CHEIRON *Classic Values, Innovative Advice*

Teachers' Pension and Annuity Fund of New Jersey

Actuarial Experience Study for July 1, 2021 through June 30, 2024

Produced by Cheiron

September 2025

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September 8, 2025

Board of Trustees
Teachers' Pension and Annuity Fund of New Jersey
State of New Jersey
Department of the Treasury
Division of Pension and Benefits, CN 295
Trenton, NJ 08625-0295

Dear Board Members:

The purpose of this report is to present the Actuarial Experience Study of the Teachers' Pension and Annuity Fund of New Jersey (TPAF, the Fund) in accordance with Title 18A, Chapter 66-58 of the NJ State Statute. This Statute requires the actuary to conduct an actuarial investigation into the mortality, service, and salary experience of the members and beneficiaries of the Fund at least once every three years.

This study covers the actuarial experience from July 1, 2021 through June 30, 2024. The report includes analyses and results of our study as well as recommended assumptions for consideration by the Board to be used beginning with the July 1, 2025 actuarial valuation. It also includes the estimated financial impact of these assumption changes. The prior experience study was performed by Cheiron and covered the period July 1, 2018 through June 30, 2021.

If you have any questions about the report or would like additional information, please let us know.

Sincerely,
Cheiron

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Principal Consulting Actuary

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SECTION I – EXECUTIVE SUMMARY

Actuarial assumptions (economic and demographic) are intended to be long-term in nature and should be both individually reasonable and consistent in the aggregate. The purpose of this experience study is to evaluate whether the current assumptions adequately reflect the long-term expectations for TPAF, and if not, to recommend adjustments. It is important to note that frequent and significant changes in the actuarial assumptions are not typically recommended, unless there are known fundamental changes in expectations of the economy, or with respect to TPAF's membership, membership's future behavior or assets that would warrant such frequent or significant changes.

SUMMARY OF ASSUMPTION ANALYSIS

This experience study specifically analyzes and makes the following recommendations for the demographic assumptions.

- **Retirement rates** – Modify rates based on recent experience.
- **Termination rates** – Modify termination rates and the percentage of members electing a deferred retirement benefit.
- **Disability rates** – Modify ordinary disability rates. Continue with the current accidental disability rates.
- **Mortality rates** – Update to newly published Pub-2016 base mortality tables and update adjustment factors. Continue with generational mortality improvement scale MP-2021.
- **Family composition** – Modify percentage married based on recent experience. Continue with current spousal age difference assumption.
- **Price and wage inflation rates –** Continue with the current assumptions.
- **Salary increase rates –** Modify rates based on recent experience and long-term inflation expectations.

The recommended changes to the assumptions in aggregate would decrease the actuarial liability and Statutory contribution.

Further information about the impact of these changes to overall contribution rates can be found on the following page. We illustrate the cost impact based on the July 1, 2024 valuation results. However, assumption changes adopted by the Board will first impact the July 1, 2025 actuarial valuation.

The body of this report provides additional detail and support for our conclusions and recommendations.

SECTION I – EXECUTIVE SUMMARY

Table I-1
Cost Impact of Assumption Changes on July 1, 2024 Valuation Results

	Current Assumptions	Recommended Assumptions	Change in $	% Change
Assets and Liabilities				
Actuarial Liability	$ 75,717,169,450	$ 74,825,446,816	$ (891,722,634)	-1.2%
Actuarial Value of Assets (AVA)[1]	34,660,772,750	34,660,772,750	0	0.0%
Unfunded Actuarial Liability/(Surplus)	$ 41,056,396,700	$ 40,164,674,066	$ (891,722,634)	-2.2%
Funded Ratio	45.8%	46.3%		0.5%
Contribution Amounts				
Gross Normal Cost at End of Year	$ 1,619,834,624	$ 1,601,880,482	$ (17,954,142)	-1.1%
Expected Member Contributions	(990,982,670)	(990,445,138)	537,532	-0.1%
State Normal Cost at End of Year	$ 628,851,954	$ 611,435,344	$ (17,416,610)	-2.8%
Amortization Payment of UAL	3,523,070,636	3,446,551,456	(76,519,180)	-2.2%
Total Statutory Contribution for FYE	$ 4,151,922,590	$ 4,057,986,800	$ (93,935,790)	-2.3%

[1] Includes discounted State appropriations receivable and Lottery proceeds

The State normal cost decreased 2.8% due to the recommended changes in assumptions, resulting in a decrease of 2.3% in the total Statutory contribution. The decrease in normal cost was driven by the changes to the mortality, termination, and salary increase assumptions. The gross normal cost decreased 1.1% due to assumption changes. Because the member contribution rate is fixed, a large portion of the decrease in gross normal cost flows into the State's share of the normal cost resulting in the 2.8% decrease in State normal cost.

SECTION II – CERTIFICATION

The purpose of this report is to provide the results of an Actuarial Experience Study of the Teachers' Pension and Annuity Fund of New Jersey (TPAF) covering the three-year period from July 1, 2021 through June 30, 2024. This report is for the use of the Division of Pensions and Benefits and the TPAF Board of Trustees in selecting assumptions to be used in actuarial valuations beginning July 1, 2025. This experience study was completed in accordance with the provisions of Title 18A, Chapter 66-58 of the NJ State Statute which requires periodic review of the experience of the Fund.

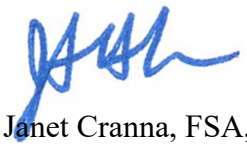
In preparing our report, we relied on information (some oral and some written) supplied by the Division of Pensions and Benefits. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23, *Data Quality*.

Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate liabilities and project benefit payments. We have relied on WinTech as the developer of ProVal. We have reviewed ProVal and have used ProVal in accordance with its original intended purpose. We have not identified any material inconsistencies in ProVal assumptions or output that would affect this analysis.

The data, plan provisions, and actuarial methods are the same as those shown in our July 1, 2024 actuarial valuation report, and the actuarial assumptions are the same except as modified for the purpose of estimating the financial impact of the recommended assumption changes.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This report was prepared exclusively for the Teachers' Pension and Annuity Fund of New Jersey for the purposes described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any such party.



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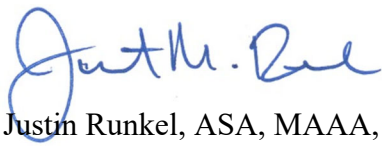

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SECTION III – DEMOGRAPHIC ASSUMPTIONS

Demographic assumptions are used to predict membership behavior, including rates of retirement, termination, disability, and mortality. These assumptions are based primarily on the historical experience of TPAF, with some adjustments where future experience is expected to differ from historical experience and with deference to standard tables where TPAF experience is not fully credible, which means there is insufficient data to support an assumption, and a standard table is available.

ANALYSIS OF DEMOGRAPHIC ASSUMPTIONS

For all of the demographic assumptions, we determined the ratio of the actual (A) number of decrements for each membership group compared to the expected (E) number of decrements (A/E ratio or actual-to-expected ratio). Generally, the goal is to get as close as possible to an A/E ratio of 100%. Appropriate assumptions are often dependent on the amount of data available, and if there is insufficient data, then the best assumption may be a reflection of standard tables. For example, there are typically relatively low incidences of pre-retirement deaths so using standard mortality tables may be more appropriate. This could result in the A/E ratio moving further away from 100%. Also, we aggregate members for demographic assumptions review when the data at individual ages is not credible. For example, we may reduce the number of service bands for an assumption with low incidences, if retaining those service bands does not materially improve the quality of the results.

We also calculate an *r-squared statistic* for each assumption. R-squared measures how well the assumption fits the actual data and can be thought of as the percentage of the variation in actual data explained by the assumption. Ideally, r-squared would equal 1.000, although this is never the case in reality. Any recommended assumption change should increase the r-squared compared to the current assumption, making it closer to 1.000, unless the pattern of future decrements is expected to be different from the pattern experienced during the period of study.

In addition, we calculate the 90% confidence interval, which represents the range within which the true decrement rate during the experience study period is expected to fall 90% of the time. In the graphs, the black squares represent the actual experience observed, and the gray bars represent the 90% confidence interval around that experience. The red and green lines represent the current and recommended assumptions, respectively. When the recommended assumption is the same as the current assumption, the green line sits over the red line and the red line does not show. Where there is sufficient experience, the confidence interval is relatively narrow, and where there is little experience, the confidence interval can be very wide. We generally recommend assumption changes when the current assumption is outside the 90% confidence interval of the observed experience. However, adjustments are made to account for differences between future expectations and historical experience and to account for the past experience represented by the current assumption. For mortality rates, we compare TPAF's experience to that of a standard table.

SECTION III – DEMOGRAPHIC ASSUMPTIONS

NON-CONTRIBUTING MEMBERS

The valuation census data provided by the Division of Pensions and Benefits includes non-contributing members. These members previously contributed to the Fund and, therefore, accrued benefits. However, they no longer contribute or accrue benefits. Typically, these members have terminated employment or applied for a retirement, disability, or death benefit, and their paperwork was not processed in time to be reflected in the fiscal year end census data. For the purpose of determining the actual number of decrements during the experience period, we make assumptions regarding the ultimate status of these non-contributing members.

We reviewed the experience among members who became non-contributing members during both the current and preceding three-year experience periods to determine the status reported for these non-contributing members in subsequent years. This experience was used to estimate the proportion of this population that returned to work, elected a refund of their contributions, retired, became disabled, and died.

Based on this experience, for those who became non-contributing members during the study, 25% were assumed to return to active contributing status. Of the 75% of members not assumed to return to work, 3.0% of members eligible for ordinary disability were assumed to have become ordinarily disabled, 0.5% were assumed to have died, and all others were assumed to have permanently terminated employment. Among members assumed to terminate employment, those eligible for a retirement benefit were assumed to have retired. Among members assumed to terminate employment prior to eligibility for a retirement benefit, 90% of members eligible for a deferred annuity were assumed to elect the deferred annuity, and all other members were assumed to elect a refund of their contributions.

These assumptions are the same as those used in the prior experience study, except that the percentage of non-contributing members assumed to return to active contributing status decreased from 30% to 25%, and the percentage of non-contributing members eligible for a deferred annuity that were assumed to elect the deferred annuity increased from 80% to 90%.

The available experience data is limited because the experience period is relatively short and some non-contributing members maintain that status for several years before electing a refund or returning to work. Therefore, we will continue to monitor this experience and may update the assumptions during the next experience study.

RETIREMENT RATES

The current retirement rates vary by tier, age, and service and are applied to all members who are eligible to retire. As a result, a member who is age 60 with 20 years of service, for example, is assumed to be less likely to retire than a member who is age 60 with 25 years of service. In reviewing the data for TPAF, we find that members are more likely to retire once they have attained 25 years of service, and those with less than 25 years of service are less likely to retire.

TPAF is not large enough to justify assumptions for each age, service, and tier combination, so we recommend assumptions by service groups separately for Tiers 1-4 and for Tier 5. The actual results shown on the following pages reflect eligible members and retirements in all five tiers.

We reviewed retirement behavior from the past two experience studies to supplement retirement experience from the current period. While the current period shows higher rates of retirement at some ages and service than our recommendation, the previous studies support a smaller change in assumptions.

We did not separate the results by tier because very few members in Tiers 2 through 5 are eligible for retirement. As of June 30, 2024, members in Tiers 2 through 5 can only retire under a service retirement because they do not have sufficient service to meet early retirement eligibility. In addition, Tiers 2 through 4 are closed to new members so there likely will not be significant experience for these tiers. Due to the limited exposures for Tiers 2 through 5, the current assumed rates shown on the following pages are based only on the current Tier 1 retirement rates.

We recommend separate retirement rates for Tier 5 because Tier 5 members need 30 years of service to retire early whereas Tiers 1 through 4 only require 25 years of service. Recommended retirement rates for Tier 5 members are based on professional judgement due to limited experience. We recommend separate assumptions for the following service groups and tiers.

Tiers 1-4 Members

- Members with less than 25 years of service,
- Members with 25 years of service, and
- Members with 26 or more years of service.

Tier 5 Members

- Members with less than 25 years of service,
- Members with 25 years of service,
- Members with 26 to 29 years of service,
- Members with 30 years of service, and
- Members with 31 or more years of service.

