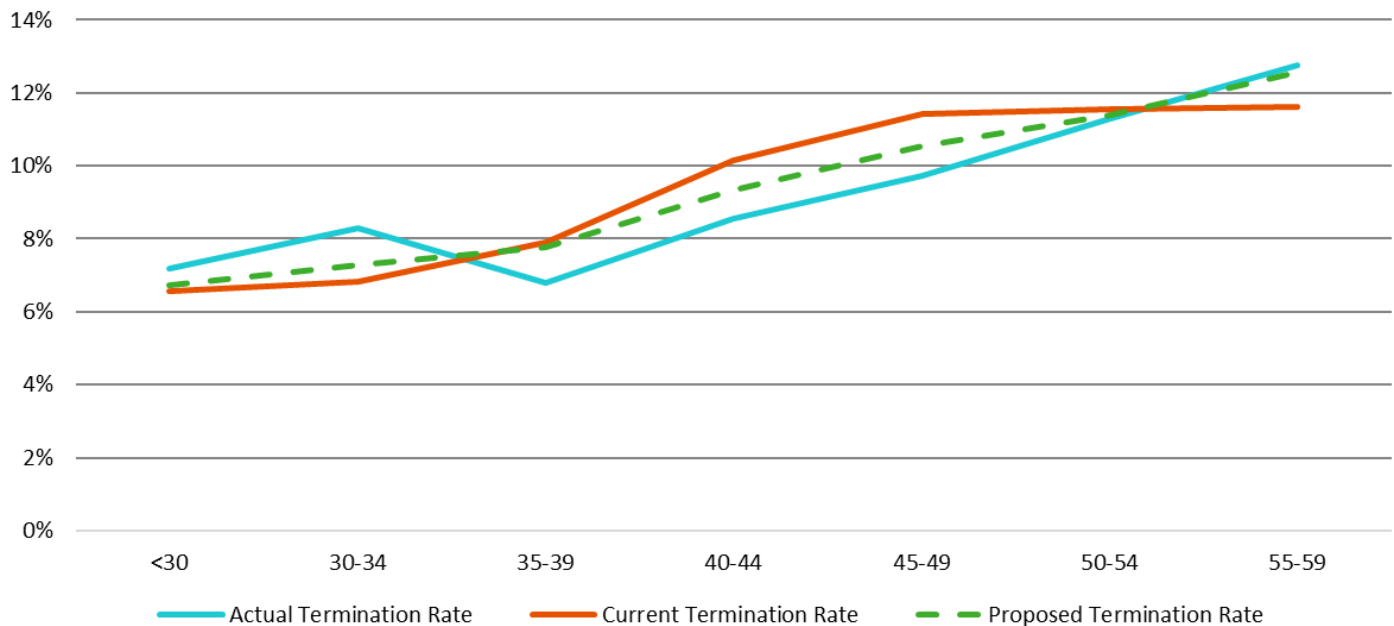
Section 3: Demographic Assumptions

Termination continued

Select Period Termination, Less Than Five Years of Service – Males

Age	Exposures	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
Less Than 30	7,323	7.20%	6.57%	110%	6.73%	107%
30 – 34	3,115	8.28%	6.84%	121%	7.27%	114%
35 – 39	2,077	6.79%	7.91%	86%	7.76%	87%
40 – 44	1,533	8.55%	10.15%	84%	9.34%	91%
45 – 49	996	9.74%	11.43%	85%	10.53%	92%
50 – 54	681	11.31%	11.56%	98%	11.40%	99%
55 – 59	525	12.76%	11.61%	110%	12.57%	101%
Total	16,250	7.99%	7.80%	102%	7.93%	102%

Actual, Expected, and Proposed Experience Select Period Termination, Less Than Five Years of Service – Males



Ultimate Termination Rates

The current ultimate termination assumptions are sex-distinct and based on members' age. Based on our analysis, **we recommend that the sex-distinct basis be retained and that the ultimate termination rates be modified** (primarily increased for younger ages and decreased for older ages) to reflect recent plan experience.

The tables and graphs on the next page show the actual, expected, and proposed ultimate termination rates based on age and sex.

