CHEIRON Classic Values, Innovative Advice

Stanislaus County Employees' Retirement Association

Actuarial Experience Study for July 1, 2018 through June 30, 2021

Produced by Cheiron

February 2022

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February 15, 2022

Board of Retirement
Stanislaus County Employees' Retirement Association
832 12th Street, Suite 600
Modesto, CA 95353

Dear Members of the Board:

The purpose of this report is to present an Actuarial Experience Study of the Stanislaus County Employees' Retirement Association (StanCERA, the Fund, the Plan) covering actuarial experience from July 1, 2018 through June 30, 2021. The report includes analyses and recommendations of economic and demographic assumptions to be used beginning with the July 1, 2021 actuarial valuation.

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

Sincerely,
Cheiron

Graham A. Schmidt, ASA, FCA, MAAA, EA
Consulting Actuary

Jonathan B. Chipko, FSA, MAAA, EA
Consulting Actuary

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 or not the current assumptions adequately reflect the long-term expectations for StanCERA, 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 StanCERA's membership or assets that would warrant such frequent or significant changes.

SUMMARY OF ECONOMIC ASSUMPTION ANALYSIS

The specific economic assumptions analyzed in this report are price inflation, wage inflation, COLA growth, and the discount rate. These assumptions have a significant impact on the contribution rates in the short-term and the risk of negative outcomes in the long-term.

The economic assumptions adopted by the Retirement Board at the April 27, 2021 meeting include a 6.75% long-term rate of return on Plan assets, an annual increase in prices measured by the Consumer Price Index (CPI) of 2.50%, annual wage increase equal to 25 basis points greater than price increases (2.75% in total), and a post-retirement COLA average growth rate of 2.40%.

The discount rate assumption is consistent with the long-term (20-year) capital market assumptions from a survey of investment consultants. Other data presented in this report indicate that the discount rate and other economic assumptions adopted by the Retirement Board are reasonable.

However, the Plan's investment consultant (NEPC) projects lower returns for the next 10 years, averaging 5.66%, for StanCERA's current target portfolio. If the current target asset allocation is maintained and NEPC's projections are realized, the Board can expect a pattern of actuarial losses from the assets in the near term. However, we would expect these losses to be offset by liability gains over the same time period, since NEPC's inflation assumption (2.30%) is lower than the Plan's assumption (2.50%), resulting in lower than expected pay and COLA increases.

SUMMARY OF DEMOGRAPHIC ASSUMPTION ANALYSIS

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

- **Merit salary increases** – Adjustments to the rates for Safety members.
- **Retirement rates** – Adjustments to the rates for both General and Safety members in non-PEPRA tiers.
- **Termination rates** – Lower rates for most Safety members. Lower rates for General members with 2-4 years of service and higher rates for most General members with five or more years of service.

SECTION I – EXECUTIVE SUMMARY

- **Mortality rates** – Update to the new CalPERS base tables with appropriate adjustments and the use of new generational mortality improvement scales (from MP-2018 to 80% of the MP-2020 tables).
- **Family composition assumption changes** – Males now assumed to be two years older than female spouses, 90% of male and 95% of female married members assumed to elect the joint and survivor option, and 80% of male and 60% of female members assumed to be married. Also, previously we assumed that spouses of current retirees reported on the data survived through the valuation date. We propose relying on the reported spouse date of death instead of using an assumption.
- **Other assumptions changes** – Increase terminal payload for vacation cash outs, adjust rates of withdrawals and reciprocity, reduce expected commencement age for Tier 4 and 5 Safety reciprocal transfers and update administrative expense assumption.

The changes in the economic assumptions increase costs overall, with a decrease due to the inflation rate change somewhat offsetting an increase due to the discount rate reduction. Among the demographic assumptions, the recommendation to change mortality assumptions has the largest impact on contribution rates, reducing rates substantially. The recently completed mortality study by the Society of Actuaries found that mortality rates had improved slower than previously anticipated and recommended future projections of mortality improvement commensurate with recent experience in the short-term tapering to a steady long-term expected rate. The recommended change to mortality rates for StanCERA reflects both the changes in StanCERA experience since the last experience study and the application of the recommended lower rates of improvement projected in the future.

The recommended changes to retirement and termination rates, as well as the changes to the family composition assumptions also would decrease contribution rates, while the changes to assumed Safety merit salary increases, terminal payload, and deferral age would increase overall contribution rates.

Further information about impact of these changes to overall contribution rates can be found on the following page:

SECTION I – EXECUTIVE SUMMARY

Stanislaus County Employees' Retirement Association Assumptions Changes Impact (Employee + Employer)	Gross Normal Cost %	Amortization of UAL %	Gross Contribution
General			
Economic	0.13%	0.43%	0.56%
Mortality	-0.28%	-1.73%	-2.01%
Merit Pay	0.00%	0.00%	0.00%
Reciprocity	0.04%	-0.09%	-0.05%
Deferral Age	0.00%	0.00%	0.00%
Family Compositon	-0.02%	-0.27%	-0.29%
Vacation Pay	0.15%	0.47%	0.62%
Termination	-0.54%	-0.08%	-0.62%
Retirement	-0.05%	-0.26%	-0.31%
Impact of All Changes to General	**-0.57%**	**-1.53%**	**-2.10%**
Safety			
Economic	0.23%	0.65%	0.89%
Mortality	-0.14%	-1.17%	-1.31%
Merit Pay	1.44%	1.17%	2.60%
Reciprocity	0.22%	-0.05%	0.17%
Deferral Age	0.29%	0.73%	1.02%
Family Compositon	-0.21%	-0.77%	-0.98%
Vacation Pay	0.13%	0.41%	0.54%
Termination	0.26%	0.08%	0.34%
Retirement	0.13%	0.55%	0.68%
Impact of All Changes to Safety	**2.35%**	**1.60%**	**3.95%**
Aggregate			
Economic	0.15%	0.48%	0.63%
Mortality	-0.25%	-1.61%	-1.86%
Merit Pay	0.32%	0.26%	0.58%
Reciprocity	0.08%	-0.08%	0.00%
Deferral Age	0.07%	0.16%	0.23%
Family Compositon	-0.07%	-0.37%	-0.44%
Vacation Pay	0.14%	0.46%	0.60%
Termination	-0.35%	-0.05%	-0.40%
Retirement	-0.02%	-0.08%	-0.10%
TOTAL IMPACT OF ALL CHANGES	**0.07%**	**-0.83%**	**-0.76%**

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

SECTION II – CERTIFICATION

The purpose of this report is to provide the results of an Actuarial Experience Study of the Stanislaus County Employees' Retirement Association (StanCERA) covering actuarial experience from July 1, 2018 through June 30, 2021. This report is for the use of the StanCERA Retirement Board in selecting assumptions to be used in actuarial valuations beginning June 30, 2021.

In preparing our report, we relied on information (some oral and some written) supplied by StanCERA. 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.