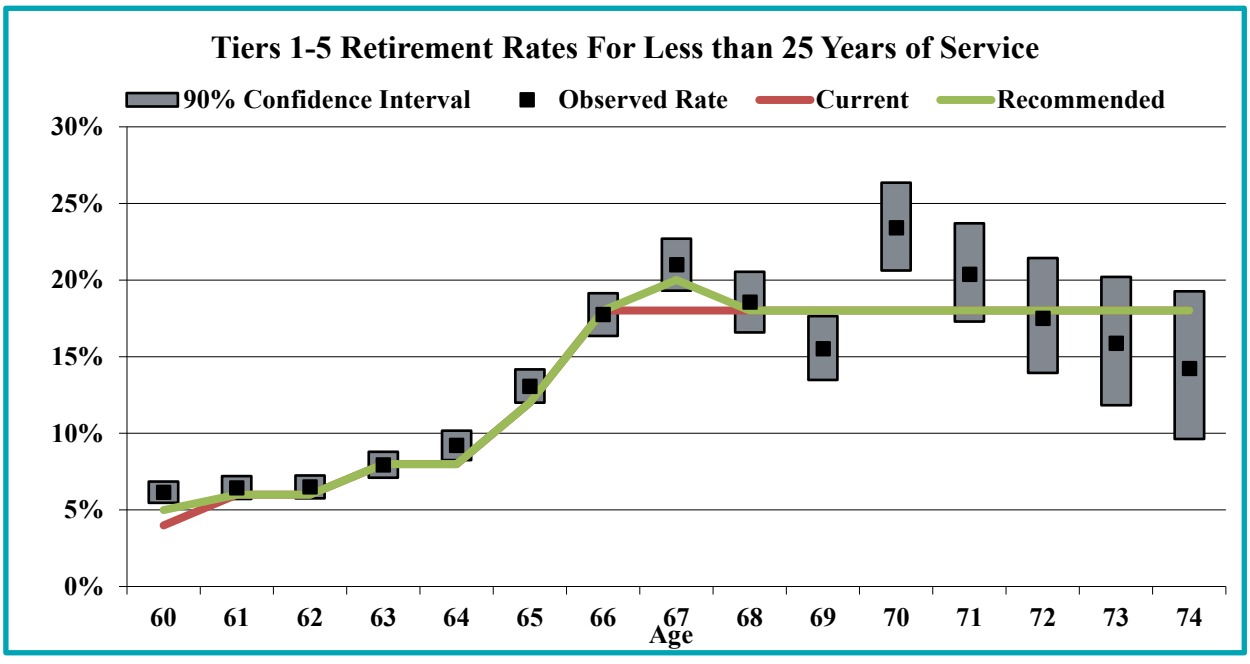
SECTION III – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

In Table III-R1, we show the calculation of actual-to-expected ratios and the r-squared statistic for Tier 1-5 members with less than 25 years of service, and Chart III-R1 shows the information graphically along with the 90% confidence interval based on the data covering the period July 1, 2021 through June 30, 2024. After considering the data from this experience study, as well as the prior two studies, we recommend increasing the retirement assumption at ages 60 and 67. The combined A/E ratio using the data from the last three studies improves from 103% using the current retirement assumptions to 100% using the recommended retirement assumptions.

Table III-R1

Tiers 1-5 Retirement Rates For Less than 25 Years of Service									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Recommended	Actual	Current	Recommended	Current	Recommended
60	3,221	198	128.8	161.1	6.2%	4.0%	5.0%	154%	123%
61	2,958	191	177.5	177.5	6.4%	6.0%	6.0%	107%	107%
62	3,020	196	181.2	181.2	6.5%	6.0%	6.0%	108%	108%
63	2,797	222	223.8	223.8	7.9%	8.0%	8.0%	99%	99%
64	2,506	231	200.5	200.5	9.2%	8.0%	8.0%	115%	115%
65	2,633	344	316.0	316.0	13.1%	12.0%	12.0%	109%	109%
66	2,085	370	375.3	375.3	17.7%	18.0%	18.0%	99%	99%
67	1,533	322	275.9	306.6	21.0%	18.0%	20.0%	117%	105%
68	1,062	197	191.2	191.2	18.6%	18.0%	18.0%	103%	103%
69	794	123	142.9	142.9	15.5%	18.0%	18.0%	86%	86%
70	577	135	103.9	103.9	23.4%	18.0%	18.0%	130%	130%
71	422	86	76.0	76.0	20.4%	18.0%	18.0%	113%	113%
72	280	49	50.4	50.4	17.5%	18.0%	18.0%	97%	97%
73	203	32	36.5	36.5	15.9%	18.0%	18.0%	88%	88%
74	135	19	24.3	24.3	14.2%	18.0%	18.0%	79%	79%
Total	**24,226**	**2,715**	**2,504.1**	**2,567.0**	**11.2%**	**10.3%**	**10.6%**	**108%**	**106%**
R-squared			**0.956**	**0.978**					

Chart III-R1



SECTION III – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

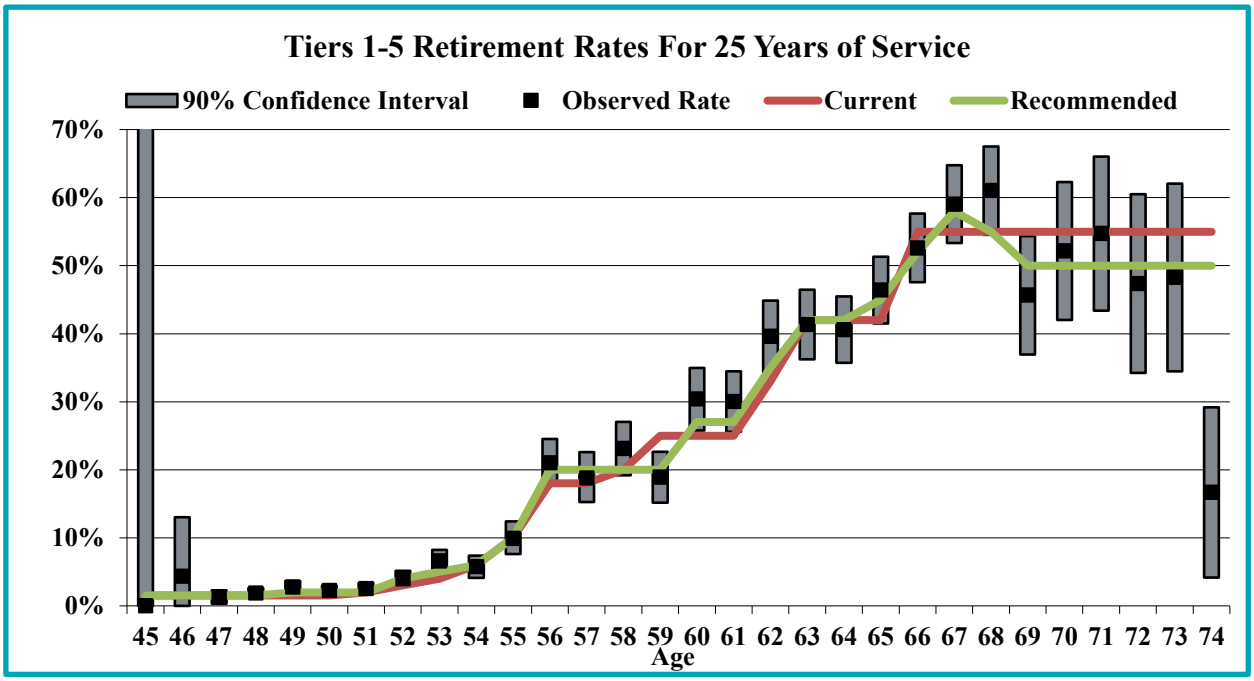
Table III-R2 shows the calculation of actual-to-expected ratios and the r-squared statistic for members with 25 years of service, and Chart III-R2 shows the information graphically along with the 90% confidence interval based on the data covering the period July 1, 2021 through June 30, 2024. After considering the data from this experience study, as well as the prior two studies, for participants with 25 years of service, we recommend increasing the retirement assumption at younger ages and decreasing the assumption at ages 69 and older. The combined A/E ratio, using the data from the last three studies and the recommended assumptions, is 99%, compared to an A/E ratio of 101% using the current assumptions.

Table III-R2

Tiers 1-5 Retirement Rates For 25 Years of Service									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Recommended	Actual	Current	Recommended	Current	Recommended
45	7	0	0.1	0.1	0.0%	1.5%	1.5%	0%	0%
46	23	1	0.3	0.3	4.3%	1.5%	1.5%	290%	290%
47	303	4	4.5	4.5	1.3%	1.5%	1.5%	88%	88%
48	949	18	14.2	14.2	1.9%	1.5%	1.5%	125%	125%
49	1,127	31	16.9	22.5	2.8%	1.5%	2.0%	185%	139%
50	1,066	24	16.0	21.3	2.3%	1.5%	2.0%	150%	113%
51	1,013	25	20.3	20.3	2.5%	2.0%	2.0%	126%	126%
52	858	34	25.7	34.3	4.0%	3.0%	4.0%	133%	100%
53	704	46	28.2	35.2	6.6%	4.0%	5.0%	165%	132%
54	582	33	34.9	34.9	5.7%	6.0%	6.0%	96%	96%
55	419	41	41.9	41.9	9.9%	10.0%	10.0%	99%	99%
56	379	80	68.2	75.8	21.0%	18.0%	20.0%	117%	105%
57	314	59	56.5	62.8	18.8%	18.0%	20.0%	104%	94%
58	307	71	61.4	61.4	23.1%	20.0%	20.0%	116%	116%
59	296	56	74.0	59.2	18.9%	25.0%	20.0%	76%	95%
60	260	79	65.0	70.2	30.4%	25.0%	27.0%	122%	113%
61	293	88	73.3	79.1	30.0%	25.0%	27.0%	120%	111%
62	245	97	80.9	85.8	39.6%	33.0%	35.0%	120%	113%
63	254	105	106.7	106.7	41.3%	42.0%	42.0%	98%	98%
64	266	108	111.7	111.7	40.6%	42.0%	42.0%	97%	97%
65	265	123	111.3	119.3	46.4%	42.0%	45.0%	111%	103%
66	248	130	136.4	129.0	52.6%	55.0%	52.0%	96%	101%
67	210	124	115.5	121.8	59.0%	55.0%	58.0%	107%	102%
68	154	94	84.7	84.7	61.0%	55.0%	55.0%	111%	111%
69	92	42	50.6	46.0	45.7%	55.0%	50.0%	83%	91%
70	69	36	38.0	34.5	52.2%	55.0%	50.0%	95%	104%
71	53	29	29.2	26.5	54.7%	55.0%	50.0%	99%	109%
72	38	18	20.9	19.0	47.4%	55.0%	50.0%	86%	95%
73	29	14	16.0	14.5	48.3%	55.0%	50.0%	88%	97%
74	24	4	13.2	12.0	16.7%	55.0%	50.0%	30%	33%
Total	**10,847**	**1,616**	**1,516.4**	**1,549.6**	**14.9%**	**14.0%**	**14.3%**	**107%**	**104%**
R-squared			**0.954**	**0.985**					

SECTION III – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Chart III-R2



SECTION III – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

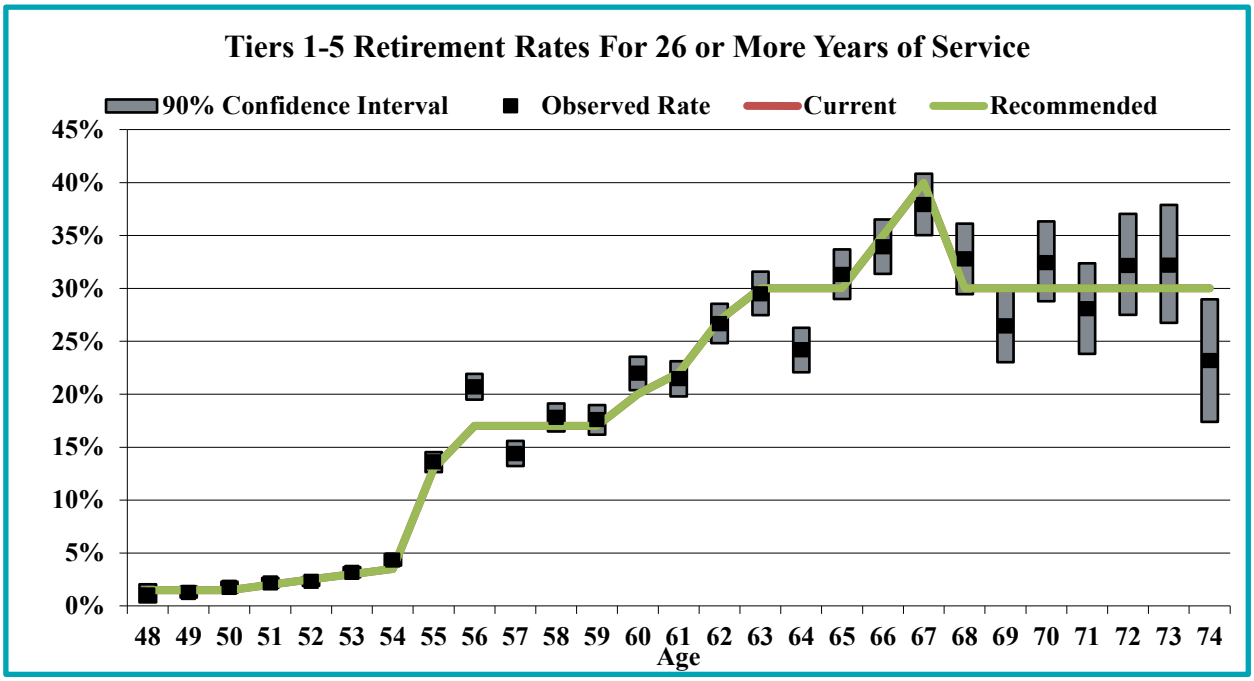
Table III-R3 shows the calculation of actual-to-expected ratios and the r-squared statistic for members with 26 or more years of service, and Chart III-R3 shows the information graphically along with the 90% confidence interval based on the data covering the period July 1, 2021 through June 30, 2024. After considering the data from this experience study, as well as the prior two studies, for retirements with 26 or more years of service, we recommend continuing with the current assumption. The combined A/E ratio, using the data from the last three studies, is 100% with the current assumptions.