Section 3: Demographic Assumptions

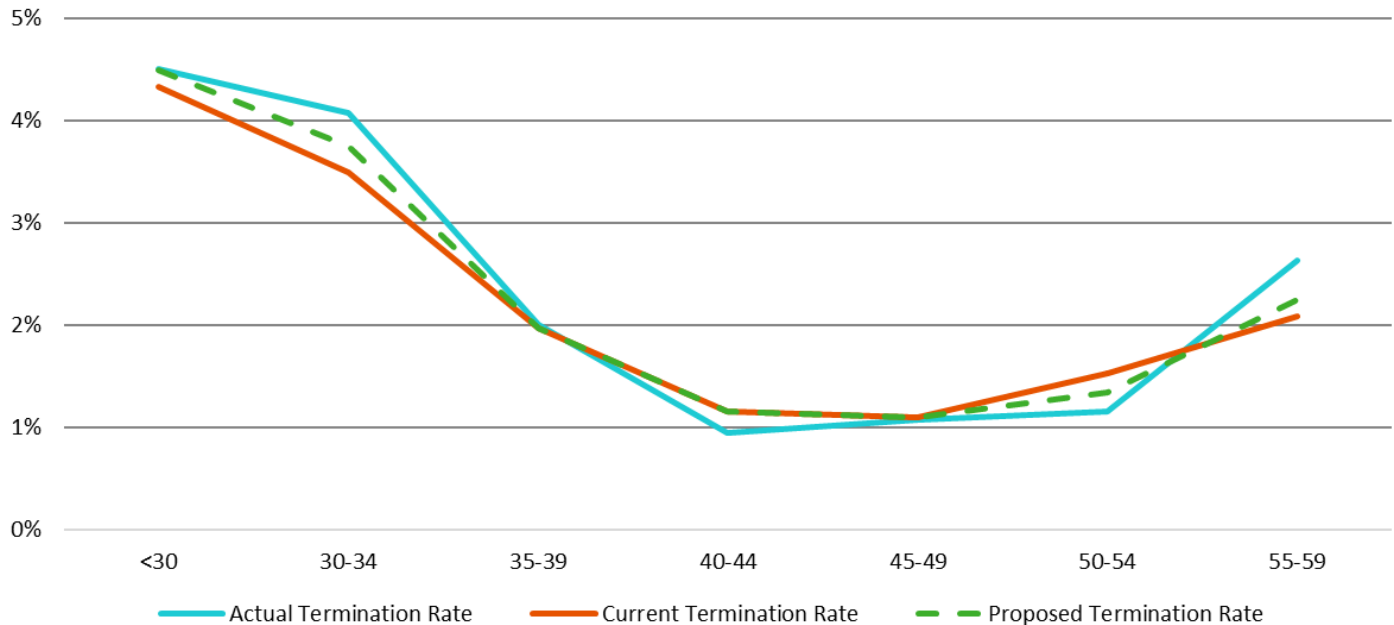
Termination continued

Ultimate Period Termination, Five or More Years of Service – Females

Age	Exposures	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
Less Than 30	\$8,617	4.50%	4.33%	104%	4.50%	100%
30 – 34	31,670	4.08%	3.49%	117%	3.75%	109%
35 – 39	44,670	2.00%	1.97%	102%	1.97%	102%
40 – 44	49,696	0.94%	1.15%	82%	1.15%	82%
45 – 49	45,006	1.07%	1.10%	98%	1.10%	98%
50 – 54	41,498	1.16%	1.53%	75%	1.34%	86%
55 – 59	10,145	2.63%	2.09%	126%	2.25%	117%
Total	\$231,302	1.85%	1.85%	100%	1.86%	99%