Cheiron utilizes ProVal, an actuarial valuation application 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, have a basic understanding of it, and have used it in accordance with its original intended purpose. We have not identified any material inconsistencies in assumptions or output of ProVal that would affect this report.

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 for the StanCERA Retirement Board for the purposes described herein. This report is not intended to benefit any other party, and Cheiron assumes no duty or liability to any such party.

Graham A. Schmidt, ASA, FCA, MAAA, EA
Consulting Actuary

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SECTION III – ECONOMIC ASSUMPTIONS
PRICE INFLATION

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 indirectly as an underlying component of other economic assumptions.
- **Wage inflation** – across the board wage growth used to project benefits and to amortize the unfunded liability as a level percentage of expected payroll.
- **COLA growth** – rate at which inflation-linked post-retirement COLAs are expected to change.
- **Discount rate** – used both to project long-term asset growth and to discount future cash flows in calculating the liabilities and costs of the Plan.

In order to develop recommendations for each of these assumptions, we considered historical data, both nationally and for the Plan, and expectations for the future, as expressed by the Plan's and other external investment consultants and the Board.

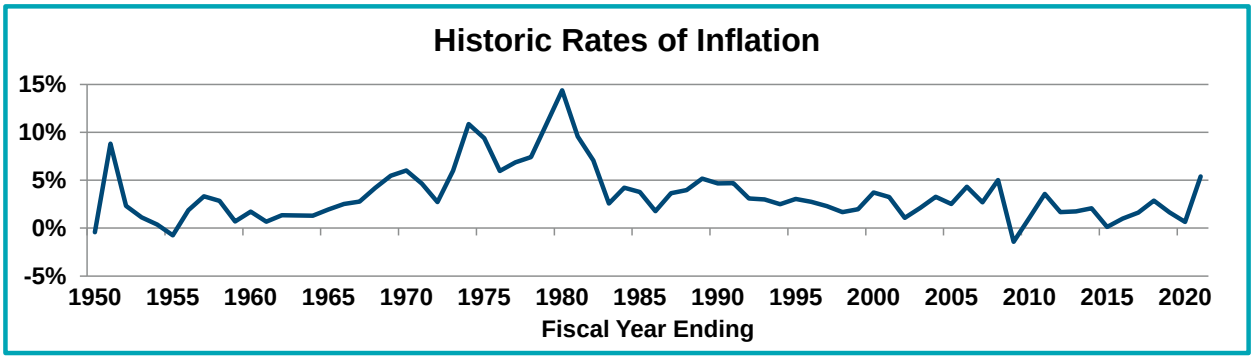
PRICE INFLATION

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 some additional real growth rate, whether it reflects productivity in terms of wages or risk premiums in terms of investments.

Historical Data

Chart III-1 below shows inflation for the U.S. by individual year since 1950.

Chart III-1



Over the 50 years ending June 2021, the geometric average inflation rate for the U.S. has been about 3.9%, 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 2.3%, and it has been only 1.9% over the 10 years ending June 2021.

SECTION III – ECONOMIC ASSUMPTIONS
PRICE INFLATION

In the year ending June 2021, inflation broke from this long-term trend with an annual rate of 5.4%. Inflation continued to come in higher than in recent history in the months after June 2021 and prior to the issuance of this report. This short-term deviation bears monitoring but does 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. That is particularly important considering the major economic impact of the recent COVID-19 pandemic.

Future Expectations

A measure of the market consensus of expected future inflation rates is the difference in yields between conventional treasury bonds and Treasury Inflation-Protected Securities (TIPS) at the same maturity. Table III-1 shows the yields on both types of bonds and the break-even inflation rate as of December 2021. Break-even inflation is the level of inflation needed for an investment in TIPS to "break even" with an investment in conventional treasury bonds of the same maturity. Longer-term expectations are lower than short-term expectations.

Table III-1

Break-Even Inflation Based on Treasury Bond Yields			
Time to Maturity	Conventional Yield	TIPS Yield	Break Even Inflation
5 Years	1.23%	-1.52%	2.75%
10 Years	1.47%	-0.99%	2.46%
20 Years	1.90%	-0.61%	2.51%

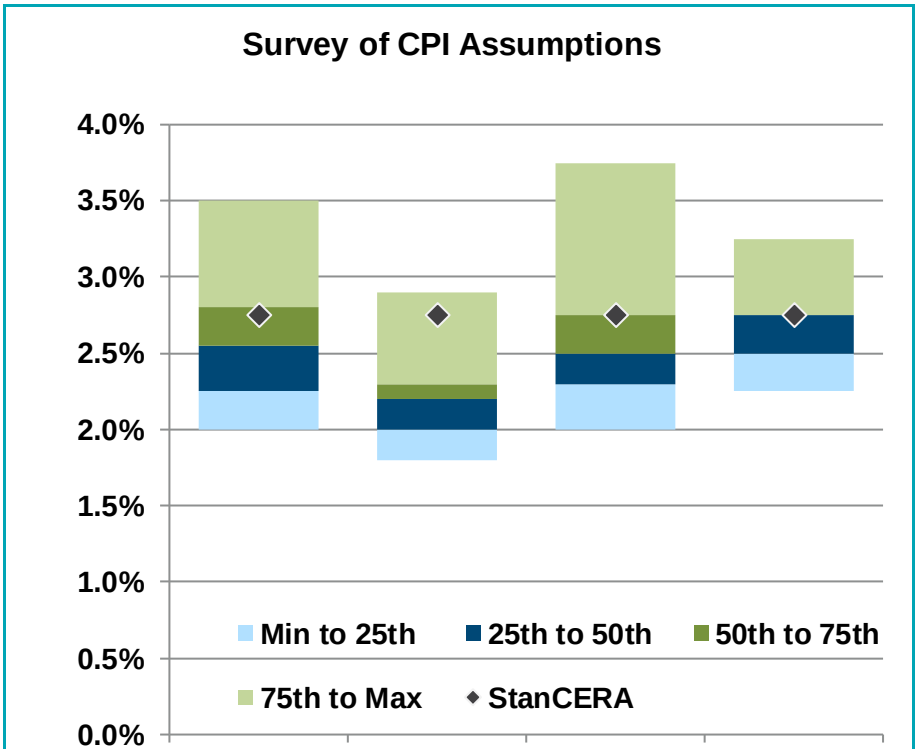
Data Source Federal Reserve, Constant Maturity Yields, Monthly Series

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 fourth quarter of 2021 shows a median inflation forecast of 2.55%; a minimum forecast of about 2.0% and a maximum forecast of 3.5%.

Chart III-2 on the next page shows the distribution of the professionals forecasts for average inflation over the next 10 years compared to assumptions from the Horizon Actuarial Services Survey of Capital Market Assumptions (2021 Edition), the 2020 Data Survey from US Public Plan Data (PPD) maintained by the Center for Retirement Research at Boston College and the MissionSquare Research Institute and our 2020 internal survey of California public pension plans.