Table III-R3

Tiers 1-5 Retirement Rates For 26 or More Years of Service									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Recommended	Actual	Current	Recommended	Current	Recommended
45	7	0	0.1	0.1	0.0%	1.5%	1.5%	0%	0%
46	19	0	0.3	0.3	0.0%	1.5%	1.5%	0%	0%
47	34	1	0.5	0.5	2.9%	1.5%	1.5%	196%	196%
48	294	3	4.4	4.4	1.0%	1.5%	1.5%	68%	68%
49	1,036	13	15.5	15.5	1.3%	1.5%	1.5%	85%	85%
50	1,845	32	27.7	27.7	1.8%	1.5%	1.5%	117%	117%
51	2,640	57	52.8	52.8	2.2%	2.0%	2.0%	109%	109%
52	3,392	78	84.8	84.8	2.3%	2.5%	2.5%	92%	92%
53	3,774	120	113.2	113.2	3.2%	3.0%	3.0%	106%	106%
54	3,759	163	131.6	131.6	4.3%	3.5%	3.5%	124%	124%
55	3,547	482	461.1	461.1	13.6%	13.0%	13.0%	105%	105%
56	2,998	620	509.7	509.7	20.7%	17.0%	17.0%	122%	122%
57	2,466	355	419.2	419.2	14.4%	17.0%	17.0%	85%	85%
58	2,279	406	387.4	387.4	17.8%	17.0%	17.0%	105%	105%
59	2,019	355	343.2	343.2	17.6%	17.0%	17.0%	103%	103%
60	1,830	402	366.0	366.0	22.0%	20.0%	20.0%	110%	110%
61	1,617	347	355.7	355.7	21.5%	22.0%	22.0%	98%	98%
62	1,527	407	412.3	412.3	26.7%	27.0%	27.0%	99%	99%
63	1,311	387	393.3	393.3	29.5%	30.0%	30.0%	98%	98%
64	1,119	271	335.7	335.7	24.2%	30.0%	30.0%	81%	81%
65	1,069	335	320.7	320.7	31.3%	30.0%	30.0%	104%	104%
66	937	318	328.0	328.0	33.9%	35.0%	35.0%	97%	97%
67	759	288	303.6	303.6	37.9%	40.0%	40.0%	95%	95%
68	540	177	162.0	162.0	32.8%	30.0%	30.0%	109%	109%
69	469	124	140.7	140.7	26.4%	30.0%	30.0%	88%	88%
70	410	133	123.0	123.0	32.4%	30.0%	30.0%	108%	108%
71	315	88	94.5	94.5	28.1%	30.0%	30.0%	94%	94%
72	251	81	75.3	75.3	32.2%	30.0%	30.0%	107%	107%
73	198	64	59.4	59.4	32.2%	30.0%	30.0%	107%	107%
74	138	32	41.4	41.4	23.2%	30.0%	30.0%	77%	77%
Total	**42,599**	**6,140**	**6,063.1**	**6,063.1**	**14.4%**	**14.2%**	**14.2%**	**101%**	**101%**
R-squared			**0.972**	**0.972**					

SECTION III – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Chart III-R3



There is insufficient data to show tables and charts for Tier 5 members separately. The recommended Tier 5 specific retirement rates are shown in Appendix A.

SECTION III – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

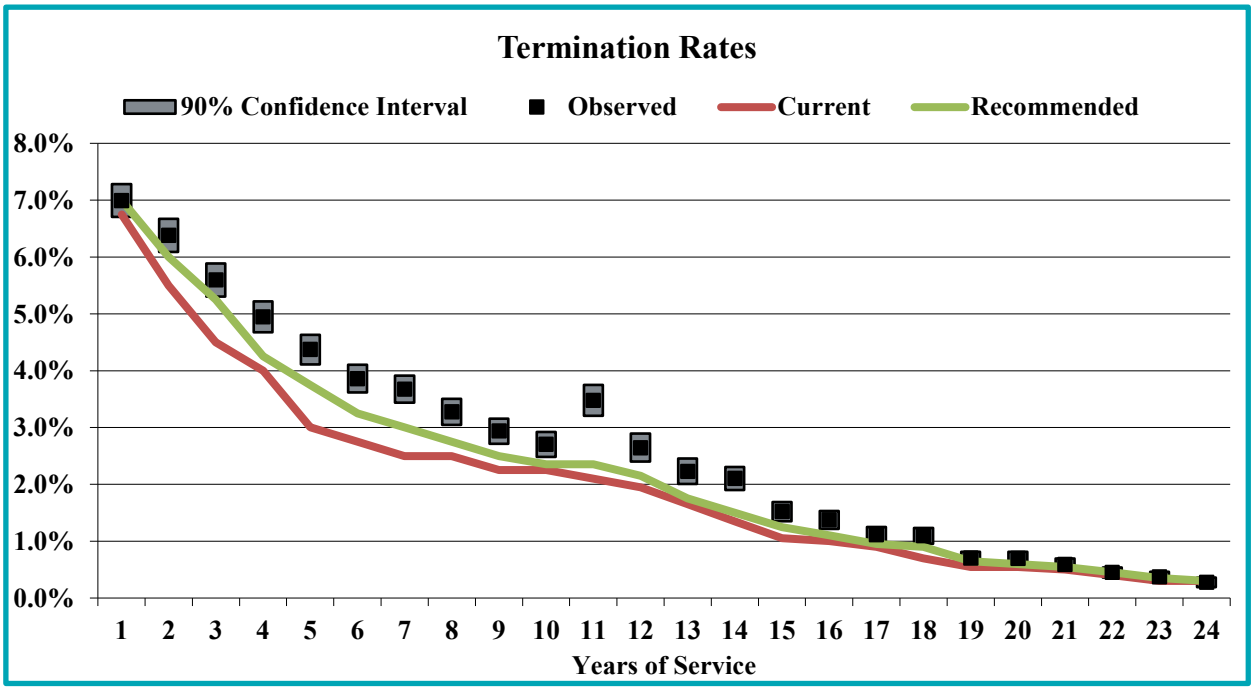
Termination rates reflect the frequency at which active members leave employment for reasons other than retirement, death, or disability. Table III-T1 shows the number of terminations, our recommended termination rates based on years of service, the calculation of actual-to-expected ratios for each year of service, and the r-squared statistic based on the data covering the period July 1, 2021 through June 30, 2024. Chart III-T1 shows the information graphically along with the 90% confidence interval. We saw higher rates of termination at almost all levels of service during this period. This is a change from what was observed in the prior experience study. Because of potential implications of COVID-19, we use caution in fully increasing the termination rates to the higher levels experienced during the current experience period. We have reviewed the experience from the current study period, along with the prior two studies, to develop our recommended rates. We recommend increasing the termination rates at most service thresholds. Using the experience from the last three studies, the A/E ratio improves from 112% using the current assumptions to 101% using the recommended assumptions.

Table III-T1

Termination Rates									
		Terminations			Termination Rates			A/E Ratios	
Service	Exposures	Actual	Current	Recommended	Actual	Current	Recommended	Current	Recommended
1	21,222	1,484	1,432.5	1,485.5	6.99%	6.75%	7.00%	104%	100%
2	19,063	1,216	1,048.5	1,143.8	6.38%	5.50%	6.00%	116%	106%
3	16,868	944	759.1	885.6	5.60%	4.50%	5.25%	124%	107%
4	17,011	841	680.4	723.0	4.95%	4.00%	4.25%	124%	116%
5	16,690	730	500.7	625.9	4.37%	3.00%	3.75%	146%	117%
6	16,546	638	455.0	537.7	3.86%	2.75%	3.25%	140%	119%
7	16,788	617	419.7	503.6	3.67%	2.50%	3.00%	147%	122%
8	16,610	544	415.3	456.8	3.27%	2.50%	2.75%	131%	119%
9	15,837	465	356.3	395.9	2.94%	2.25%	2.50%	131%	117%
10	14,604	394	328.6	343.2	2.70%	2.25%	2.35%	120%	115%
11	12,498	435	262.5	293.7	3.48%	2.10%	2.35%	166%	148%
12	11,536	305	225.0	248.0	2.64%	1.95%	2.15%	136%	123%
13	11,696	261	193.0	204.7	2.23%	1.65%	1.75%	135%	127%
14	13,307	280	179.6	199.6	2.10%	1.35%	1.50%	156%	140%
15	14,045	213	147.5	175.6	1.52%	1.05%	1.25%	145%	121%
16	14,572	200	145.7	160.3	1.37%	1.00%	1.10%	137%	125%
17	14,928	166	134.4	141.8	1.11%	0.90%	0.95%	123%	117%
18	14,888	163	104.2	134.0	1.09%	0.70%	0.90%	156%	122%
19	14,610	102	80.4	95.0	0.70%	0.55%	0.65%	127%	108%
20	14,492	101	79.7	87.0	0.70%	0.55%	0.60%	127%	116%
21	14,390	85	72.0	79.1	0.59%	0.50%	0.55%	118%	107%
22	13,733	61	54.9	61.8	0.45%	0.40%	0.45%	112%	99%
23	12,100	45	36.3	42.4	0.37%	0.30%	0.35%	123%	105%
24	10,347	28	31.0	31.0	0.27%	0.30%	0.30%	91%	91%
Total	**358,381**	**10,318**	**8,142.1**	**9,054.9**	**2.88%**	**2.27%**	**2.53%**	**127%**	**114%**
R-squared			**0.975**	**0.989**					

SECTION III – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Chart III-T1



The current assumption is that all members who terminate employment with less than 10 years of service are assumed to elect a refund of contributions. Currently, 70% of members with 10 or more years of service are assumed to elect deferred annuities. Of the 2,839 members who terminated employment with 10 or more years of service in the three-year experience study period, 2,179 elected a deferred annuity and 660 elected a refund of contributions. After considering the data from this experience study, as well as the prior two studies, we recommend increasing the assumption to reflect 72% of members terminating with 10 or more years of service will elect a deferred annuity; all other members terminating are assumed to receive a refund of accumulated deductions with credited interest.

SECTION III – DEMOGRAPHIC ASSUMPTIONS
DISABILITY RATES

Table III-D1 shows the calculation of actual-to-expected ratios and the r-squared statistic for accidental disability. The experience shows very low incidence of accidental disability. Therefore, we recommend continuing with the current assumption.

Table III-D1

Accidental Disability Rates									
Age Band	Exposures	Disabilities			Disability Rates			A/E Ratios	
		Actual	Current	Recommended	Actual	Current	Recommended	Current	Recommended
35 - 39	21,352	0	1.3	1.3	0.000%	0.006%	0.006%	0%	0%
40 - 44	49,590	2	3.0	3.0	0.004%	0.006%	0.006%	67%	67%
45 - 49	51,100	4	3.1	3.1	0.008%	0.006%	0.006%	130%	130%
50 - 54	47,630	0	2.9	2.9	0.000%	0.006%	0.006%	0%	0%
55 - 59	33,300	2	2.0	2.0	0.006%	0.006%	0.006%	100%	100%
60 - 64	23,371	3	1.4	1.4	0.013%	0.006%	0.006%	214%	214%
65 - 69	11,420	2	0.7	0.7	0.018%	0.006%	0.006%	292%	292%
70 - 74	2,847	2	0.2	0.2	0.070%	0.006%	0.006%	1,171%	1,171%
Total	**240,610**	**15**	**14.4**	**14.4**	**0.006%**	**0.006%**	**0.006%**	**104%**	**104%**
R-squared			**0.000**	**0.000**					

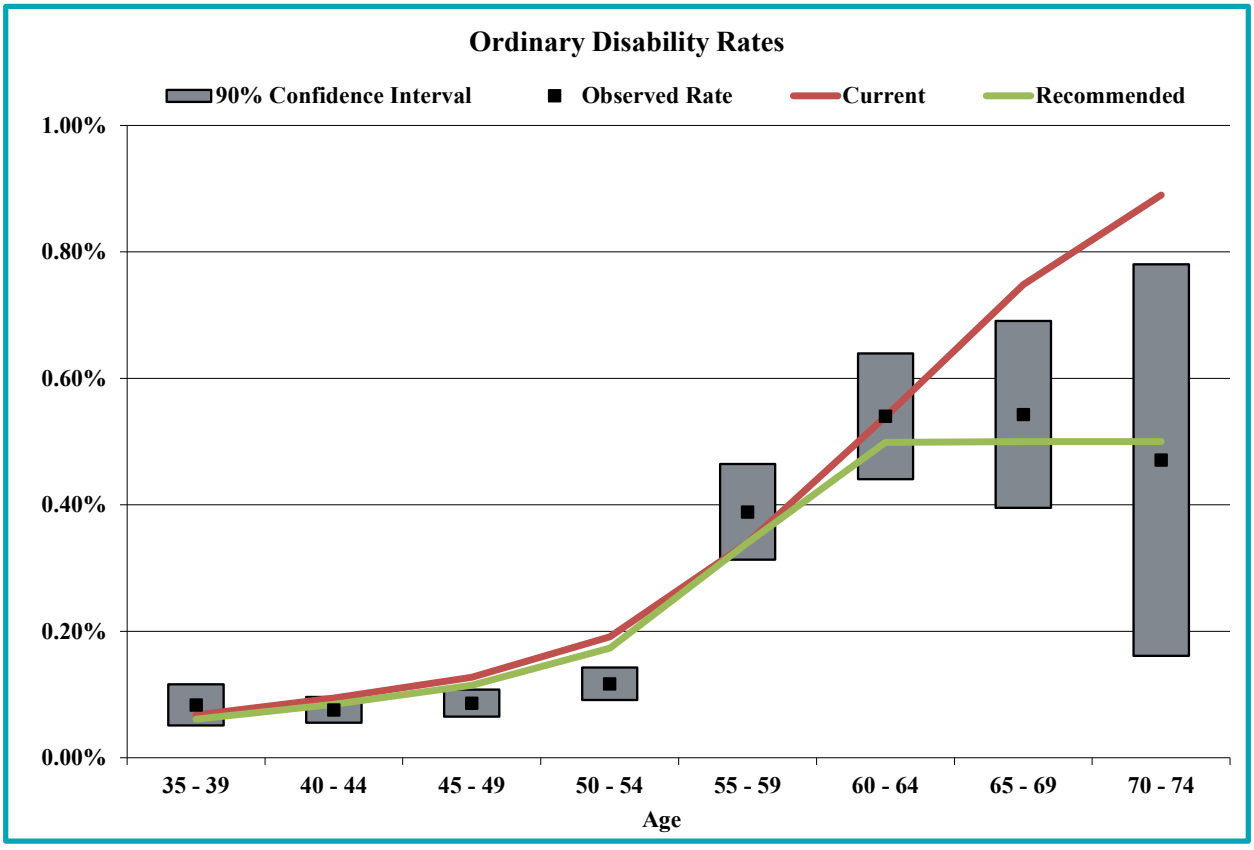
SECTION III – DEMOGRAPHIC ASSUMPTIONS
DISABILITY RATES

Table III-D2 shows the calculation of actual-to-expected ratios and the r-squared statistic for ordinary disability, and Chart III-D2 shows the information graphically along with the 90% confidence interval. We recommend lowering the rates for all ages.