Actual, Expected, and Proposed Experience

Ultimate Period Termination, Five or More Years of Service – Females



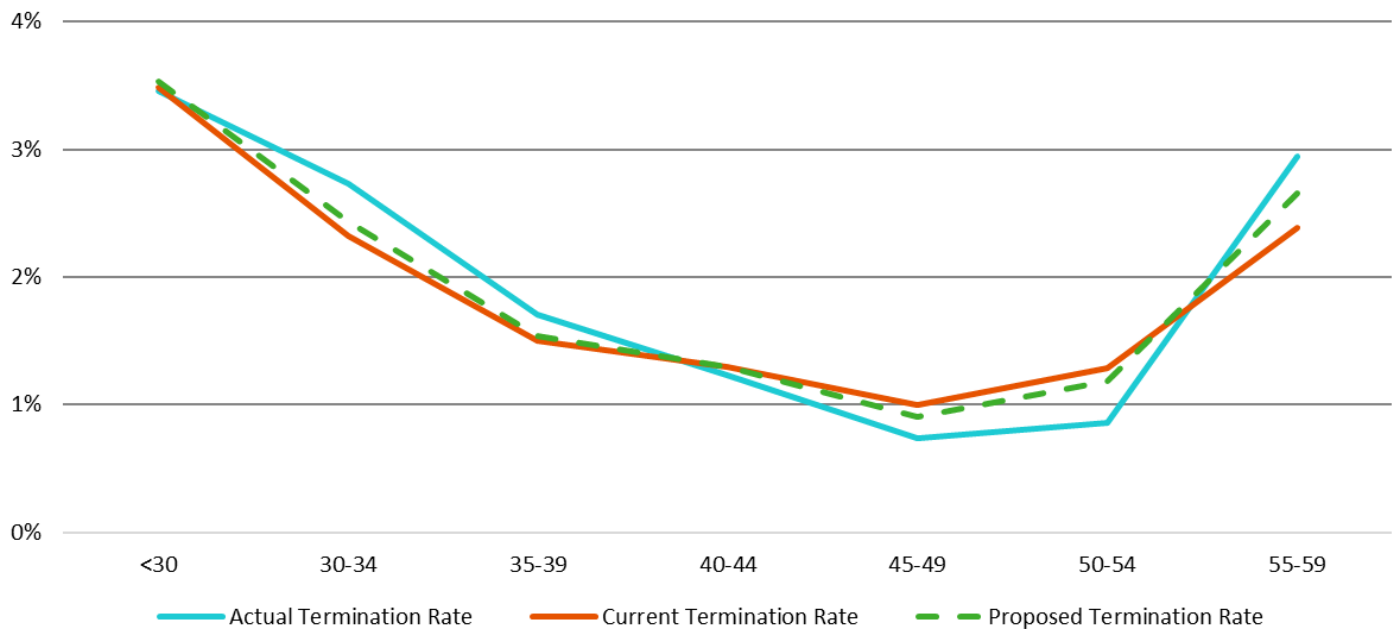
Section 3: Demographic Assumptions

Termination continued

Ultimate Period Termination, Five or More Years of Service – Males

Age	Exposures	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
Less Than 30	\$1,706	3.46%	3.48%	99%	3.53%	98%
30 – 34	8,721	2.73%	2.32%	118%	2.43%	112%
35 – 39	14,254	1.70%	1.50%	114%	1.54%	111%
40 – 44	16,449	1.23%	1.30%	94%	1.30%	94%
45 – 49	15,416	0.73%	1.00%	73%	0.90%	81%
50 – 54	13,801	0.86%	1.28%	67%	1.18%	72%
55 – 59	2,210	2.94%	2.38%	123%	2.66%	111%
Total	\$72,557	1.43%	1.48%	97%	1.47%	97%

Actual, Expected, and Proposed Experience Ultimate Period Termination, Five or More Years of Service – Males



Section 3: Demographic Assumptions

Disability Retirement

Disability incidence rate tables function in the same way as retirement rate 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, since anyone who becomes disabled is not projected to receive retirement benefits other than the disability benefit.

The current disability rates are based on members' age and sex. Overall, the number of actual disabilities were less than the number of assumed disabilities for both females and males. The following table summarizes the disability retirement experience by sex for the study period:

Sex	Exposures	Actual Disabilities	Expected Disabilities	Ratio of Actual to Expected
Female	349,135	210	323	65%
Male	104,946	31	50	62%
Total	454,081	241	373	66%

In light of the above, considering the small sample size, **we recommend maintaining a sex-distinct, age-based table with a uniform reduction of 30% for females and 35% for males applied to the current disability rates for all ages** to better match recent plan experience.

The complete listing of the proposed disability rates is included in Appendix E.

The following tables and graphs show the actual, expected, and proposed select termination rates based on age and sex.