SECTION III – ECONOMIC ASSUMPTIONS
PRICE INFLATION

Chart III-2



	Q4 2021 Economic Forecasters	2021 Horizon Survey	2020 Public Plan Database	2020 Cheiron California Survey
Minimum	2.00%	1.80%	2.00%	2.25%
25th	2.25%	2.00%	2.30%	2.50%
50th	2.55%	2.20%	2.50%	2.75%
75th	2.80%	2.30%	2.75%	2.75%
Maximum	3.50%	2.90%	3.75%	3.25%

Finally, NEPC, the Board's investment consultant, uses an inflation assumption of 2.30% for the next 10 years. A broader survey of 39 investment advisors, as published by Horizon Actuarial Services in 2021, reflects a 2.12% average assumption over the next 10 years and 2.23% over the next 20 years.

Based on all of these considerations, we believe a reasonable range for long-term price inflation for use in the Plan's actuarial valuations is between 2.25% and 2.75%. Therefore, we agree with the Board's recent action to reduce the assumption from 2.75% to 2.50%. Although inflation has accelerated in the latter half of 2021 and the beginning of 2022, the updated inflation assumption is consistent with current long-term market expectations and still slightly higher than the average expectations of many investment consultants.

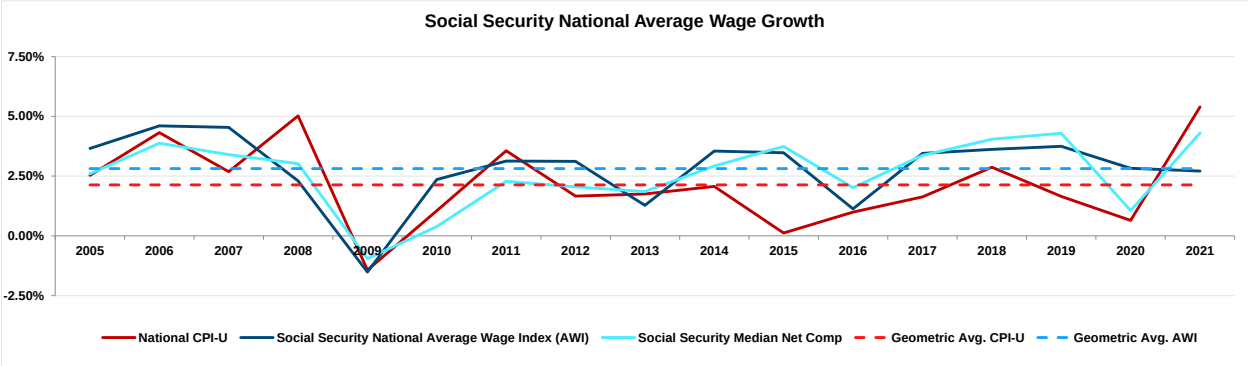
WAGE INFLATION

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.

Wage inflation is used in the actuarial valuation as the minimum expected salary increase for an individual and, for purposes of amortizing the unfunded actuarial liability, the rate at which payroll is expected to grow over the long term, assuming a stable active member population.

Chart III-3 shows the increase in national average wages (as reported by the Social Security Administration) compared to inflation from 2005 through 2021.

Chart III-3



Over this period, national wage inflation averaged approximately 2.8% compared to annual price inflation of 2.1%, making real wage increases about 0.7% above inflation. However, over the same time period the increase in the median real wage was only 0.5% per year, as much of the growth in wages was clustered at the top end of the wage scale.

It is acceptable to assume some additional level of base payroll increase beyond general inflation. Potential reasons contributing to the increase may include 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, as has sometimes proven the case in parts of California. Also, the Social Security Administration projects real wage growth of 0.5% - 1.8% going forward in their Social Security solvency projections included in the 2021 annual Trustees Report. However, recent higher rates of inflation have resulted in negative real wage growth for US workers in 2021, and the expectation of higher inflation in the short term is anticipated to continue to put downward pressure on real wages, at least in the short term.

Cheiron recommends maintaining the small non-inflationary base payroll growth assumption of 0.25% annually. The annual expected increase in base payroll will be 2.75%, reduced from

3.00% in the June 30, 2020 valuation. This increase will be applied to all continuing active members, and to starting pay for new entrants when projections of future populations are required. This increase will also be used in the calculation of the unfunded liability amortization payment as a level percentage of payroll.

COLA GROWTH

Members of StanCERA – other than those in Tier 3 - are eligible to receive automatic Cost of Living Adjustments (COLAs), based on the growth in the Bay Area Consumer Price Index (CPI-U) and a 3% cap on the annual COLA increase. Any increase in the CPI above the maximum increase can be banked for future years in which the change in the CPI is below the maximum increase.

It is necessary to determine an assumed rate of COLA growth, reflecting both inflation (i.e., the growth in the CPI), and the interaction of the CPI with the COLA cap and banking mechanism. Simulations of inflation show that the average growth in the COLA is expected to be below the cap, even if the expected increase in the CPI is equal to or higher than the cap itself. This is because if there is not a significant bank already in existence (such as in the early years of retirement) and there are years in which inflation is below the cap, this shortfall will not be made up in future years.

We have produced stochastic simulations of inflation and then modeled how the COLA maxima and the banking process interact with the changes in CPI. For a given long-term estimate of inflation, we used a 30% autocorrelation factor with 1.50% annual inflation volatility (expressed as a standard normal error). A starting inflation level of 4.00% was used in the simulations, to reflect the most recent annual average increase in the level of Bay Area inflation. This model is intended only for use in analyzing the relationship between long-term average COLAs and CPI. These assumptions may result in an unrealistically narrow distribution of annual inflation rates.

Based on the results of these simulations and using the 2.50% inflation assumption adopted by the Board, which we believe to be reasonable, we recommended a COLA growth assumption of 2.40%.

DISCOUNT RATE

The discount rate assumption is generally the most significant of all the assumptions employed in actuarial valuations. The discount rate is based on the long-term expected return on plan investments. In the short-term, a higher discount rate results in lower expected contributions. However, over the long term, actual contributions will depend on actual investment returns and not the discount rate (or expected investment returns). If actual investment returns are lower than expected, contribution rates will increase in the future. It is important to set a realistic discount rate so that projections of future contributions for budgeting purposes will not be biased.