Table III-D2

Ordinary Disability Rates									
Age Band	Exposures	Disabilities			Disability Rates			A/E Ratios	
		Actual	Current	Recommended	Actual	Current	Recommended	Current	Recommended
35 - 39	21,216	18	14.4	12.9	0.084%	0.068%	0.061%	124%	137%
40 - 44	49,516	38	46.8	41.9	0.076%	0.095%	0.085%	80%	90%
45 - 49	51,057	44	65.1	58.5	0.086%	0.128%	0.115%	68%	75%
50 - 54	47,585	56	91.1	82.5	0.117%	0.191%	0.173%	61%	68%
55 - 59	18,259	71	62.0	62.0	0.389%	0.340%	0.340%	114%	114%
60 - 64	14,632	79	78.9	73.0	0.540%	0.539%	0.499%	100%	108%
65 - 69	6,679	36	50.0	33.4	0.543%	0.748%	0.500%	73%	109%
70 - 74	1,322	6	11.8	6.6	0.471%	0.890%	0.500%	53%	94%
Total	**210,266**	**348**	**420.0**	**370.8**	**0.165%**	**0.200%**	**0.176%**	**83%**	**94%**
R-squared			**0.652**	**0.696**					

Chart III-D2



SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Mortality assumptions are typically developed separately by gender. Unlike most demographic assumptions, mortality assumptions do not rely exclusively on the experience of the plan. Standard mortality tables and projection scales, reflecting future life expectancy improvements, serve as the primary basis for the assumptions. The standard table can then be modified to better reflect the Fund's experience, depending on the amount of available data.

The Society of Actuaries (SOA) completed an extensive mortality study of public pension plan experience and issued a set of mortality tables named the Pub-2016 mortality tables which provide insights into the composition of gender-specific pension mortality by factors such as job category (e.g. General Employees, Teachers, Public Safety), salary/benefit amount, and health status (e.g. healthy or disabled).

In addition, there has been a long history of mortality improvement among pensioners in the U.S., and there is an expectation that mortality rates will continue to improve in the future. The SOA periodically publishes a mortality improvement scale that reflects continued mortality improvement trends. The SOA's MP-2021 scale remains the most recent mortality improvement projection scale at the time this analysis was prepared. However, the MP-2021 scale only reflects historical mortality data through calendar year 2019. The COVID-19 pandemic may have caused a temporary change in mortality patterns.

The steps in our analysis of the mortality assumptions are as follows:

1. Select a standard mortality table that reflects the anticipated experience of the Fund.
2. Compare actual experience of the Fund to what would have been predicted by the selected standard table for the period of the experience study.
3. Adjust the standard table either fully or partially depending on the level of credibility for the Fund's experience. This adjusted table is called the base table.
4. Select an appropriate standard mortality improvement projection scale and apply it to the base table.

Similar to the methodology used to develop the Pub-2016 tables, when actual experience of the Fund is compared to that of the standard table, the experience is weighted based on the amount of income (salary for pre-retirement mortality and pension benefit for post-retirement mortality). Mortality studies in the U.S. have consistently shown that individuals with higher income have longer life expectancies than individuals with lower income. It is important for a pension plan to use assumptions that are weighted by income to reflect not just the incidence of a decrement but the impact on liabilities.

SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

In the prior study, TPAF adopted the following assumptions:

Active Members (Non-Annuitants): The Pub-2010 Teachers Above-Median Income Employee mortality table *[PubT-2010(A) Employee]* as published by the Society of Actuaries with a 93.9% adjustment for males and 85.3% adjustment for females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2021. All pre-retirement deaths are assumed to be ordinary deaths.

Healthy Retirees and Beneficiaries (Healthy Annuitants): The Pub-2010 Teachers Above-Median Income Healthy Retiree mortality table *[PubT-2010(A) Healthy Retiree]* as published by the Society of Actuaries with a 114.7% adjustment for males and 99.6% adjustment for females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2021.

Disabled Retirees (Disabled Annuitants): The Pub-2010 Non-Safety Disabled Retiree mortality table *[PubNS-2010 Disabled Retiree]* as published by the Society of Actuaries with a 106.3% adjustment for males and 100.3% adjustment for females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2021.

There are enough deaths for TPAF to provide meaningful statistics in the three-year period. However, the current period includes mortality experience from the COVID-19 pandemic. Mortality rates across the country were elevated during the pandemic and that experience is not necessarily indicative of future trends. Nonetheless, TPAF's post-pandemic mortality experience remains higher than expected based on the current mortality assumptions. The recent Pub-2016 mortality table report covering public plan experience from 2013 – 2019 also found higher mortality rates than the previous Pub-2010 report, which covered 2008 – 2013. Therefore, we believe it is appropriate to update the mortality assumptions to partially reflect recent experience.

To avoid overweighting recent experience, we have expanded our review to include the past two studies in our analysis. We have developed recommended assumptions using nine years of experience from July 1, 2015 through June 30, 2024. For healthy annuitants, there were 23,985 deaths over this period, for disabled retirees there were 1,248 deaths, and for active members there were 779 deaths. For reference, a fully credible sample would include 1,082 deaths. We recommend using a Pub-2016 table for teachers with adjustments to account for TPAF experience. The tables and graphs shown in this section are based on the data covering the nine-year period ending June 30, 2024.

Since the SOA has not released a more recent mortality improvement scale due to the impact of the COVID-19 pandemic on underlying data, we recommend continuing to use MP-2021 as the mortality improvement scale.

SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

We recommend the following mortality assumptions:

Active members (Non-Annuitants): The Pub-2016 Teachers Above-Median Income Employee mortality table *[PubT-2016(A) Employee]* as published by the Society of Actuaries with a 94.1% adjustment for males and 84.0% adjustment for females, and with future improvement from the base year of 2016 on a generational basis using SOA's Scale MP-2021. All pre-retirement deaths are assumed to be ordinary deaths.

Healthy retirees and beneficiaries (Healthy Annuitants): The Pub-2016 Teachers Above-Median Income Healthy Retiree mortality table *[PubT-2016(A) Healthy Retiree]* as published by the Society of Actuaries with a 121.1% adjustment for males and 99.5% adjustment for females, and with future improvement from the base year of 2016 on a generational basis using SOA's Scale MP-2021.

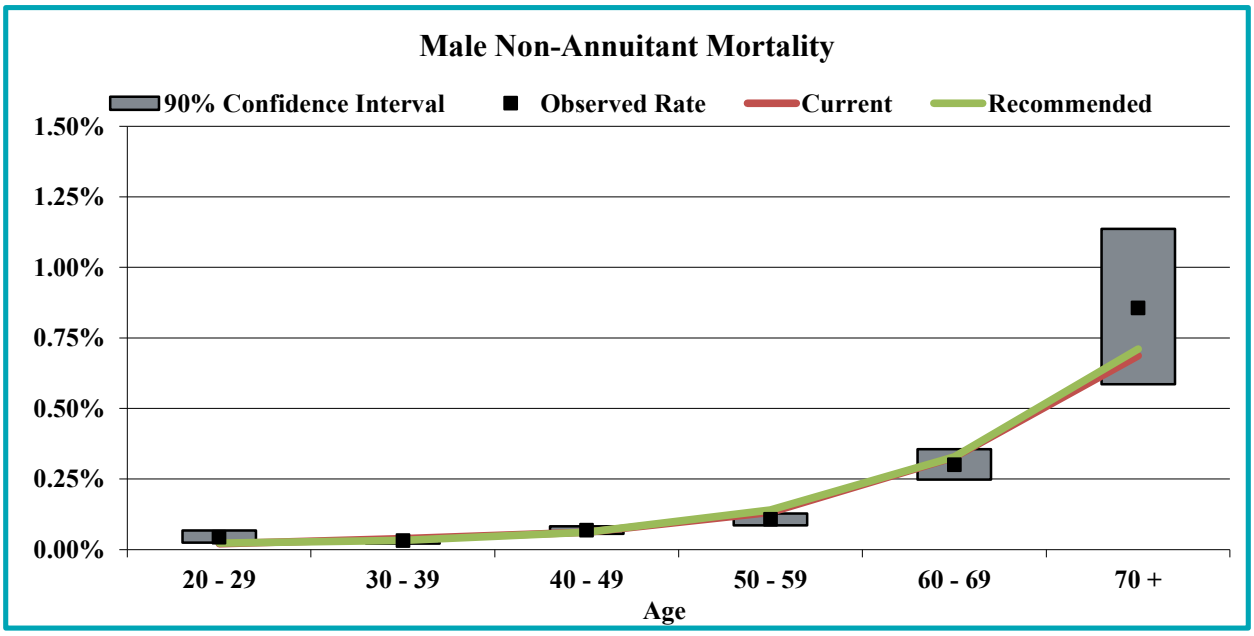
Disabled retirees (Disabled Annuitants): The Pub-2016 Non-Safety Disabled Retiree mortality table *[PubNS-2016 Disabled Retiree]* as published by the Society of Actuaries with a 128.0% adjustment for males and 113.7% adjustment for females, and with future improvement from the base year of 2016 on a generational basis using SOA's Scale MP-2021.

SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Table III-M1 – Active Males

Non-Annuitant Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratio	
				Actual	Current	Recommended	Current	Recommended
20 - 29	20,803	7	1,164,051,483	512,578	244,042	264,472	210%	194%
30 - 39	83,138	24	5,598,474,089	1,779,058	2,176,856	1,846,245	82%	96%
40 - 49	95,138	64	8,517,411,505	5,882,692	5,284,497	5,296,469	111%	111%
50 - 59	64,903	74	6,343,003,204	6,790,615	8,382,257	8,894,431	81%	76%
60 - 69	28,702	90	2,799,368,802	8,408,863	9,153,606	9,176,378	92%	92%
70 +	2,904	25	306,513,391	2,626,559	2,103,542	2,178,911	125%	121%
Total	**295,588**	**284**	**24,728,822,474**	**26,000,366**	**27,344,800**	**27,656,906**	**95%**	**94%**
R-Squared					**0.692**	**0.684**		

Chart III-M1

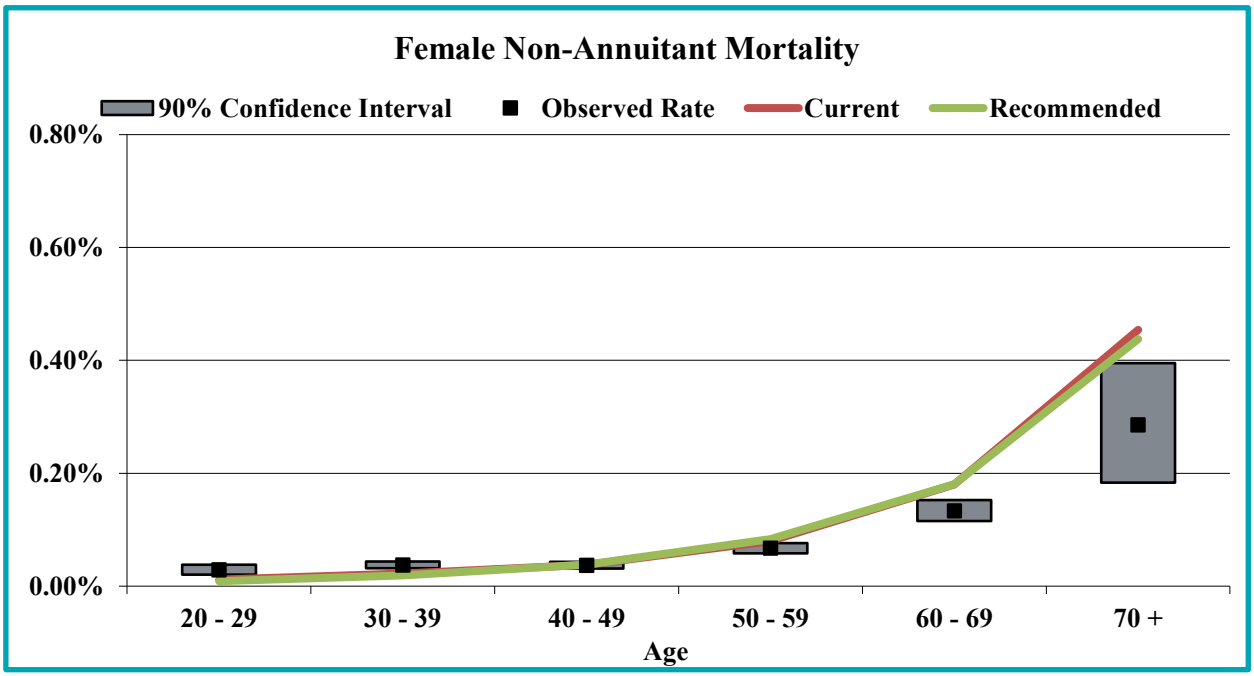


SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Table III-M2 – Active Females