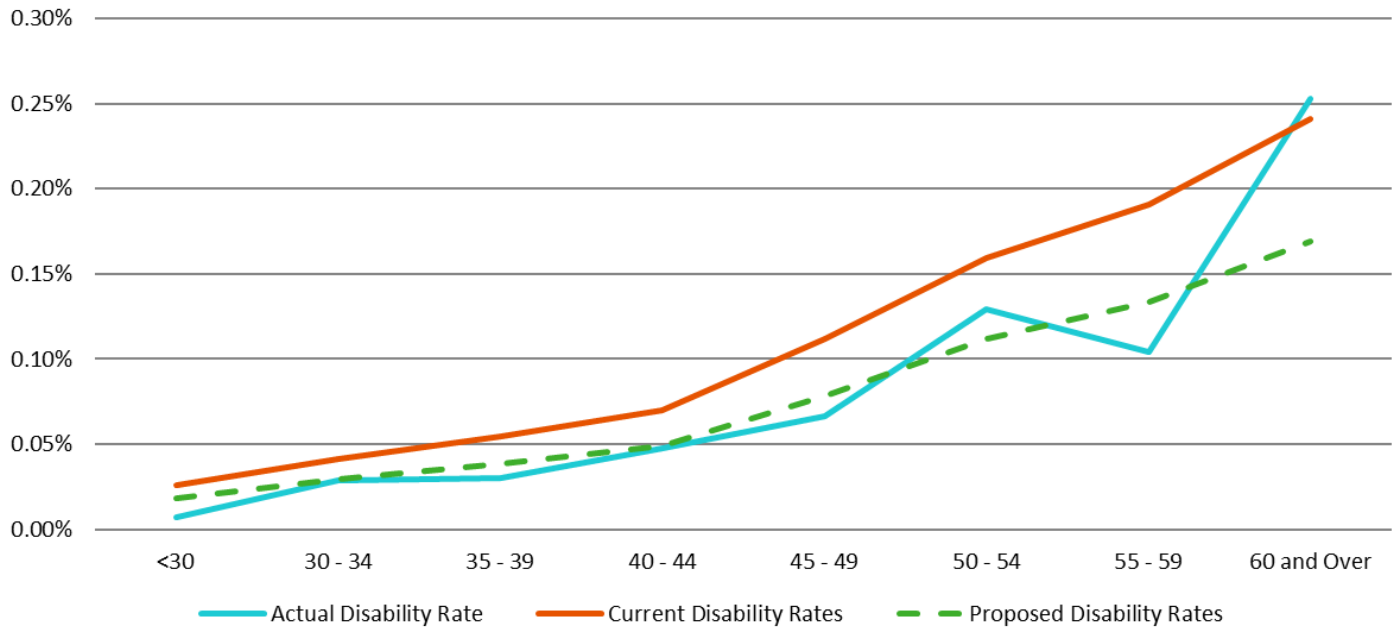
Section 3: Demographic Assumptions

Disability Retirement continued

Disability Retirement – Females

Age	Exposures (Benefits in 000s)	Actual Disability Rate	Expected Disability Rate	Ratio of Actual to Expected	Proposed Disability Rate	Ratio of Actual to Proposed
Less Than 30	\$881,539	0.01%	0.03%	28%	0.02%	40%
30 – 34	1,055,002	0.03%	0.04%	70%	0.03%	99%
35 – 39	1,523,941	0.03%	0.05%	55%	0.04%	79%
40 – 44	1,848,795	0.05%	0.07%	68%	0.05%	96%
45 – 49	1,753,918	0.07%	0.11%	59%	0.08%	85%
50 – 54	1,665,157	0.13%	0.16%	81%	0.11%	116%
55 – 59	1,057,671	0.10%	0.19%	54%	0.13%	78%
60 and Over	69,728	0.25%	0.24%	105%	0.17%	150%
Total	\$9,855,751	0.06%	0.10%	66%	0.07%	94%

Actual, Expected, and Proposed Experience Disability Retirement – Females



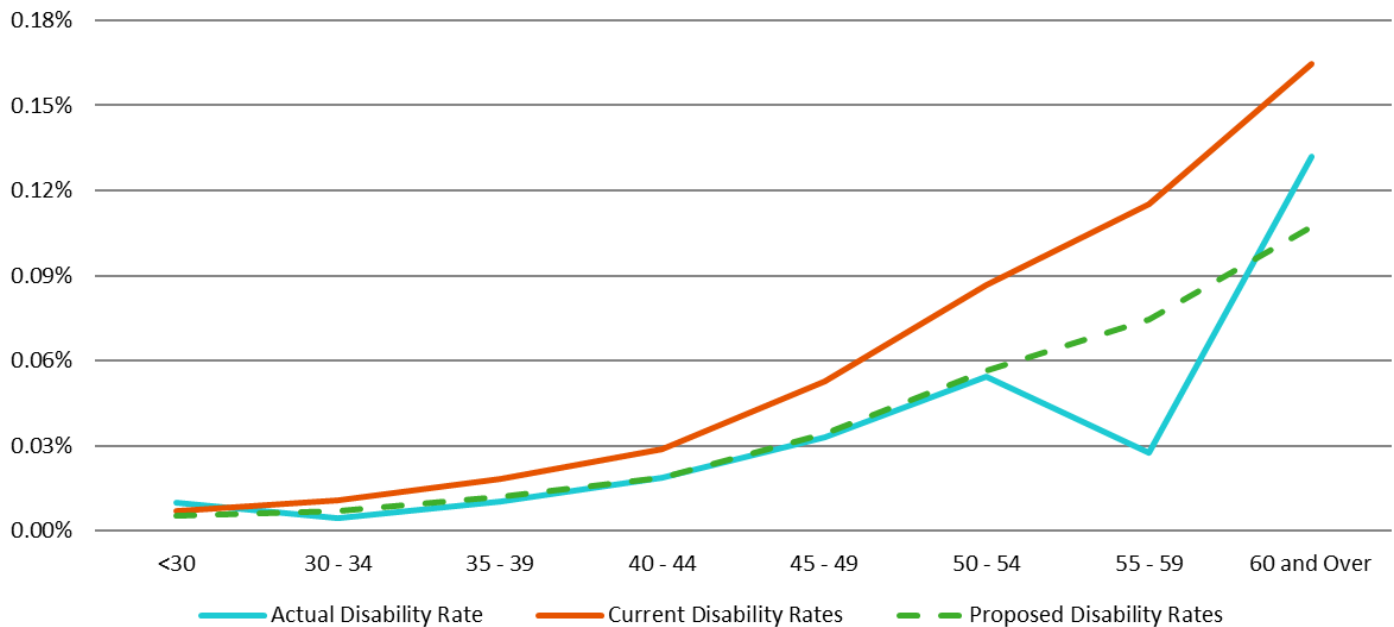
Section 3: Demographic Assumptions

Disability Retirement continued

Disability Retirement – Males

Age	Exposures (Benefits in 000s)	Actual Retirement Rate	Expected Retirement Rate	Ratio of Actual to Expected	Proposed Retirement Rate	Ratio of Actual to Proposed
Less Than 30	\$209,716	0.01%	0.01%	142%	0.01%	183%
30 – 34	330,543	0.00%	0.01%	42%	0.01%	64%
35 – 39	545,149	0.01%	0.02%	55%	0.01%	84%
40 – 44	688,286	0.02%	0.03%	65%	0.02%	100%
45 – 49	695,720	0.03%	0.05%	62%	0.03%	96%
50 – 54	658,994	0.05%	0.09%	63%	0.06%	97%
55 – 59	399,319	0.03%	0.12%	24%	0.07%	37%
60 and Over	30,391	0.13%	0.16%	80%	0.11%	123%
Total	\$3,558,119	0.03%	0.05%	53%	0.03%	82%

Actual, Expected, and Proposed Experience Disability Retirement – Males



Section 3: Demographic Assumptions

Other Demographic Assumptions

Spouse Information

Spouse information assumptions that affect the valuation include the percentage of members married and the age difference of spouses. The current assumptions are:

- 85% of active members are married;
- Male spouses are three years older than female spouses; and
- 100% of spouses are of the opposite sex.