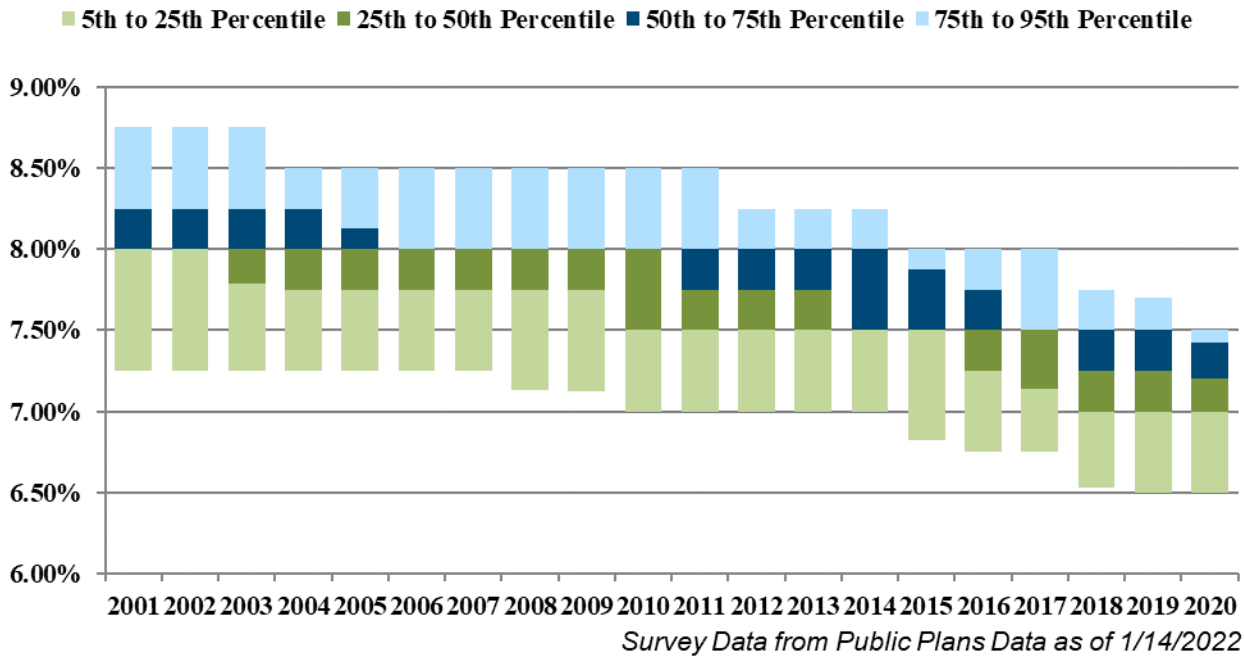
SECTION III – ECONOMIC ASSUMPTIONS
DISCOUNT RATE

Other Large Public Retirement Plans

Based on the PPD, which covers most of the largest public retirement systems in the country, there has been a general movement over at least the last decade to reduce the discount rate used in actuarial valuations. Chart III-4 below shows the change in the distribution of assumptions since 2001. The median assumption is now 7.20% and the number of plans using a discount rate 7.0% or lower has increased significantly.

Chart III-4

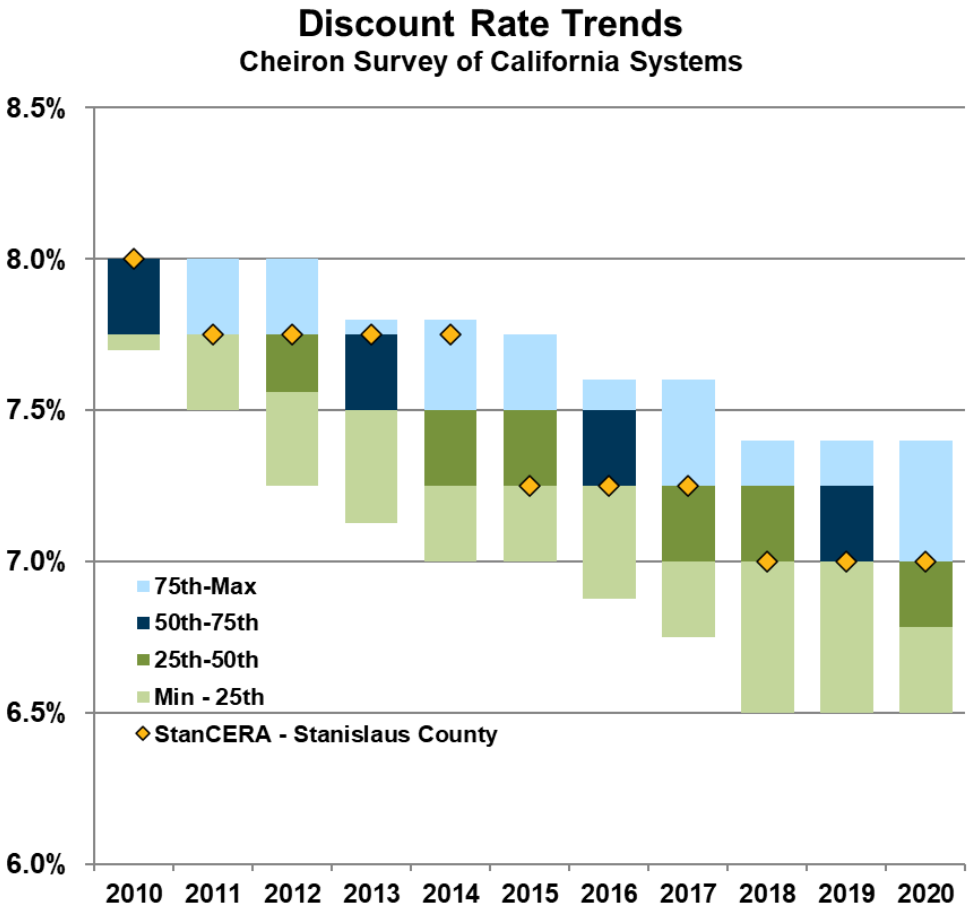
Discount Rate



In our survey of California retirement systems, the median assumption is even lower at 7.00% with over half of the 39 systems using the median rate. Only four systems were using a rate of 7.25% or higher in 2020, and some have since reduced their discount rates. Chart III-5 below shows the change in discount rate assumptions for California systems from 2010 to 2020.

SECTION III – ECONOMIC ASSUMPTIONS
DISCOUNT RATE

Chart III-5



Target Asset Allocation and Future Expectations

The discount rate assumption depends on the anticipated average level of inflation and the anticipated average *real rate of return.* The real rate of return is the investment return in excess of underlying inflation. The expected average real rate of return is heavily dependent on asset mix: The portion of assets in stocks, bonds, and other asset classes.

Table III-2 below shows the expected nominal geometric return based on the Board's current target asset allocation and the capital market assumptions provided by the Plan's investment consultant (NEPC) in 2021, as well as a survey of multiple investment consultants published by Horizon Actuarial Services in 2021 over both a 10 and 20-year time horizon. These expected returns reflect a 5 basis point adjustment for investment expenses. The table also shows the underlying inflation assumption used in the development of these capital market assumptions and computes the expected real rate of return (investment return in excess of inflation).

For some classes in the StanCERA portfolio – in particular, US Treasuries, Value-Add Real Estate and Private Real Assets (Natural Resources) – the Horizon survey did not include specific

assumptions, therefore the NEPC assumptions were used for these classes (adjusted for differences in inflation).