Non-Annuitant Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratio	
				Actual	Current	Recommended	Current	Recommended
20 - 29	95,085	20	5,349,712,762	1,529,374	610,872	464,015	250%	330%
30 - 39	284,873	80	18,628,570,766	6,946,449	4,169,698	3,502,051	167%	198%
40 - 49	288,898	97	23,580,865,438	8,637,720	8,836,300	8,992,374	98%	96%
50 - 59	218,819	138	18,978,219,840	12,744,550	15,151,736	15,808,442	84%	81%
60 - 69	107,069	140	9,677,831,460	12,894,452	17,385,875	17,425,462	74%	74%
70 +	7,083	20	692,583,084	1,976,025	3,145,193	3,033,675	63%	65%
Total	**1,001,827**	**495**	**76,907,783,350**	**44,728,570**	**49,299,674**	**49,226,020**	**91%**	**91%**
R-Squared					**0.759**	**0.753**		

Chart III-M2



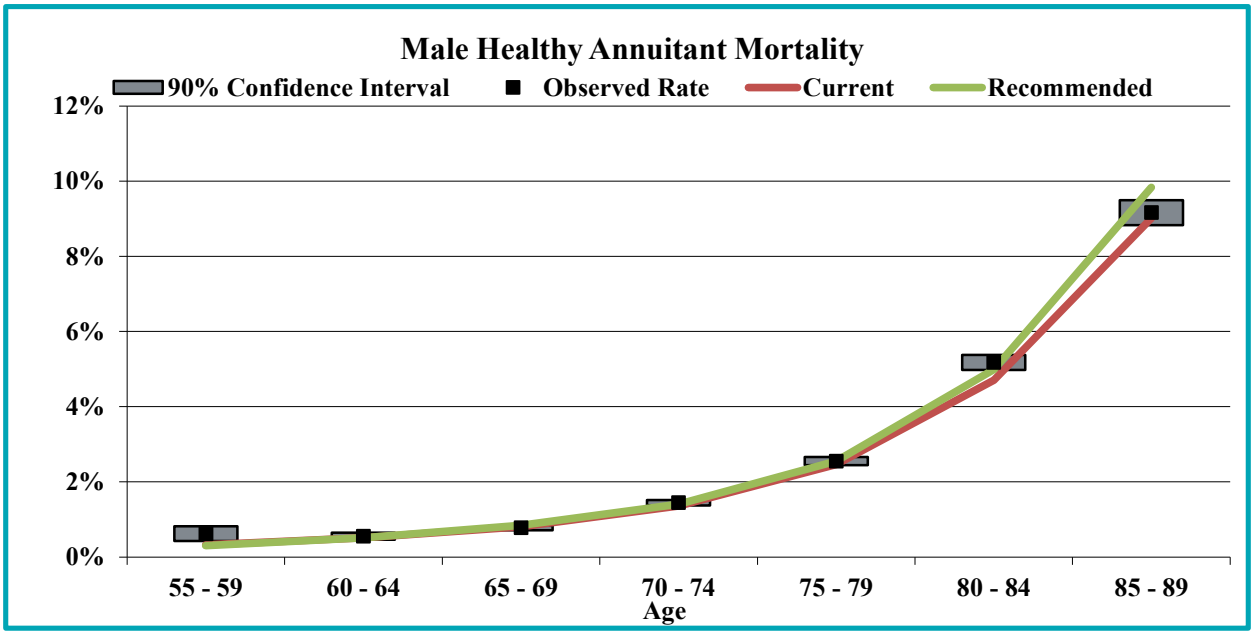
During the nine-year period, there were 779 deaths in active service. Of these deaths, one was accidental. We recommend maintaining the assumption that all pre-retirement deaths are ordinary deaths.

SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Table III-M3 – Healthy Annuitant Males

Healthy Annuitant Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Recommended	Current	Recommended
55 - 59	4,662	32	228,754,279	1,406,662	745,296	689,563	189%	204%
60 - 64	17,178	108	838,795,150	4,614,990	4,308,248	4,283,388	107%	108%
65 - 69	46,367	393	2,254,637,386	17,485,898	18,230,571	18,974,236	96%	92%
70 - 74	69,945	1,079	3,336,304,975	48,038,097	45,276,240	46,958,181	106%	102%
75 - 79	56,663	1,529	2,616,817,140	66,736,063	64,363,763	66,684,677	104%	100%
80 - 84	33,533	1,772	1,477,326,429	76,442,562	69,511,379	73,736,983	110%	104%
85 - 89	20,418	1,936	835,328,134	76,537,761	75,293,503	82,161,409	102%	93%
90 - 94	9,056	1,654	325,931,922	59,463,391	52,027,620	57,050,371	114%	104%
95 +	1,949	552	56,655,773	16,190,442	15,009,401	16,458,845	108%	98%
Total	**259,771**	**9,055**	**11,970,551,188**	**366,915,866**	**344,766,021**	**366,997,654**	**106%**	**100%**
R-Squared					**0.973**	**0.972**		

Chart III-M3

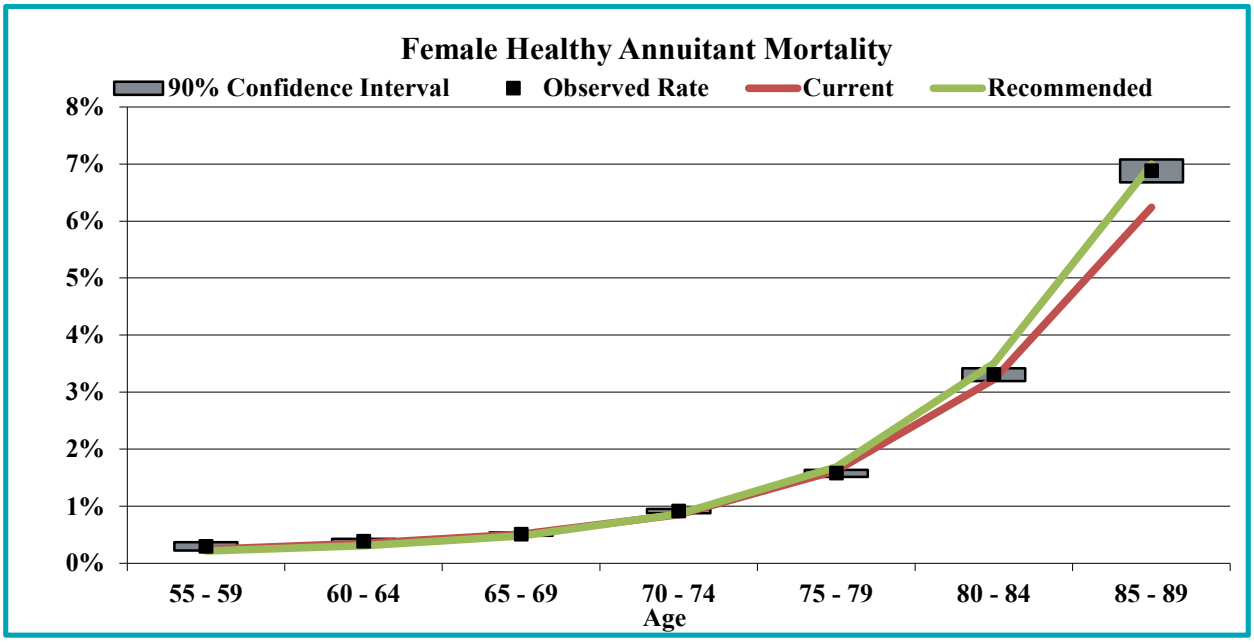


SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Table III-M4 – Healthy Annuitant Females

Healthy Annuitant Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Recommended	Current	Recommended
55 - 59	15,888	55	752,793,100	2,235,525	1,820,869	1,617,037	123%	138%
60 - 64	62,750	259	2,758,586,390	10,689,670	9,716,090	8,546,830	110%	125%
65 - 69	144,768	758	6,215,361,265	31,753,841	31,806,782	29,819,081	100%	106%
70 - 74	169,569	1,544	7,088,386,848	64,826,047	60,547,027	61,135,345	107%	106%
75 - 79	117,704	1,894	4,642,002,094	73,167,292	75,477,766	78,351,830	97%	93%
80 - 84	68,651	2,307	2,493,445,179	82,433,891	80,365,174	87,503,998	103%	94%
85 - 89	43,521	3,015	1,411,754,320	97,119,989	88,103,311	98,773,416	110%	98%
90 - 94	24,272	3,218	671,326,250	86,668,431	76,586,935	83,442,616	113%	104%
95 +	8,726	1,880	194,722,661	41,468,288	38,803,676	41,269,964	107%	100%
Total	**655,849**	**14,930**	**26,228,378,107**	**490,362,974**	**463,227,630**	**490,460,117**	**106%**	**100%**
R-Squared					**0.985**	**0.989**		

Chart III-M4

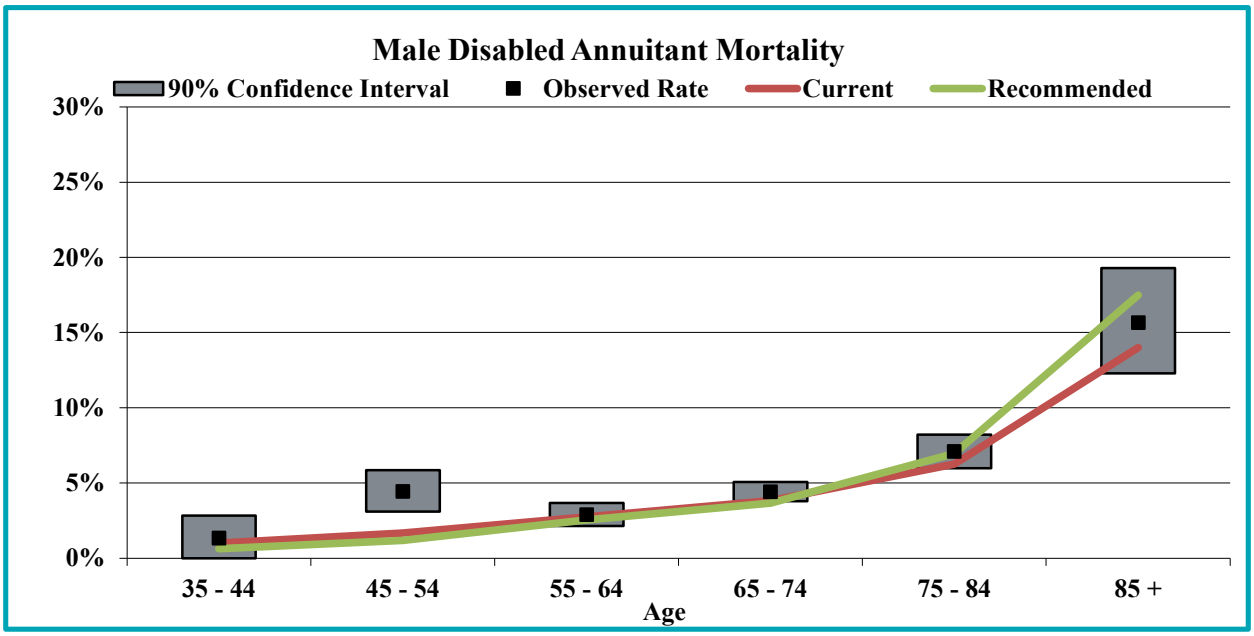


SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Table III-M5 – Disabled Annuitant Males

Disabled Annuitant Mortality - Base Table for Males								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Recommended	Current	Recommended
35 - 44	141	2	4,112,203	54,834	41,066	26,121	134%	210%
45 - 54	581	26	18,745,815	833,108	311,273	220,866	268%	377%
55 - 64	1,393	42	45,036,447	1,302,649	1,232,613	1,141,962	106%	114%
65 - 74	2,800	127	85,485,660	3,769,229	3,270,684	3,122,196	115%	121%
75 - 84	1,387	104	38,923,027	2,758,255	2,436,549	2,713,203	113%	102%
85 +	285	45	5,765,123	902,989	806,954	1,009,102	112%	89%
Total	**6,587**	**346**	**198,068,275**	**9,621,064**	**8,099,138**	**8,233,449**	**119%**	**117%**
R-Squared					**0.755**	**0.743**		