We have limited data on marital status and spouse information. However, the current assumptions are reasonable and consistent with assumptions used for similar plans. Therefore, **we recommend no changes to the current assumptions.**

Sick Leave Service Credit

The liability for retirement benefits for active members is increased to cover assumed unused and uncompensated sick leave service credit at retirement. The current assumption is based on service at retirement.

The following table summarizes the experience for the plan during the study period.

Actual Sick Leave Credit	Expected Sick Leave Credit	Actual to Expected	Proposed Sick Leave Credit	Ratio of Actual to Proposed
10,481	10,393	101%	10,349	101%

Overall, plan experience, on average, is consistent with the current assumption, although it is inconsistent at individual service levels (e.g., assumed service credit for low-service retirements are overstated while high-service retirements are understated). In light of the above, **we recommend slightly adjusting sick leave service credit rates** to better reflect plan experience. The proposed sick leave service credits have been developed based on weighting the current assumption (i.e., historical experience) and recent experience by 50%.

The complete listing of the proposed sick leave service credit rates is included in Appendix F.

Optional Service Purchase

The liability for retirement benefits for active members who have not previously purchased optional service is increased to cover the employer cost of out-of-system service purchased in the last two years prior to retirement. The current assumption is based on service at retirement.

Overall, plan experience, on average, shows less optional service years purchased than currently assumed. The table on the following page provides a summary of the experience for the plan during the study period.

Section 3: Demographic Assumptions

Other Demographic Assumptions continued

Actual Optional Service Years Purchased	Expected Optional Service Years Purchased	Actual to Expected	Proposed Optional Service Years Purchased	Ratio of Actual to Proposed
2,910	4,379	66%	3,524	83%

In light of the above, **we recommend adjusting optional service purchase rates** to better reflect plan experience. The proposed optional service purchases have been developed based on weighting the current assumption (i.e., historical experience) and recent experience by 50%.

The complete listing of the proposed optional service purchase rates is included in Appendix G.

Future Service Accrual Rate

The current assumptions are:

- Full-Time members assumed to accrue 0.980 years of service per year; and
- Hourly members assumed to accrue 0.275 years of service per year.

Overall, plan experience, on average, shows slightly greater service accruals than expected for both full-time and hourly members. The following table summarizes the experience for the plan during the study period.

Member Type	Actual Mean / Median Service Accrual	Expected Average Service Accrual	Actual to Expected	Proposed Average Service Accrual	Ratio of Actual to Proposed
Full-Time	0.990 / 1.000	0.980	101%	1.000	99%
Hourly	0.330 / 0.200	0.275	120%	0.330	100%

In light of the above, **we recommend the following:**

- **Increasing the rate of service accrual for full-time members to 1.00 years of service per year;**
- **Updating to use an individual-based approach for hourly members based on the member's actual service accrual in the prior year¹; and**
- **Increasing the future service accrual rate to 0.33 years of service per year for future hourly new entrants.**

¹ Recommendation based on difference between the mean and median average service accrual for hourly members.

Section 3: Demographic Assumptions

Other Demographic Assumptions continued

Automatic Annual Increase (AAI) Buyout

Public Acts 100-0587 and 101-0010 provide Tier 1 members the option to receive a lump sum at retirement in exchange for having their AAI based on 1.5% of the originally granted annuity (instead of 3% compounded) effective at the age 67 (instead of age 61).

The current AAI buyout assumption is 20% of eligible retiring Tier 1 members will elect the buyout.

Over the past three years, there were more Tier 1 members who elected the AAI buyouts than expected. The following table summarizes the experience for the plan during the study period.

Actual AAI Buyout	Expected AAI Buyout	Actual to Expected	Proposed AAI Buyout	Ratio of Actual to Proposed
2,626	1,925	136%	2,406	109%

In light of the above, **we recommend increasing the AAI buyout election assumption to 25%** to reflect plan experience.

Inactive Vested (IV) Buyout

Public Acts 100-0587 and 101-0010 provide Tier 1 and Tier 2 inactive vested members the option to receive an immediate lump sum in exchange for their annuity at retirement.

The current IV Buyout assumption is 10% of future inactive vested members will elect the IV Buyout.