Based on these assumptions, we calculated an expected geometric return of 6.77% and 6.89% under the NEPC 30-year and the Horizon 20-year survey assumptions, respectively, but only a 5.66% and 6.06% return under the NEPC 10-year and Horizon 10-year survey assumptions, respectively.

Table III-2

StanCERA Portfolio Return Expectations
(reflects 5bp adjustment for investment expenses)

Consultant	Nominal	Inflation	Real	Standard Deviation
NEPC (10-year)	5.66%	2.30%	3.36%	12.07%
NEPC (30-year)	6.77%	2.50%	4.27%	12.07%
Horizon (Survey, 10-year)	6.06%	2.12%	3.94%	11.83%
Horizon (Survey, 20-year)	6.89%	2.23%	4.66%	11.83%
Average	6.34%	2.29%	4.06%	11.95%
Current Assumption	7.00%	2.75%	4.25%	

Based on these capital market assumptions, we also calculated the potential distribution of returns over the various periods as shown in Table III-3. The 50th percentile nominal return under 6.77% under the NEPC 30-year assumptions and 6.89% under Horizon 20-year survey assumptions, both of which are higher than the 6.75% nominal return recently adopted by the Board.

Table III-3

Expected Distribution of Average Nominal Annual Investment Returns
(reflects 5bp adjustment for investment expenses)

Percentile	NEPC (10-Year)	NEPC (30-Year)	Horizon (10-Year)	Horizon (20-Year)	Average
95th	12.06%	10.42%	12.33%	11.29%	11.53%
75th	8.24%	8.25%	8.59%	8.67%	8.44%
60th	**6.62%**	**7.32%**	**7.00%**	**7.56%**	**7.12%**
50th	5.66%	6.77%	6.06%	6.89%	6.34%
40th	**4.70%**	**6.22%**	**5.12%**	**6.23%**	**5.57%**
25th	3.14%	5.31%	3.59%	5.14%	4.29%
5th	-0.39%	3.24%	0.13%	2.66%	1.41%

SECTION III – ECONOMIC ASSUMPTIONS
DISCOUNT RATE

As stated earlier in this report, the NEPC geometric assumption for the current target portfolio is lower than the adopted nominal return of 6.75% over the next 10 years (5.66%), as is the Horizon 10-year expectation (6.06%). The Board's adopted real return assumption (4.25%, based on a 6.75% nominal return and 2.50% price inflation) is also higher than the 10-year real return under the NEPC assumptions (3.36%) and the Horizon survey assumptions (3.94%). The adopted real return assumption is similar to the longer-term real returns under both the NEPC and the Horizon survey assumptions.

As of the 2013 valuation, the expected rate of return is expressed net of investment, but not administrative, expenses. The returns above were modeled based on the expected returns of the portfolio benchmark indices, which are expected to have minimal expenses. The actuarial standards on selecting a return assumption (ASOP 27) state that in general superior or inferior returns (net of fees) should not be assumed for active versus passive management, therefore we do not recommend a significant adjustment to the modeled returns for the fees of the asset managers. However, a slight margin is appropriate to reflect the investment-related expenses other than those of the investment managers, which would include the investment advisor and custodian. The expected returns shown above reflect a 5 basis point adjustment for investment expenses.

The recently adopted discount rate of 6.75% is consistent with the capital market assumptions discussed above, including an adjustment for differences in inflation and a small adjustment for investment-related expenses as described above. We therefore find this discount rate to be a reasonable assumption.

While short-term considerations should not be unduly weighted when setting the discount rate, stakeholders should be aware of the following factors regarding short-term expectations:

- Many investment consultants expect poor rates of return in the immediate and near-term future. They reason that there is little in the way of yields on fixed income, and that the equity markets are fully valued.
- We believe that near- and mid-term return projections should be considered along with long-term projections. Fund performance is usually measured over five to 10 years; longer measurement periods are often considered less relevant because of the potential for changes in the economy and in the investment markets.
- If NEPC and much of the investment community are correct in their projections, we can expect returns below the 6.75% assumed rate for a number of years. This will result in actuarial losses and increases in employer contribution rates, assuming other assumptions have no gain or loss.

Anecdotally, we have begun to see modest increases in capital market expectations over the past few months due to the recent high level of inflation and corresponding expected increases in interest rates. While this trend bears monitoring, we believe the recently adopted discount rate of 6.75% remains reasonable.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
MERIT SALARY INCREASES

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 StanCERA, with some adjustments where future experience is expected to differ from historical experience and with deference to standard tables where StanCERA experience is not fully credible and a standard table is available. In some cases, we have combined the experience of the past three years with that of the prior three-year period in order to have a more robust dataset to review.

For purposes of this study, merit salary increases are also considered a demographic assumption because the assumption is based primarily on StanCERA's historical experience.

MERIT SALARY INCREASES

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. Increases due to cost of living and non-inflationary base pay factors were addressed in an earlier section of this report. To analyze the merit component, we subtracted the Plan's base wage growth as measured by the increase in the Plan's aggregate average wages and adjusted for changes in the average service level.

The merit salary increase assumption is analyzed by employee group and by service. Generally, newer employees are more likely to earn a longevity increase or receive a promotion, so their salary increases tend to be greater than those for longer service employees.

Charts IV-1 and IV-2 on the next page analyze the pay patterns for Safety and General members, respectively. The charts show the current assumption (red line) compared to the actual experience (blue line) and the proposed assumption (green line).

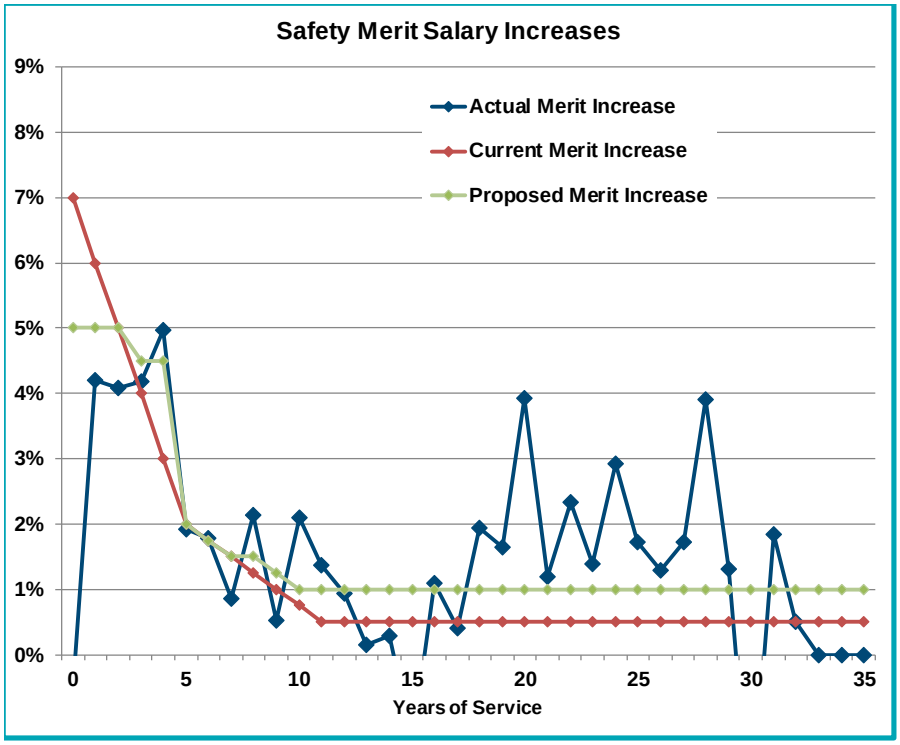
For Safety members, we have proposed new assumptions with rates of 5% per year in the first three years of service and slightly higher increases thereafter, when compared to the previous assumption. The 5% pattern of increases in the first three years fits well with our general understanding of how the step increases work in the members' pay schedules.