Chart III-M5

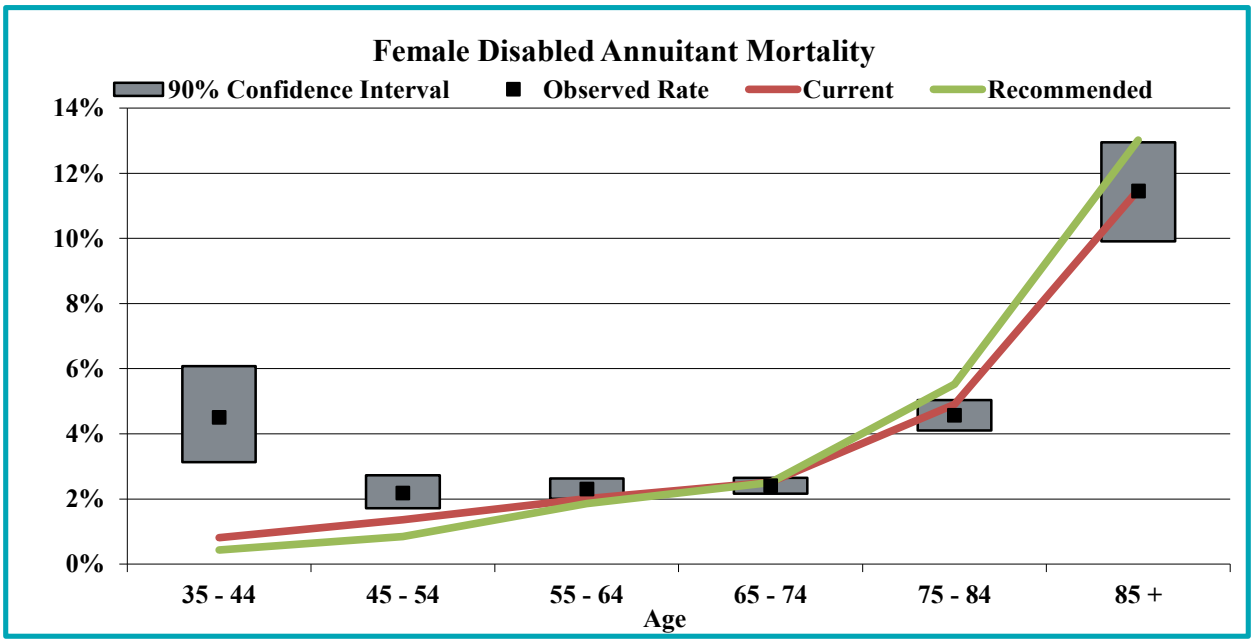


SECTION III – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Table III-M6 – Disabled Annuitant Females

Disabled Annuitant Mortality - Base Table for Females								
Age Band	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths			A/E Ratios	
				Actual	Current	Recommended	Current	Recommended
35 - 44	543	25	14,656,993	660,228	118,420	63,578	558%	1038%
45 - 54	2,277	55	71,321,250	1,559,205	972,761	609,495	160%	256%
55 - 64	6,188	153	195,477,020	4,513,856	3,928,048	3,633,639	115%	124%
65 - 74	10,358	266	316,674,142	7,626,059	7,978,104	7,951,514	96%	96%
75 - 84	5,293	255	148,074,982	6,774,862	7,268,005	8,178,704	93%	83%
85 +	1,181	148	26,865,383	3,076,281	3,086,576	3,499,236	100%	88%
Total	**25,840**	**902**	**773,069,770**	**24,210,491**	**23,351,913**	**23,936,167**	**104%**	**101%**
R-Squared					**0.862**	**0.837**		

Chart III-M6



SECTION III – DEMOGRAPHIC ASSUMPTIONS

FAMILY COMPOSITION

In the event of a member death, pension benefits may extend to a surviving spouse. Spousal demographic information is important in determining the value of their potential future benefit. However, marital information is not always readily available. In the case of an unmarried active member, they could marry before commencing benefits. Even married retirees are sometimes reported without a beneficiary date of birth. With this uncertainty, we make assumptions regarding the frequency with which participants are married at the time of benefit commencement as well as the age difference between the retirees and their spouses.

We currently assume the following:

- For members not currently receiving a benefit, 60% of members are assumed married to spouses of the opposite sex.
- Males are assumed to be two years older than females.

Based on healthy and disabled retirees that have commenced benefits between July 1, 2021 and June 30, 2024, approximately 47.9% are married with males being older than females by an average of 1.8 years. For purposes of determining the percentage married, we assumed that all retirees reported with a beneficiary date of birth are married.

As a result, we recommend the following:

- The percentage married assumption is reduced from 60% to 50%.
- The assumed age difference between males and females is unchanged at two years.

SECTION IV – ECONOMIC ASSUMPTIONS

The economic assumptions used in actuarial valuations are intended to be long-term in nature and should be both individually reasonable and consistent with each other. The specific assumptions analyzed in this report are:

- **Price inflation** – used to project increases in the 401(a)(17) pay limit and to determine Local employer Early Retirement Incentive Program (ERI) payments for those Local employers who elected to amortize their ERI liability as a level percent of payroll. This assumption is also used indirectly as an underlying component of other economic assumptions.
- **Wage inflation** – broad-based growth which is used to project the Social Security Wage Base.
- **Salary increase rate** – used to project increases in pay for active members in determining liabilities and costs of the Fund.

We have not studied the investment rate of return assumption since that assumption is set by the NJ State Treasurer.

To develop recommendations for each of these assumptions, we considered historical data, both nationally and for the Fund, expectations for the future, and assumptions used by other public sector plans.

PRICE INFLATION

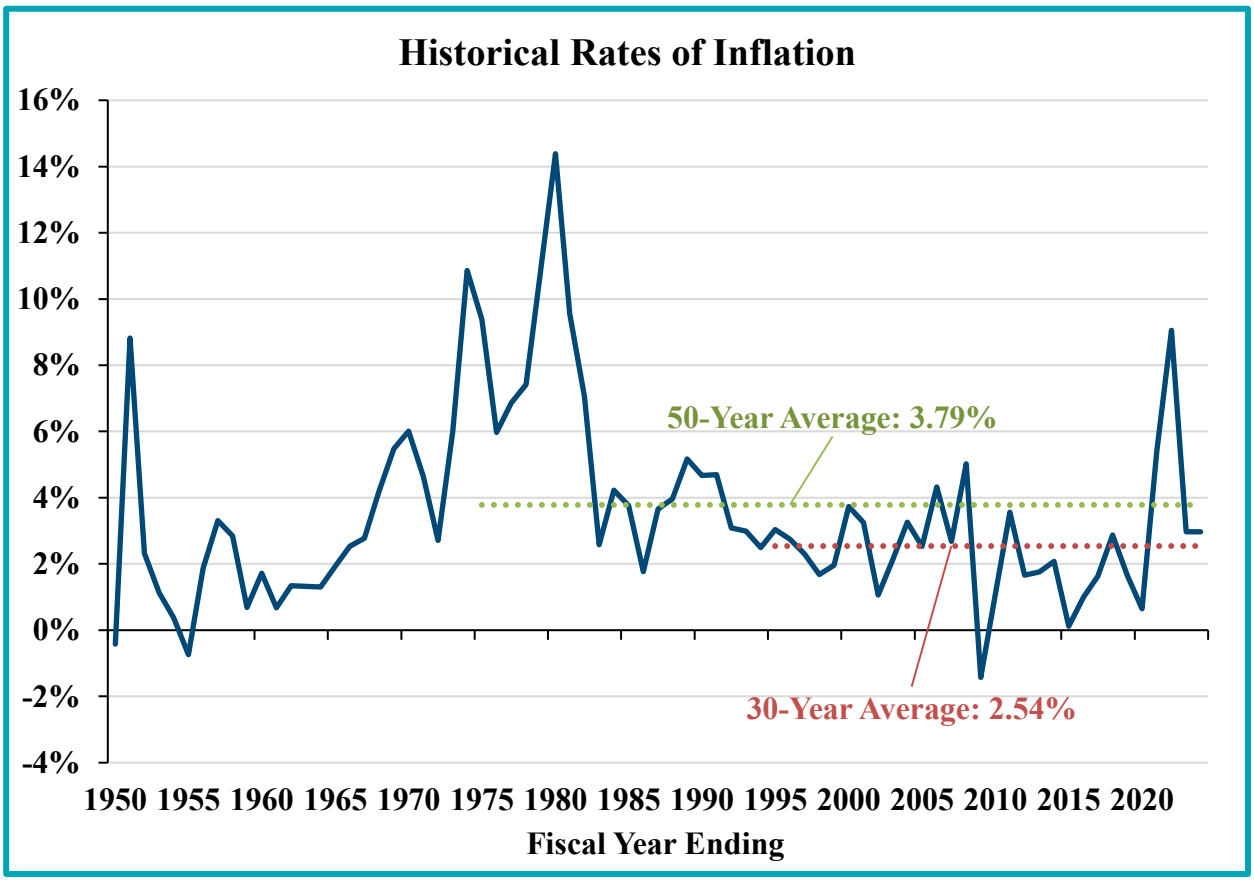
Long-term price inflation rates are the foundation of other economic assumptions. In a growing economy, wages and investments are expected to grow at the underlying inflation rate plus an additional real growth rate, whether it reflects productivity in terms of wages, or risk premiums in terms of investments.

SECTION IV – ECONOMIC ASSUMPTIONS

Historical Data

Chart IV-1 below shows inflation based on CPI-U for the U.S. by individual year from 1950 through 2024.

Chart IV-1



Data Source: US Bureau of Labor Statistics

Over the 50 years ending June 2024, the geometric average inflation rate for the U.S. has been about 3.8%, but this average is heavily influenced by the high inflation rates in the 1970s and early 1980s. Over the last 30 years, the geometric average inflation rate has been about 2.5%, and it has been 2.8% over the last 10 years.

Recently, inflation broke from the long-term trend with annual rates of 5.4% and 9.1% for the years ending June 2021 and 2022, respectively. This spike was followed by annual rates of 3.0% in both June 2023 and 2024.

Short-term deviations bear monitoring but do not require an immediate revision to expectations. Economic assumptions frequently deviate significantly from expectations. Often those deviations are followed by offsetting deviations in the opposite direction. The assumptions used in actuarial valuations are long-term in nature and are not necessarily driven by the most recent events.

SECTION IV – ECONOMIC ASSUMPTIONS

Future Expectations

A measure of the market consensus of expected future inflation rates is the difference in yields between conventional Treasury securities and Treasury inflation-protected securities (TIPS) at the same maturity. Table IV-1 shows the yields on both types of securities and the break-even inflation rate as of May 2025. Break-even inflation is the level of inflation needed for an investment in TIPS to "break even" with an investment in conventional treasury securities of the same maturity.

Table IV-1

Break-Even Inflation Based on Treasury Yields

Time to Maturity	Conventional Yield	TIPS Yield	Break Even Inflation
5 Years	4.02%	1.64%	**2.38%**
10 Years	4.42%	2.11%	**2.31%**
20 Years	4.92%	2.46%	**2.46%**

Data Source: Federal Reserve, Constant Maturity Yields, Monthly Series

The Federal Reserve Bank of Philadelphia publishes a quarterly survey of professional economic forecasters that includes their forecasts of inflation over the next 10 years. The survey for the second quarter of 2025 shows a median inflation (CPI) forecast of 2.35%, a minimum forecast of about 2.20%, and a maximum forecast of 2.80%.

Additionally, we consider the Federal Reserve's statutory mandate of stable prices. Inflation does not occur in a vacuum. The Federal Reserve actively conducts monetary policy to bring inflation in line with a target. While the effectiveness of monetary policy may vary, the Fed's inflation target is an important reference point when setting an inflation assumption.

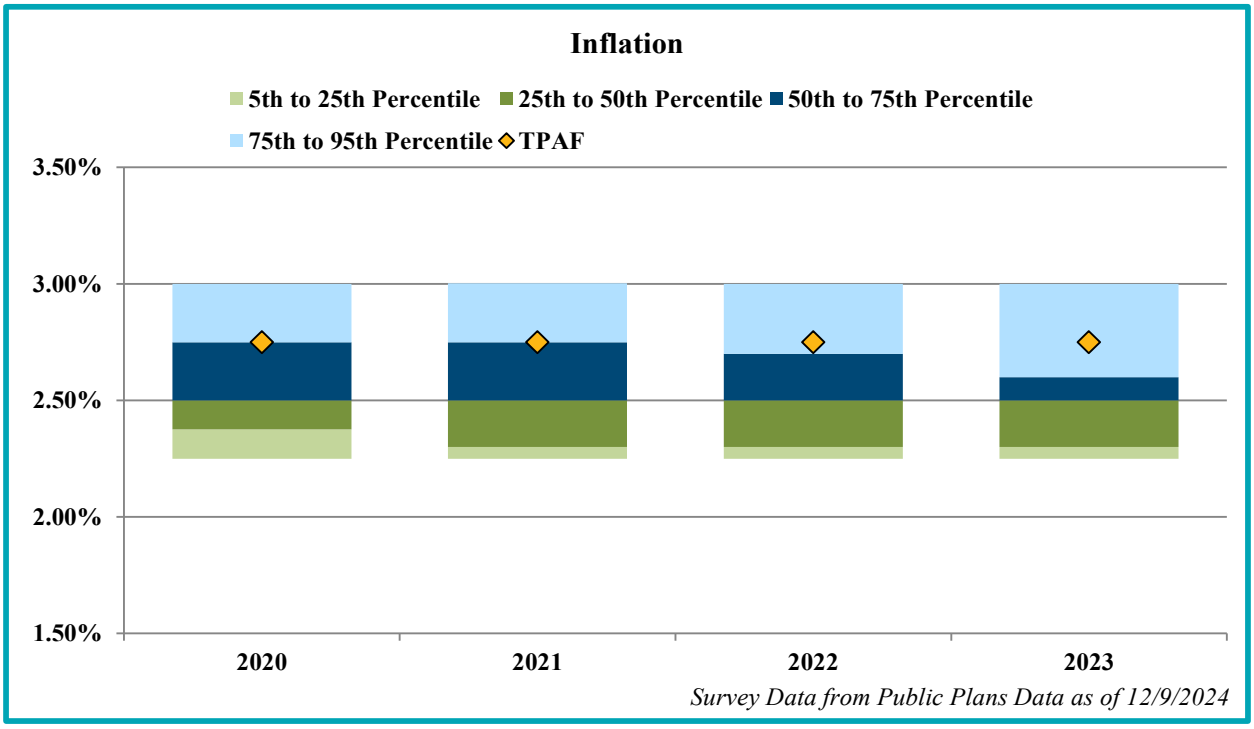
The Fed interprets stable prices as 2.0% annual inflation on a personal consumption expenditure (PCE) basis, which may differ from the CPI-based inflation used in setting the inflation assumption for TPAF. Since 2000, the annual change in CPI-U has been higher than the annual change in PCE by about 40 basis points, on average[1]. Therefore, an inflation assumption somewhat above 2.0% may be consistent with the Fed's inflation target.