In general, there were fewer actual IV buyouts than expected during the experience study period. However, buyout applications were reissued to all current inactive vested members in FY2024, which resulted in a spike of IV buyout elections in FY2024 and FY2025. As such, **we recommend maintaining the current IV buyout election assumption for future inactive vested members but adding an assumption that 1% of all current inactive vested members will elect the buyout.**

Section 4: Appendix

Appendix A: Proposed Salary Increases

Years of Service	Current Total Salary Increase Rate ¹	Proposed Total Salary Increase Rate ¹²
1	8.75%	8.50%
2	7.00%	7.00%
3	6.50%	6.50%
4	6.50%	6.50%
5	6.25%	6.25%
6	6.00%	6.00%
7	5.75%	5.75%
8	5.75%	5.75%
9	5.50%	5.50%
10	5.25%	5.50%
11	5.25%	5.50%
12	5.00%	5.25%
13	4.75%	5.00%
14	4.75%	5.00%
15	4.75%	4.75%
16	4.50%	4.75%
17	4.25%	4.50%
18	4.25%	4.50%
19	4.00%	4.25%
20 or More	3.75%	4.00%

¹ Includes 2.50% assumed inflation.

Section 4: Appendix

Appendix B: Proposed Mortality Rates

Healthy Post-Retirement Mortality¹

Age	Current Mortality Rates Males	Proposed Mortality Rates Males	Current Mortality Rates Females	Proposed Mortality Rates Females
55	0.234%	0.230%	0.176%	0.176%
60	0.375%	0.368%	0.261%	0.261%
65	0.622%	0.610%	0.406%	0.406%
70	1.124%	1.102%	0.701%	0.701%
75	2.133%	2.092%	1.592%	1.505%
80	4.038%	3.961%	3.072%	2.903%
85	8.321%	8.032%	5.871%	5.548%
90	15.249%	14.719%	10.997%	10.392%
95	25.661%	24.769%	19.651%	18.569%
100	37.500%	36.196%	30.694%	29.005%

Beneficiary Post-Retirement Mortality¹

Age	Current Mortality Rates Males	Proposed Mortality Rates Males	Current Mortality Rates Females	Proposed Mortality Rates Females
50	0.771%	0.743%	0.314%	0.301%
55	0.906%	0.873%	0.437%	0.419%
60	1.113%	1.073%	0.610%	0.585%
65	1.522%	1.467%	0.881%	0.845%
70	2.342%	2.257%	1.326%	1.272%
75	3.720%	3.585%	2.108%	2.022%
80	5.896%	5.682%	3.502%	3.359%
85	9.617%	9.268%	6.190%	5.937%
90	15.860%	15.283%	11.102%	10.649%
95	25.080%	24.168%	18.218%	17.475%
100	35.870%	34.566%	27.597%	26.470%

¹ Current and proposed mortality rates above are sample rates for 2010. For actuarial valuation purposes, proposed mortality rates will be projected from 2010 on a generational basis using the 2024 Adjusted MP-2021 improvement scale.

Section 4: Appendix

Appendix B: Proposed Mortality Rates continued

Disabled Post-Retirement Mortality¹

Age	Current Mortality Rates Males	Proposed Mortality Rates Males	Current Mortality Rates Females	Proposed Mortality Rates Females
40	0.645%	0.645%	0.629%	0.629%
45	1.007%	1.007%	0.985%	0.985%
50	1.605%	1.605%	1.483%	1.483%
55	2.114%	2.114%	1.742%	1.742%
60	2.503%	2.503%	1.956%	1.956%
65	3.044%	3.044%	2.256%	2.256%
70	3.901%	3.901%	2.862%	2.862%
75	5.192%	5.192%	4.003%	4.003%
80	7.348%	7.348%	6.007%	6.007%
85	10.815%	10.815%	9.331%	9.331%
90	16.253%	16.253%	13.665%	13.665%
95	23.617%	23.617%	19.298%	19.298%

Healthy Pre-Retirement Mortality¹

Age	Current Mortality Rates Males	Proposed Mortality Rates Males	Current Mortality Rates Females	Proposed Mortality Rates Females
25	0.014%	0.015%	0.008%	0.008%
30	0.020%	0.021%	0.013%	0.013%
35	0.027%	0.028%	0.018%	0.019%
40	0.038%	0.039%	0.028%	0.029%
45	0.060%	0.063%	0.043%	0.045%
50	0.100%	0.104%	0.066%	0.069%
55	0.155%	0.162%	0.096%	0.101%
60	0.238%	0.248%	0.145%	0.151%
65	0.392%	0.409%	0.243%	0.254%
70	0.638%	0.666%	0.436%	0.456%
75	0.969%	1.012%	0.829%	0.866%
80	1.917%	2.002%	1.643%	1.716%

¹ Current and proposed mortality rates above are sample rates for 2010. For actuarial valuation purposes, proposed mortality rates will be projected from 2010 on a generational basis using the 2024 Adjusted MP-2021 improvement scale.