The proposal also recommends an ultimate rate of 1.00% starting at 10 years of service. We note that the data could have supported a larger increase in the ultimate rate. However, we have been made aware that a significant portion of the merit increases for the Safety members are a result of the implementation of a POST certification bonus for the Deputy Sheriffs, which represents a one-time increase for these members, and will not apply to future PEPRA members.

For General members, we have not recommended any changes.

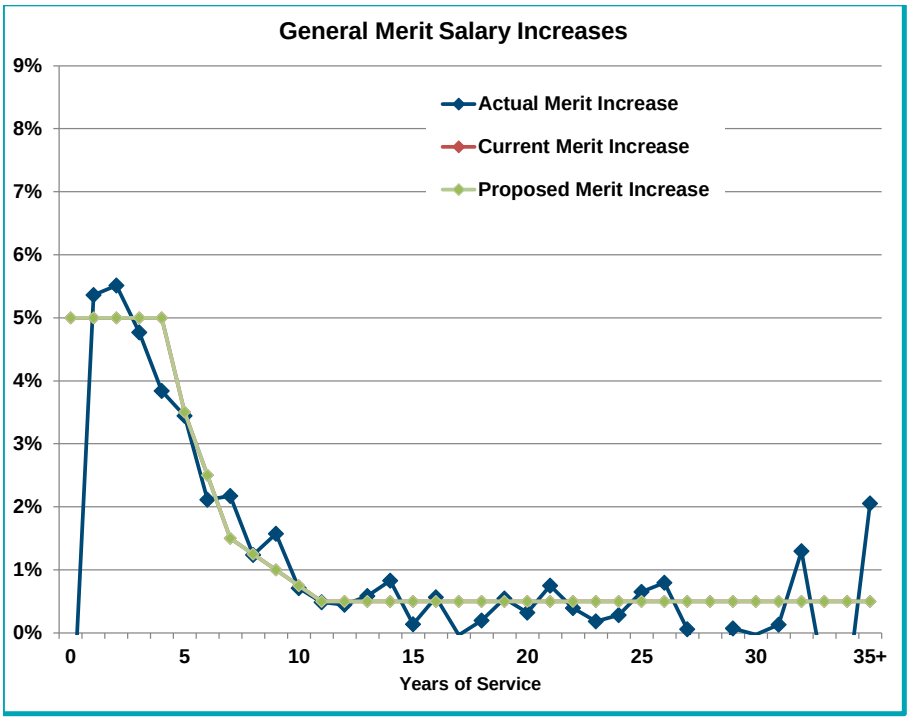
SECTION IV – DEMOGRAPHIC ASSUMPTIONS
MERIT SALARY INCREASES

Chart IV-1



Merit Salary Increases Safety		
Service	Current	Recommended
0	7.00%	5.00%
1	6.00%	5.00%
2	5.00%	5.00%
3	4.00%	4.50%
4	3.00%	4.50%
5	2.00%	2.00%
6	1.75%	1.75%
7	1.50%	1.50%
8	1.25%	1.50%
9	1.00%	1.25%
10	0.75%	1.00%
11	0.50%	1.00%
12	0.50%	1.00%
13	0.50%	1.00%
14	0.50%	1.00%
15	0.50%	1.00%
16	0.50%	1.00%
17	0.50%	1.00%
18	0.50%	1.00%
19	0.50%	1.00%
20	0.50%	1.00%
21	0.50%	1.00%
22	0.50%	1.00%
23	0.50%	1.00%
24	0.50%	1.00%
25	0.50%	1.00%
26	0.50%	1.00%
27	0.50%	1.00%
28	0.50%	1.00%
29	0.50%	1.00%
30+	0.50%	1.00%

Chart IV-2



Merit Salary Increases General		
Service	Current	Recommended
0	5.00%	5.00%
1	5.00%	5.00%
2	5.00%	5.00%
3	5.00%	5.00%
4	5.00%	5.00%
5	3.50%	3.50%
6	2.50%	2.50%
7	1.50%	1.50%
8	1.25%	1.25%
9	1.00%	1.00%
10	0.75%	0.75%
11	0.50%	0.50%
12	0.50%	0.50%
13	0.50%	0.50%
14	0.50%	0.50%
15	0.50%	0.50%
16	0.50%	0.50%
17	0.50%	0.50%
18	0.50%	0.50%
19	0.50%	0.50%
20	0.50%	0.50%
21	0.50%	0.50%
22	0.50%	0.50%
23	0.50%	0.50%
24	0.50%	0.50%
25+	0.50%	0.50%

ANALYSIS OF OTHER DEMOGRAPHIC ASSUMPTIONS

For all of the remaining demographic assumptions, we determined the ratio of the actual number of decrements for each membership group compared to the expected number of decrements (A/E ratio or actual-to-expected ratio). If the assumption is perfect, this ratio will be 100%. Otherwise, any recommended assumption change should move from the current A/E ratio towards 100% unless future experience is expected to be different than the experience during the period of study.

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 100% although this is never the case. In general, a recommended assumption change should increase the r-squared compared to the current assumption making it closer to 100% unless the pattern of future decrements is expected to be different from the pattern experienced during the period of study.

In addition, we calculated the 90% confidence interval, which represents the range within which the true decrement rate during the experience study period fell with 90% confidence. (If there is insufficient data to calculate a confidence interval, the confidence interval is shown as the entire range of the graph.) We generally propose 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, to account for the past experience represented by the current assumption, and to maintain a neutral to slight conservative bias in the selection of the assumption. For disability and mortality rates, we compare StanCERA's experience to that of a standard table, and only adjust the standard table to the extent StanCERA's experience is large enough to be credible in the case of disabilities. For mortality, we adjust the standard table to bring the proposed assumption closer to an A/E ratio of 100%.