[1] Based on PCE data from US Bureau of Economic Analysis, retrieved from FRED, Federal Reserve Bank of St. Louis.

SECTION IV – ECONOMIC ASSUMPTIONS

Finally, Chart IV-2 below shows the distribution from the 5th to 95th percentile of inflation assumptions in the Public Plans Data[2], a database of information on large public sector retirement systems in the United States.

Chart IV-2



For 2020 through 2023, the median inflation assumption from this data was 2.50%. There has been a minor trend toward lowering the assumption, as evidenced by the decrease in the quartiles.

Recommendation

Based on these considerations, we believe a reasonable range for the long-term price inflation assumption is 2.00% to 3.00%. Recent inflation rates have been near the top end of this range, while future expectations generally point toward the midpoint. We recommend maintaining the current assumption of 2.75% since it remains within the reasonable range.

WAGE INFLATION

Wage inflation can be thought of as the annual across-the-board increase in wages. Individuals often receive salary increases in excess of the wage inflation rate, and we study these increases as a part of the merit salary scale assumption. Wage inflation generally exceeds price inflation by some margin reflecting the history of increased purchasing power.

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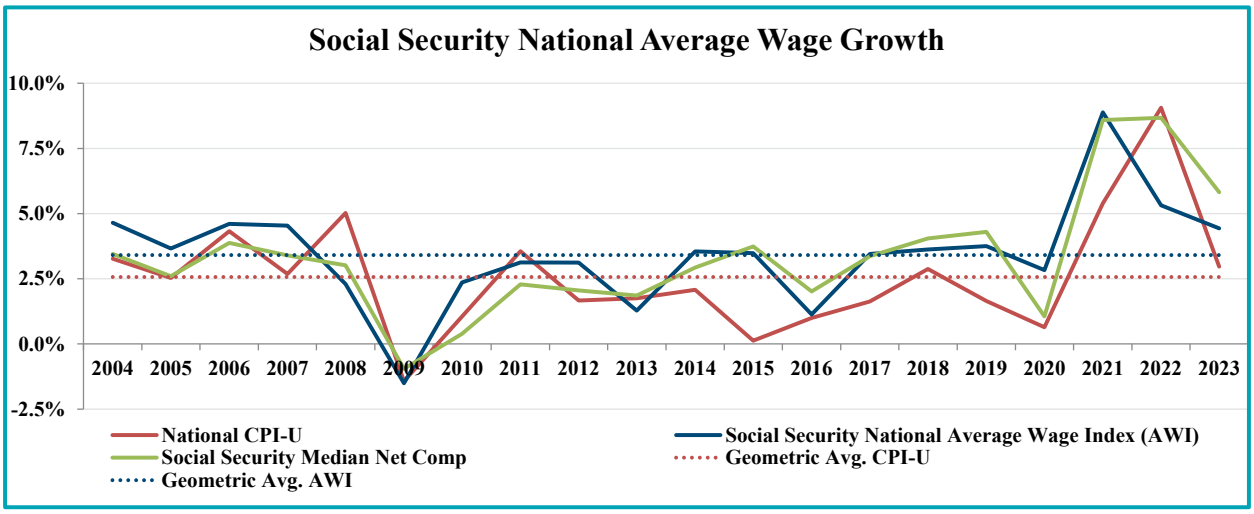
[2] www.publicplansdata.org. 2001-2023. Center for Retirement Research at Boston College, Mission Square Research Institute, National Association of State Retirement Administrators, and the Government Finance Officers Association.

SECTION IV – ECONOMIC ASSUMPTIONS

Wage inflation is used in the actuarial valuation to project the Social Security Wage Base in determining the actuarial liability.

Chart IV-3 shows the increase in national average wages (on a calendar year basis, as reported by the Social Security Administration) compared to inflation (on a June to June basis) from 2004 through 2023. National average wage data for 2024 is not yet available.

Chart IV-3



Over this period, national wage inflation averaged approximately 3.4% compared to annual price inflation of 2.6%, making real wage increases about 0.8%. Over the same time period, the increase in the median real wage was about 0.7% per year.

It is acceptable to assume some additional level of base payroll increase beyond general inflation. Potential reasons contributing to the increase may include productivity increases, the presence of strong union representation in the collective bargaining process, competition in hiring among other similar employers, and regional factors such as the local inflation index exceeding the national average. Also, the Social Security Administration projects real wage growth of 0.5% to 1.7% going forward in their Social Security solvency projections included in the 2025 annual Trustees Report.

We recommend maintaining a small non-inflationary base payroll growth assumption of 0.5% annually. As a result, after factoring in inflation, the annual expected wage base increase assumption remains at 3.25%.

SALARY INCREASE RATE

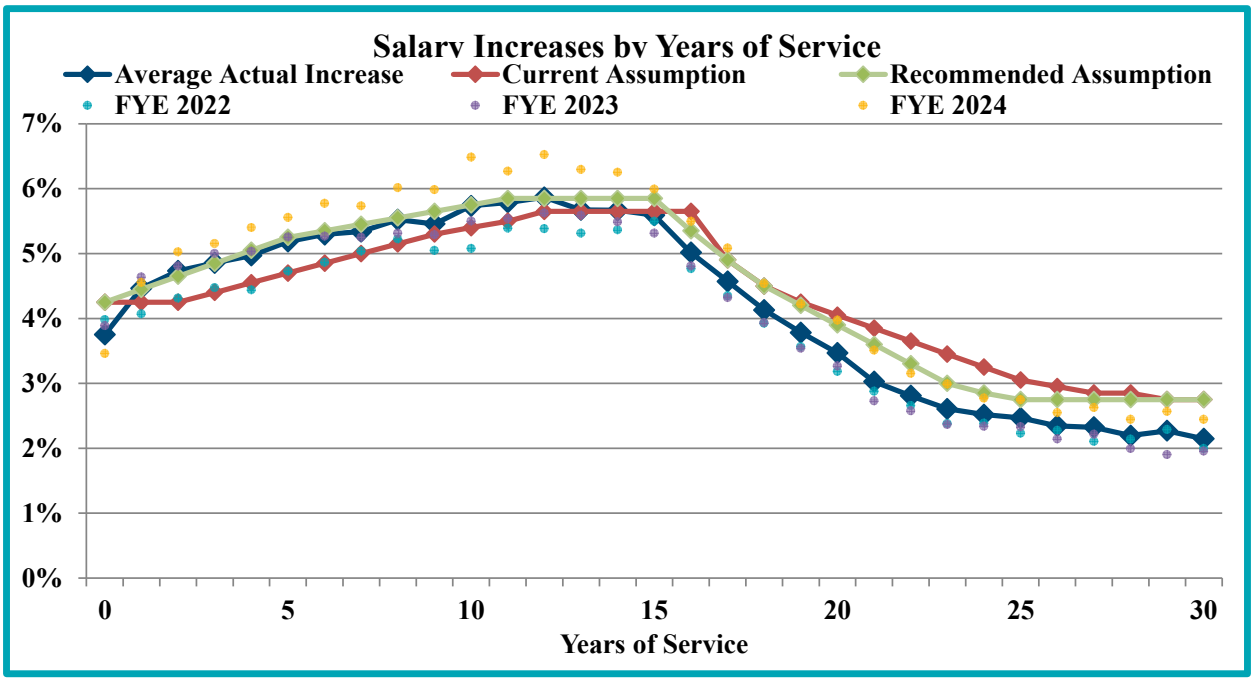
The salary increase rate represents the year over year increase in pay of continuing actives. Salary increases consist of three components: increases due to cost-of-living maintenance (inflation), increases related to non-inflationary pressures on base pay (such as productivity increases), and increases in individual pay due to merit, promotion, and longevity.

The current assumption varies by years of service. Salary increases are assumed to occur on October 1.

SECTION IV – ECONOMIC ASSUMPTIONS

Chart IV-4 shows the salary increases based on years of service for continuing active members for FYE 2022 through FYE 2024 as well as the current and recommended assumptions.

Chart IV-4



Experience continues to show a consistent relationship between salary increases and years of service. However, salary increases have generally been higher than expected for those with less than 15 years of service and lower than expected for those with more than 15 years of service. Salaries for continuing actives, on average, increased 3.9%, 4.0%, and 4.5% in FYE 2022, FYE 2023, and FYE 2024, respectively.

We recommend increasing the rates for those with 15 and fewer years of service to better reflect average experience over the three-year period. For those with more than 15 years of service, we recommend a general reduction in rates.

APPENDIX A – SUMMARY OF RECOMMENDED ASSUMPTIONS

1. Salary Increases Salary increases vary by years of service. Annual salary increases are shown below.

Years of Service	Rate
0	4.25%
1	4.45
2	4.65
3	4.85
4	5.05
5	5.25
6	5.35
7	5.45
8	5.55
9	5.65
10	5.75
11	5.85
12	5.85
13	5.85
14	5.85
15	5.85
16	5.35
17	4.90
18	4.50
19	4.20
20	3.90
21	3.60
22	3.30
23	3.00
24	2.85
25+	2.75

Salary increases are assumed to occur on October 1.

2. 401(a)(17) Pay Limit $345,000 in 2024, increasing 2.75% per annum, compounded annually.

3. Social Security Wage Base $168,600 in 2024, increasing 3.25% per annum, compounded annually.

APPENDIX A – SUMMARY OF RECOMMENDED ASSUMPTIONS

4. Termination Termination rates are as follows:

Service	Rates
0	7.00%
1	7.00
2	6.00
3	5.25
4	4.25
5	3.75
6	3.25
7	3.00
8	2.75
9	2.50
10	2.35
11	2.35
12	2.15
13	1.75
14	1.50
15	1.25
16	1.10
17	0.95
18	0.90
19	0.65
20	0.60
21	0.55
22	0.45
23	0.35
24-29	0.30

No termination is assumed after attainment of retirement eligibility.

72% of members with 10 or more years of service at termination are assumed to elect a deferred retirement benefit.

All other members are assumed to receive a refund of Accumulated Deductions with credited interest.

5. Disability Disability rates are as follows:

Age	Ordinary Disability	Accidental Disability	Age	Ordinary Disability	Accidental Disability
20	0.005%	0.006%	48	0.120%	0.006%
21	0.005	0.006	49	0.130	0.006
22	0.005	0.006	50	0.145	0.006
23	0.005	0.006	51	0.160	0.006
24	0.005	0.006	52	0.170	0.006
25	0.005	0.006	53	0.190	0.006
26	0.005	0.006	54	0.205	0.006
27	0.005	0.006	55	0.245	0.006
28	0.005	0.006	56	0.295	0.006
29	0.005	0.006	57	0.345	0.006
30	0.005	0.006	58	0.390	0.006
31	0.010	0.006	59	0.440	0.006
32	0.015	0.006	60	0.495	0.006
33	0.020	0.006	61	0.500	0.006
34	0.025	0.006	62	0.500	0.006
35	0.035	0.006	63	0.500	0.006
36	0.045	0.006	64	0.500	0.006
37	0.055	0.006	65	0.500	0.006
38	0.065	0.006	66	0.500	0.006
39	0.070	0.006	67	0.500	0.006
40	0.075	0.006	68	0.500	0.006
41	0.080	0.006	69	0.500	0.006
42	0.085	0.006	70	0.500	0.006
43	0.085	0.006	71	0.500	0.006
44	0.095	0.006	72	0.500	0.006
45	0.100	0.006	73	0.500	0.006
46	0.110	0.006	74	0.500	0.006
47	0.115	0.006			

Accidental disability rates apply at all ages.

Ordinary disability rates apply upon attainment of 10 years of service until the attainment of age 55 with at least 25 years of service.

Members are assumed to receive the greater of the applicable disability benefit or the early or service retirement benefit, depending on eligibility.