Section 4: Appendix

Appendix C: Proposed Retirement Rates

Proposed Tier 1 Retirement (Unisex)

Age	Less Than 19 Years of Service Current	Less Than 19 Years of Service Proposed	19 – 29 Years of Service Current	19 – 29 Years of Service Proposed	30 – 33 Years of Service Current	30 – 33 Years of Service Proposed	34+ Years of Service Current	34+ Years of Service Proposed
54	0%	0%	7%	7%	8%	24%	45%	50%
55	0%	0%	6%	7%	8%	24%	44%	50%
56	0%	0%	6%	7%	7%	27%	46%	50%
57	0%	0%	7%	9%	8%	33%	46%	47%
58	0%	0%	8%	10%	12%	33%	45%	46%
59	0%	0%	33%	35%	40%	50%	48%	44%
60	21%	23%	33%	35%	46%	59%	44%	44%
61	17%	16%	28%	27%	35%	36%	41%	37%
62	17%	17%	28%	27%	43%	43%	41%	37%
63	16%	16%	29%	28%	35%	38%	44%	39%
64	26%	26%	40%	40%	50%	46%	40%	36%
65	27%	28%	40%	41%	52%	45%	43%	41%
66	23%	25%	42%	38%	42%	39%	38%	40%
67	25%	25%	39%	39%	43%	40%	38%	34%
68	23%	23%	39%	35%	40%	44%	35%	39%
69	28%	29%	38%	40%	32%	37%	44%	32%
70	100%	100%	100%	100%	100%	36%	31%	32%
71						35%	39%	38%
72						100%	24%	29%
73							36%	36%
74							36%	37%
75							100%	100%

Section 4: Appendix

Appendix D: Proposed Termination Rates

Select Table (Less than Five Years of Service)

Age	Current Rate of Select Termination	Proposed Rate of Select Termination	Current Rate of Select Termination	Proposed Rate of Select Termination
	Males	Males	Females	Females
25	6.50%	6.50%	6.25%	6.50%
26	6.55%	6.65%	6.35%	6.65%
27	6.60%	6.90%	6.45%	6.75%
28	6.65%	7.00%	6.55%	6.85%
29	6.70%	7.10%	6.65%	6.95%
30	6.75%	7.25%	6.75%	7.45%
31	6.80%	7.25%	6.85%	7.55%
32	6.85%	7.25%	6.95%	7.65%
33	6.90%	7.25%	7.05%	7.75%
34	6.95%	7.35%	7.15%	7.85%
35	7.00%	7.45%	7.25%	7.75%
36	7.50%	7.55%	7.25%	7.65%
37	8.00%	7.75%	7.25%	7.55%
38	8.50%	8.00%	7.25%	7.45%
39	9.00%	8.25%	7.25%	7.35%
40	9.50%	8.70%	7.25%	7.25%
41	9.85%	9.00%	7.25%	7.20%
42	10.20%	9.50%	7.25%	7.15%
43	10.55%	9.75%	7.25%	7.20%
44	10.90%	10.00%	7.25%	7.25%
45	11.25%	10.20%	7.25%	7.50%
46	11.35%	10.40%	7.50%	7.80%
47	11.45%	10.60%	7.75%	8.00%
48	11.55%	10.75%	8.00%	8.30%
49	11.65%	10.90%	8.25%	8.40%
50	11.75%	11.10%	8.50%	8.55%
51	11.65%	11.25%	8.85%	8.70%
52	11.55%	11.40%	9.20%	9.05%
53	11.45%	11.60%	9.55%	9.40%
54	11.35%	11.75%	9.90%	9.90%
55	11.25%	12.00%	10.25%	10.60%
56	11.45%	12.25%	10.80%	11.40%
57	11.65%	12.50%	11.35%	12.00%
58	11.85%	13.00%	11.90%	12.60%
59	12.05%	13.50%	12.45%	13.15%
60	12.25%	16.30%	13.00%	14.00%
61	15.65%	17.70%	13.75%	15.00%
62	19.05%	19.00%	19.75%	16.80%
63	22.45%	22.45%	23.25%	19.75%
64	25.85%	25.85%	27.75%	23.60%
65 and over	29.25%	29.25%	32.50%	27.50%

Section 4: Appendix

Appendix D: Proposed Termination Rates continued

Ultimate Table (Five or More Years of Service)

Age	Current Rate of Ultimate Termination	Proposed Rate of Ultimate Termination	Current Rate of Ultimate Termination	Proposed Rate of Ultimate Termination
	Males	Males	Females	Females
25	4.50%	3.75%	4.50%	4.50%
26	4.20%	3.75%	4.45%	4.50%
27	3.90%	3.75%	4.40%	4.50%
28	3.60%	3.50%	4.35%	4.50%
29	3.30%	3.50%	4.30%	4.50%
30	3.00%	3.00%	4.25%	4.25%
31	2.70%	2.75%	3.90%	4.25%
32	2.40%	2.50%	3.55%	4.00%
33	2.10%	2.25%	3.20%	3.50%
34	1.80%	2.00%	2.85%	3.00%
35	1.50%	1.75%	2.50%	2.50%
36	1.50%	1.50%	2.25%	2.25%
37	1.50%	1.50%	2.00%	2.00%
38	1.50%	1.50%	1.75%	1.75%
39	1.50%	1.50%	1.50%	1.50%
40	1.50%	1.50%	1.25%	1.25%
41	1.40%	1.25%	1.20%	1.25%
42	1.30%	1.25%	1.15%	1.25%
43	1.20%	1.25%	1.10%	1.00%
44	1.10%	1.25%	1.05%	1.00%
45	1.00%	1.00%	1.00%	1.00%
46	1.00%	1.00%	1.05%	1.00%
47	1.00%	1.00%	1.10%	1.00%
48	1.00%	0.75%	1.15%	1.25%
49	1.00%	0.75%	1.20%	1.25%
50	1.00%	0.75%	1.25%	1.25%
51	1.15%	1.00%	1.40%	1.25%
52	1.30%	1.25%	1.55%	1.25%
53	1.45%	1.50%	1.70%	1.50%
54	1.60%	1.50%	1.85%	1.50%
55	1.75%	2.00%	2.00%	2.25%
56	2.10%	2.50%	2.05%	2.25%
57	2.45%	3.00%	2.10%	2.50%
58	2.80%	3.00%	2.15%	2.75%
59	3.15%	3.00%	2.20%	2.25%
60	3.50%	3.00%	2.25%	2.25%
61	3.50%	3.00%	2.30%	2.25%
62	3.50%	3.00%	2.35%	2.25%
63	3.50%	3.00%	2.40%	2.25%
64	3.50%	3.00%	2.45%	2.25%
65 and over	3.50%	3.00%	2.50%	2.25%