RETIREMENT RATES

The current retirement rates vary by age and service and are applied to all members who are eligible to retire. As a result, a General member who is age 60 with 10 years of service, for example, is assumed to be less likely to retire than a member who is age 60 with 30 years of service. In reviewing the data for StanCERA, we find that at many ages, members with more service are generally more likely to retire than members with fewer years of service. StanCERA is not large enough to justify assumptions for each age and service combination, so we recommend separate assumptions by age for each of the following three service groups for Safety members:

- Members with 10 to 14 years of service,
- Members with 15 to 19 years of service.
- Members with 20 or more years of service.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

We continue to recommend separate assumptions by age for each of the following two service groups for General members:

- Members with 10 to 29 years of service,
- Members with 30 or more years of service.

For the PEPRA membership, there is not enough data yet on retirement rates that would enable us to generate a distinct set of credible assumptions. However, based on the lower benefits at earlier ages and higher ages at which the maximum benefit multipliers are reached under the PEPRA formulas, it is reasonable to expect that some members will retire at later ages than they would under the pre-PEPRA formulas.

CalPERS has developed age and service-based retirement rates reflecting these expectations. For the PEPRA members, we recommend continuing to use the CalPERS 2% at Age 62 Public Agency Miscellaneous rates and the 2.7% at Age 57 Public Agency Police rates (since the StanCERA Safety workforce has considerably more Police than Fire members). See Appendix A for a listing of the rates.

For General members, we include experience from July 1, 2015 through June 30, 2021. For Safety members only, we excluded the experience from July 1, 2019 to June 30, 2020, due to unusually high pandemic related retirement activity. We included the July 1, 2018 to June 30, 2019 and July 1, 2020 to June 30, 2021 experience, as well as the three years of experience from the prior experience study (2015-2018).

For the pre-PEPRA membership, Table IV-R1 shows the calculation of actual-to-expected ratios and the r-squared statistic for Safety members with 10 to 14 years of service. Chart IV-R1 shows the information graphically along with the 90% confidence interval.

The data shows lower actual retirement rates than expected under the current assumption, with an A/E ratio of 36%. We are proposing lower rates from age 50 to 59 to bring the assumption more in line with experience.

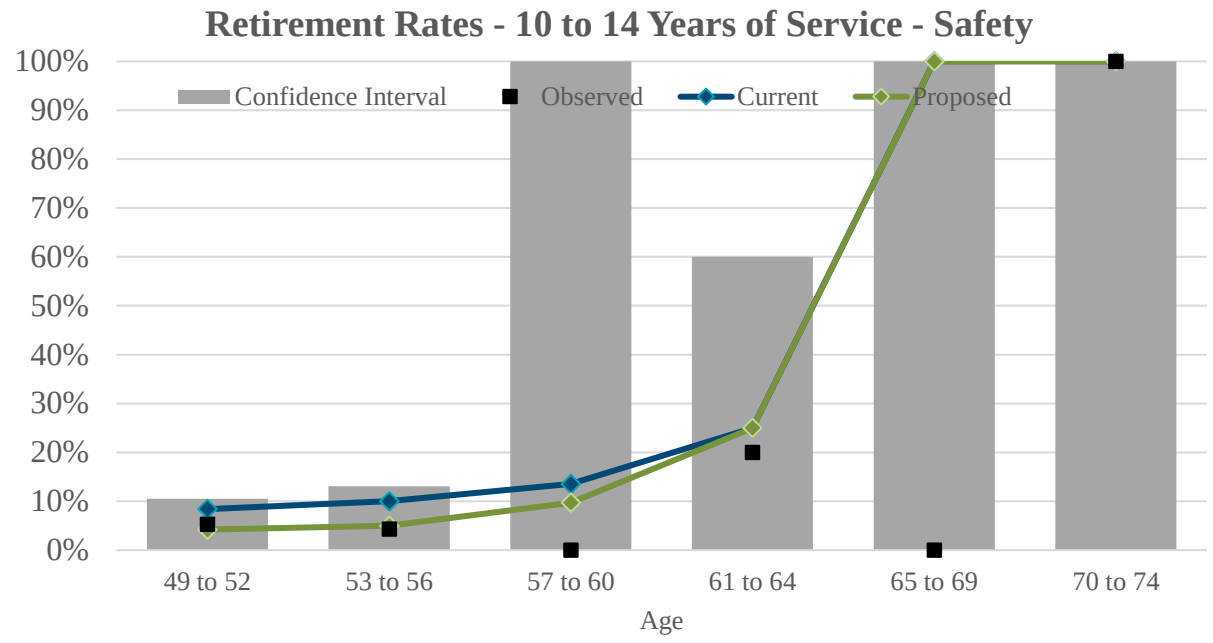
See Appendices A and B for the proposed and prior rates. The ultimate retirement age remains at 65.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Table IV-R1

Retirement Rates - 10 to 14 Years of Service - Safety									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
49 to 52	38	2	3	2	5.3%	8.4%	4.2%	63%	125%
53 to 56	23	1	2	1	4.3%	10.0%	5.0%	43%	87%
57 to 60	17	0	2	2	0.0%	13.5%	9.7%	0%	0%
61 to 64	5	1	1	1	20.0%	25.0%	25.0%	80%	80%
65 to 69	4	0	4	4	0.0%	100.0%	100.0%	0%	0%
70 to 74	1	1	1	1	100.0%	100.0%	100.0%	100%	100%
Total	**88**	**5**	**14**	**11**	**5.7%**	**16.0%**	**12.1%**	**36%**	**47%**
Confidence Interval %			**100%**	**100%**					
R-squared			**3%**	**29%**					

Chart IV-R1



SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Table IV-R2 shows the calculation of actual-to-expected ratios and the r-squared statistic for Safety members with 15 to 19 years of service, and Chart IV-R2 shows the information graphically along with the 90% confidence interval.

The data shows higher retirement rates to those expected under the current assumptions. We recommend a higher age 50 retirement rate and lower rates from ages 51 to 59 to bring the assumption more in line with experience. We note that although the overall A/E is somewhat further from 100%, the pattern of retirements is significantly closer to the data (as seen in the improvement in the r-squared statistic).

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 65.