Tier 4 and Tier 5 members are not eligible for the Ordinary or Accidental Disability benefits but the disability rates still apply. Such members terminating under the disability decrement are assumed to separate from service and elect a deferred retirement benefit.

6. Mortality

Pre-Retirement Mortality (Non-Annuitants): The Pub-2016 Teachers Above-Median Income Employee mortality table *[PubT-2016(A) Employee]* as published by the Society of Actuaries with a 94.1% adjustment for males and 84.0% adjustment for females, and with future improvement from the base year of 2016 on a generational basis using SOA's Scale MP-2021. All pre-retirement deaths are assumed to be ordinary deaths.

Healthy Retirees and Beneficiaries (Healthy Annuitants): The Pub-2016 Teachers Above-Median Income Healthy Retiree mortality table *[PubT-2016(A) Healthy Retiree]* as published by the Society of Actuaries with a 121.1% adjustment for males and 99.5% adjustment for females, and with future improvement from the base year of 2016 on a generational basis using SOA's Scale MP-2021.

Disabled Retirees (Disabled Annuitants): The Pub-2016 Non-Safety Disabled Retiree mortality table *[PubNS-2016 Disabled Retiree]* as published by the Society of Actuaries with a 128.0% adjustment for males and 113.7% adjustment for females, and with future improvement from the base year of 2016 on a generational basis using SOA's Scale MP-2021.

APPENDIX A – SUMMARY OF RECOMMENDED ASSUMPTIONS

7. Retirement

Retirement rates for Tier 1-4 members are as follows:

Age	Less Than 25 Years of Service	25 Years of Service	26 or More Years of Service
< 49	N/A	1.5%	1.5%
49	N/A	2.0	1.5
50	N/A	2.0	1.5
51	N/A	2.0	2.0
52	N/A	4.0	2.5
53	N/A	5.0	3.0
54	N/A	6.0	3.5
55	N/A	10.0	13.0
56	N/A	20.0	17.0
57	N/A	20.0	17.0
58	N/A	20.0	17.0
59	N/A	20.0	17.0
60	5.0	27.0	20.0
61	6.0	27.0	22.0
62	6.0	35.0	27.0
63	8.0	42.0	30.0
64	8.0	42.0	30.0
65	12.0	45.0	30.0
66	18.0	52.0	35.0
67	20.0	58.0	40.0
68	18.0	55.0	30.0
69	18.0	50.0	30.0
70	18.0	50.0	30.0
71	18.0	50.0	30.0
72	18.0	50.0	30.0
73	18.0	50.0	30.0
74	18.0	50.0	30.0
75	100.0	100.0	100.0

Rates apply upon retirement eligibility by tier.

APPENDIX A – SUMMARY OF RECOMMENDED ASSUMPTIONS

Retirement rates for Tier 5 members are as follows:

Age	Less Than 25 Years of Service	25 Years of Service	26 to 29 Years of Service	30 Years of Service	31 or More Years of Service
< 49	N/A	N/A	N/A	1.5%	1.5%
49	N/A	N/A	N/A	2.0	1.5
50	N/A	N/A	N/A	2.0	1.5
51	N/A	N/A	N/A	2.0	2.0
52	N/A	N/A	N/A	4.0	2.5
53	N/A	N/A	N/A	5.0	3.0
54	N/A	N/A	N/A	6.0	3.5
55	N/A	N/A	N/A	10.0	13.0
56	N/A	N/A	N/A	20.0	17.0
57	N/A	N/A	N/A	20.0	17.0
58	N/A	N/A	N/A	20.0	17.0
59	N/A	N/A	N/A	20.0	17.0
60	N/A	N/A	N/A	27.0	20.0
61	N/A	N/A	N/A	27.0	22.0
62	N/A	N/A	N/A	35.0	27.0
63	N/A	N/A	N/A	42.0	30.0
64	N/A	N/A	N/A	42.0	30.0
65	12.0	45.0	45.0	45.0	30.0
66	18.0	52.0	35.0	35.0	35.0
67	20.0	58.0	40.0	40.0	40.0
68	18.0	55.0	30.0	30.0	30.0
69	18.0	50.0	30.0	30.0	30.0
70	18.0	50.0	30.0	30.0	30.0
71	18.0	50.0	30.0	30.0	30.0
72	18.0	50.0	30.0	30.0	30.0
73	18.0	50.0	30.0	30.0	30.0
74	18.0	50.0	30.0	30.0	30.0
75	100.0	100.0	100.0	100.0	100.0

APPENDIX A – SUMMARY OF RECOMMENDED ASSUMPTIONS

8.	**Family Composition Assumptions**	For members not currently in receipt, 50% of members are assumed married to spouses of the opposite sex. Males are assumed to be two years older than females. For purposes of the optional form of payment death benefit for members currently in receipt, beneficiary status is based on the beneficiary allowance reported. If no beneficiary date of birth is provided, the beneficiary is assumed to be the member's spouse of the opposite sex with males assumed to be two years older than females. No additional dependent children or parents are assumed.
9.	**Form of Payment**	Current actives are assumed to elect the Maximum Option.

APPENDIX B – SUMMARY OF CURRENT ASSUMPTIONS

The following are the assumptions used in the actuarial valuation as of July 1, 2024. The demographic and economic assumptions (other than the investment return assumption) for that valuation were determined in the Actuarial Experience Study covering the period July 1, 2018 – June 30, 2021 and approved by the Board of Trustees on December 1, 2022.

1. Salary Increases

Salary increases vary by years of service. Annual salary increases are shown below.

Years of Service	Rate Period
0-2	4.25%
3	4.40
4	4.55
5	4.70
6	4.85
7	5.00
8	5.15
9	5.30
10	5.40
11	5.50
12-16	5.65
17	4.90
18	4.50
19	4.25
20	4.05
21	3.85
22	3.65
23	3.45
24	3.25
25	3.05
26	2.95
27-28	2.85
29+	2.75

Salary increases are assumed to occur on October 1.

2. 401(a)(17) Pay Limit

$345,000 in 2024, increasing 2.75% per annum, compounded annually.

3. Social Security Wage Base

$168,600 in 2024, increasing 3.25% per annum, compounded annually.

APPENDIX B – SUMMARY OF CURRENT ASSUMPTIONS

4. Termination Termination rates are as follows:

Service	Rates
0	6.75%
1	6.75
2	5.50
3	4.50
4	4.00
5	3.00
6	2.75
7	2.50
8	2.50
9	2.25
10	2.25
11	2.10
12	1.95
13	1.65
14	1.35
15	1.05
16	1.00
17	0.90
18	0.70
19	0.55
20	0.55
21	0.50
22	0.40
23	0.30
24-29	0.30

No termination is assumed after attainment of retirement eligibility.

70% of members with 10 or more years of service at termination are assumed to elect a deferred retirement benefit.

All other members are assumed to receive a refund of Accumulated Deductions with credited interest.

APPENDIX B – SUMMARY OF CURRENT ASSUMPTIONS

5. Disability

Disability rates are as follows:

Age	Ordinary Disability	Accidental Disability	Age	Ordinary Disability	Accidental Disability
20	0.005%	0.006%	48	0.135%	0.006%
21	0.005	0.006	49	0.145	0.006
22	0.005	0.006	50	0.160	0.006
23	0.005	0.006	51	0.175	0.006
24	0.005	0.006	52	0.190	0.006
25	0.005	0.006	53	0.210	0.006
26	0.005	0.006	54	0.225	0.006
27	0.005	0.006	55	0.245	0.006
28	0.005	0.006	56	0.295	0.006
29	0.005	0.006	57	0.345	0.006
30	0.005	0.006	58	0.390	0.006
31	0.010	0.006	59	0.440	0.006
32	0.015	0.006	60	0.495	0.006
33	0.020	0.006	61	0.515	0.006
34	0.030	0.006	62	0.520	0.006
35	0.040	0.006	63	0.570	0.006
36	0.050	0.006	64	0.620	0.006
37	0.060	0.006	65	0.670	0.006
38	0.070	0.006	66	0.725	0.006
39	0.080	0.006	67	0.780	0.006
40	0.085	0.006	68	0.835	0.006
41	0.090	0.006	69	0.890	0.006
42	0.095	0.006	70	0.950	0.006
43	0.095	0.006	71	1.010	0.006
44	0.105	0.006	72	1.070	0.006
45	0.110	0.006	73	1.130	0.006
46	0.120	0.006	74	1.190	0.006
47	0.130	0.006			

Accidental disability rates apply at all ages.

Ordinary disability rates apply upon attainment of 10 years of service until the attainment of age 55 with at least 25 years of service.

Members are assumed to receive the greater of the applicable disability benefit or the early or service retirement benefit, depending on eligibility.

APPENDIX B – SUMMARY OF CURRENT ASSUMPTIONS

Tier 4 and Tier 5 members are not eligible for the Ordinary or Accidental Disability benefits but the disability rates still apply. Such members terminating under the disability decrement are assumed to separate from service and elect a deferred retirement benefit.

6. Mortality

Pre-Retirement Mortality (Non-Annuitants): The Pub-2010 Teachers Above-Median Income Employee mortality table *[PubT-2010(A) Employee]* as published by the Society of Actuaries with a 93.9% adjustment for males and 85.3% adjustment for females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2021. All pre-retirement deaths are assumed to be ordinary deaths.

Healthy Retirees and Beneficiaries (Healthy Annuitants): The Pub-2010 Teachers Above-Median Income Healthy Retiree mortality table *[PubT-2010(A) Healthy Retiree]* as published by the Society of Actuaries with a 114.7% adjustment for males and 99.6% adjustment for females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2021.

Disabled Retirees (Disabled Annuitants): The Pub-2010 Non-Safety Disabled Retiree mortality table *[PubNS-2010 Disabled Retiree]* as published by the Society of Actuaries with a 106.3% adjustment for males and 100.3% adjustment for females, and with future improvement from the base year of 2010 on a generational basis using SOA's Scale MP-2021.

APPENDIX B – SUMMARY OF CURRENT ASSUMPTIONS

7. Retirement

Retirement rates for Tiers 1-4 members are as follows:

Age	Less Than 25 Years of Service	25 Years of Service	26 or More Years of Service
< 50	N/A	1.5%	1.5%
50	N/A	1.5	1.5
51	N/A	2.0	2.0
52	N/A	3.0	2.5
53	N/A	4.0	3.0
54	N/A	6.0	3.5
55	N/A	10.0	13.0
56	N/A	18.0	17.0
57	N/A	18.0	17.0
58	N/A	20.0	17.0
59	N/A	25.0	17.0
60	4.0	25.0	20.0
61	6.0	25.0	22.0
62	6.0	33.0	27.0
63	8.0	42.0	30.0
64	8.0	42.0	30.0
65	12.0	42.0	30.0
66	18.0	55.0	35.0
67	18.0	55.0	40.0
68	18.0	55.0	30.0
69	18.0	55.0	30.0
70	18.0	55.0	30.0
71	18.0	55.0	30.0
72	18.0	55.0	30.0
73	18.0	55.0	30.0
74	18.0	55.0	30.0
75	100.0	100.0	100.0

Rates apply upon retirement eligibility by tier.

APPENDIX B – SUMMARY OF CURRENT ASSUMPTIONS

Retirement rates for Tier 5 members are as follows:

Age	Less Than 25 Years of Service	25 Years of Service	26 to 29 Years of Service	30 Years of Service	31 or More Years of Service
< 50	N/A	N/A	N/A	1.5%	1.5%
50	N/A	N/A	N/A	1.5	1.5
51	N/A	N/A	N/A	2.0	2.0
52	N/A	N/A	N/A	3.0	2.5
53	N/A	N/A	N/A	4.0	3.0
54	N/A	N/A	N/A	6.0	3.5
55	N/A	N/A	N/A	10.0	13.0
56	N/A	N/A	N/A	18.0	17.0
57	N/A	N/A	N/A	18.0	17.0
58	N/A	N/A	N/A	20.0	17.0
59	N/A	N/A	N/A	25.0	17.0
60	N/A	N/A	N/A	25.0	20.0
61	N/A	N/A	N/A	25.0	22.0
62	N/A	N/A	N/A	33.0	27.0
63	N/A	N/A	N/A	42.0	30.0
64	N/A	N/A	N/A	42.0	30.0
65	12.0	42.0	42.0	42.0	30.0
66	18.0	55.0	35.0	35.0	35.0
67	18.0	55.0	40.0	40.0	40.0
68	18.0	55.0	30.0	30.0	30.0
69	18.0	55.0	30.0	30.0	30.0
70	18.0	55.0	30.0	30.0	30.0
71	18.0	55.0	30.0	30.0	30.0
72	18.0	55.0	30.0	30.0	30.0
73	18.0	55.0	30.0	30.0	30.0
74	18.0	55.0	30.0	30.0	30.0
75	100.0	100.0	100.0	100.0	100.0

APPENDIX B – SUMMARY OF CURRENT ASSUMPTIONS

8. Family Composition Assumptions	For members not currently in receipt, 60% of members are assumed married to spouses of the opposite sex. Males are assumed to be two years older than females. For purposes of the optional form of payment death benefit for members currently in receipt, beneficiary status is based on the beneficiary allowance reported. If no beneficiary date of birth is provided, the beneficiary is assumed to be the member's spouse of the opposite sex with males assumed to be two years older than females. No additional dependent children or parents are assumed.
9. Form of Payment	Current actives are assumed to elect the Maximum Option.