Section 4: Appendix

Appendix E: Proposed Disability Retirement Rates

Age	Current Rate of Disability Males	Proposed Rate of Disability Males	Current Rate of Disability Females	Proposed Rate of Disability Females
25	0.007%	0.005%	0.021%	0.015%
26	0.007%	0.005%	0.024%	0.017%
27	0.007%	0.005%	0.026%	0.018%
28	0.007%	0.005%	0.029%	0.020%
29	0.007%	0.007%	0.031%	0.022%
30	0.007%	0.005%	0.034%	0.024%
31	0.009%	0.006%	0.037%	0.026%
32	0.011%	0.007%	0.041%	0.029%
33	0.012%	0.008%	0.044%	0.031%
34	0.014%	0.009%	0.048%	0.034%
35	0.015%	0.010%	0.051%	0.036%
36	0.017%	0.011%	0.053%	0.037%
37	0.018%	0.012%	0.054%	0.038%
38	0.020%	0.013%	0.056%	0.039%
39	0.021%	0.014%	0.058%	0.041%
40	0.023%	0.015%	0.060%	0.042%
41	0.026%	0.017%	0.065%	0.046%
42	0.028%	0.018%	0.070%	0.049%
43	0.032%	0.021%	0.075%	0.053%
44	0.035%	0.023%	0.080%	0.056%
45	0.038%	0.025%	0.085%	0.060%
46	0.045%	0.029%	0.099%	0.069%
47	0.053%	0.034%	0.112%	0.078%
48	0.060%	0.039%	0.126%	0.088%
49	0.068%	0.044%	0.139%	0.097%
50	0.075%	0.049%	0.153%	0.107%
51	0.081%	0.053%	0.156%	0.109%
52	0.087%	0.057%	0.160%	0.112%
53	0.093%	0.060%	0.163%	0.114%
54	0.099%	0.064%	0.167%	0.117%
55	0.105%	0.068%	0.170%	0.119%
56	0.111%	0.072%	0.182%	0.127%
57	0.117%	0.076%	0.194%	0.136%
58	0.123%	0.080%	0.206%	0.144%
59	0.129%	0.084%	0.218%	0.153%
60	0.135%	0.088%	0.229%	0.160%
61	0.146%	0.095%	0.234%	0.164%
62	0.156%	0.101%	0.238%	0.167%
63	0.167%	0.109%	0.244%	0.171%
64	0.177%	0.115%	0.250%	0.175%
65 and over	0.187%	0.122%	0.255%	0.179%

Section 4: Appendix

Appendix F: Proposed Sick Leave Service Credits

Years of Service	Current Assumption	Proposed Assumption
9	0.229	0.187
10	0.330	0.291
11	0.422	0.387
12	0.506	0.474
13	0.582	0.554
14	0.652	0.626
15	0.716	0.692
16	0.774	0.752
17	0.827	0.807
18	0.876	0.858
19	0.921	0.905
20	0.963	0.949
21	1.004	0.991
22	1.042	1.031
23	1.080	1.070
24	1.117	1.109
25	1.154	1.148
26	1.193	1.188
27	1.233	1.229
28	1.275	1.273
29	1.320	1.320
30	1.369	1.371
31	1.422	1.426
32	1.479	1.485
33	1.543	1.551
34	1.612	1.623

Section 4: Appendix

Appendix G: Proposed Optional Service Purchases

Years of Service	Current Assumption	Proposed Assumption
9	0.158	0.057
10	0.158	0.073
11	0.169	0.096
12	0.189	0.124
13	0.218	0.157
14	0.253	0.194
15	0.293	0.233
16	0.337	0.275
17	0.385	0.317
18	0.434	0.359
19	0.483	0.401
20	0.531	0.440
21	0.577	0.477
22	0.619	0.511
23	0.657	0.540
24	0.688	0.563
25	0.712	0.580
26	0.727	0.590
27	0.732	0.592
28	0.725	0.584
29	0.706	0.567
30	0.673	0.538
31	0.625	0.498
32	0.560	0.445
33	0.477	0.379
34	0.000	0.000