Table IV-R2

Retirement Rates - 15 to 19 Years of Service - Safety									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
49 to 52	38	6	2	3	15.8%	6.1%	7.5%	261%	211%
53 to 56	19	0	2	1	0.0%	10.0%	5.0%	0%	0%
57 to 60	17	1	2	2	6.1%	14.1%	10.5%	43%	58%
61 to 64	6	3	2	2	50.0%	25.0%	25.0%	200%	200%
65 to 69	0	0	0	0	0.0%	0.0%	0.0%	0%	0%
70 to 74	0	0	0	0	0.0%	0.0%	0.0%	0%	0%
Total	**79**	**10**	**8**	**7**	**12.7%**	**10.1%**	**8.9%**	**125%**	**143%**
Confidence Interval %			**83%**	**83%**					
R-squared			**32%**	**77%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Chart IV-R2

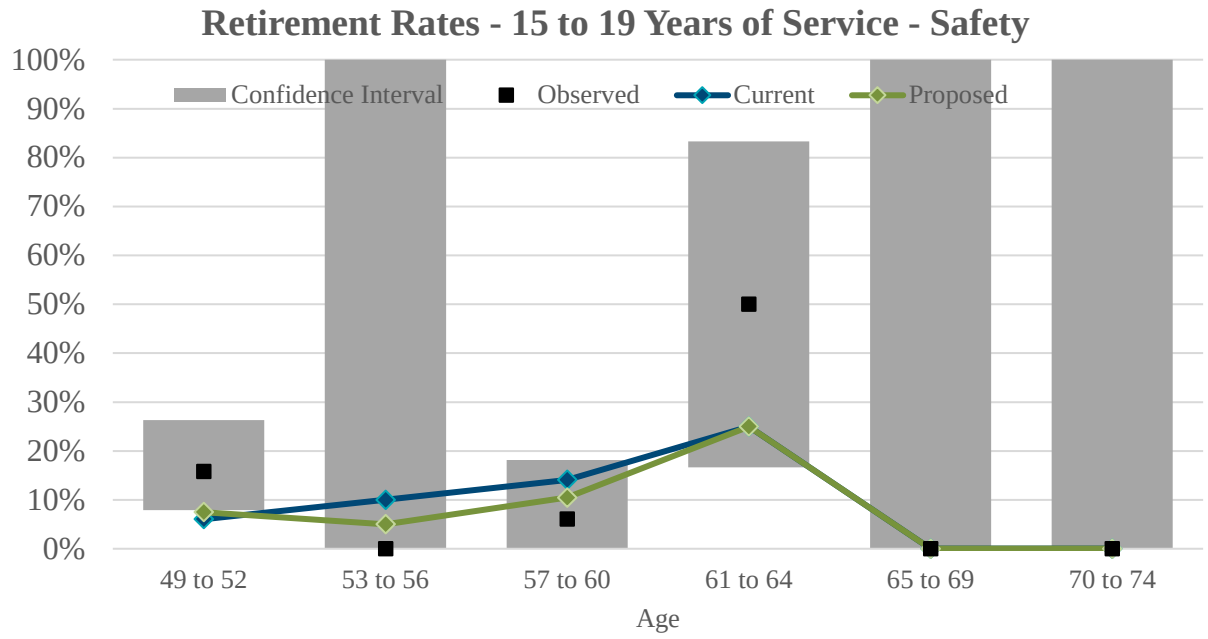


Table IV-R3 shows the calculation of actual-to-expected ratios and the r-squared statistic for Safety members with more than 20 years of service, and Chart IV-R3 shows the information graphically along with the 90% confidence interval.

The data shows higher retirement rates to those expected under the current assumptions. We recommend a higher age 50 to 59 rates to bring the assumption more in line with experience. Similar to the 15-19 service interval, we note that although the overall A/E is somewhat further from 100%, the pattern of retirements is significantly closer to the data (as seen in the improvement in the r-squared statistic), particularly at the ages with the most exposures (age 49 to 56).

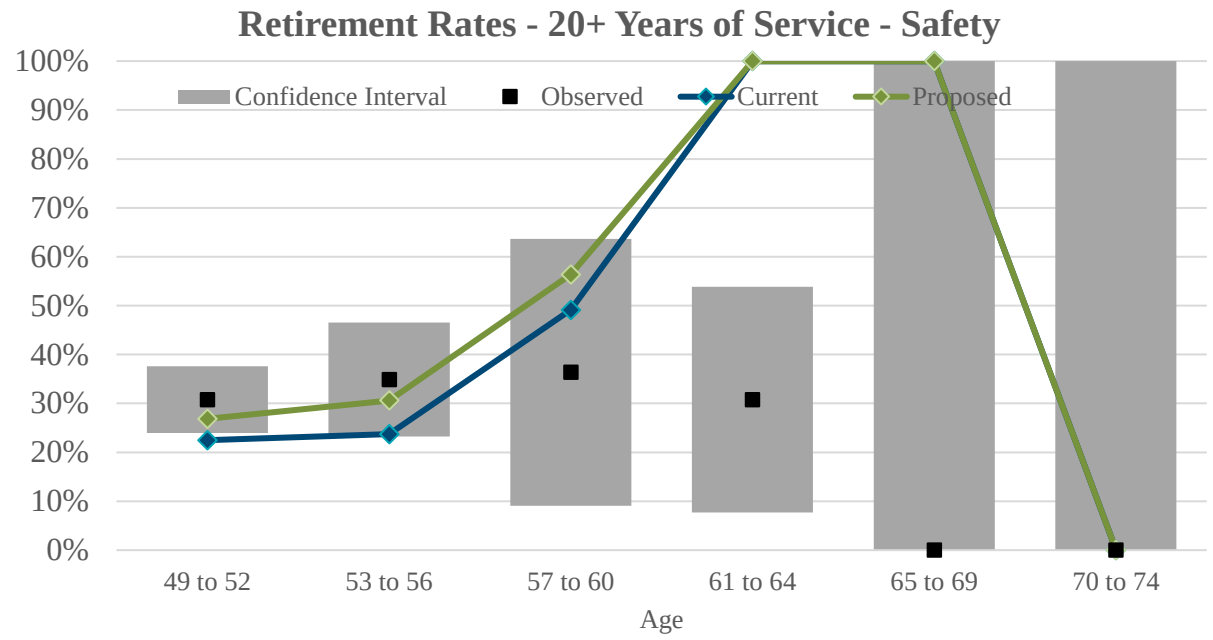
See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 65.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Table IV-R3

Retirement Rates - 20+ Years of Service - Safety									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
49 to 52	117	36	26	31	30.8%	22.5%	26.8%	137%	115%
53 to 56	43	15	10	13	34.9%	23.7%	30.6%	147%	114%
57 to 60	11	4	5	6	36.4%	49.1%	56.4%	74%	65%
61 to 64	13	4	13	13	30.8%	100.0%	100.0%	31%	31%
65 to 69	2	0	2	2	0.0%	100.0%	100.0%	0%	0%
70 to 74	0	0	0	0	0.0%	0.0%	0.0%	0%	0%
Total	**186**	**59**	**57**	**66**	**31.7%**	**30.6%**	**35.3%**	**104%**	**90%**
Confidence Interval %			**67%**	**83%**					
R-squared			**85%**	**91%**					

Chart IV-R3



SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Table IV-R4 shows the calculation of actual-to-expected ratios and the r-squared statistic for General members with less than 30 years of service. Chart IV-R4 shows the information graphically along with the 90% confidence interval.

The data shows lower actual retirement rates than expected under the current assumption. The proposed assumptions decrease the rates for most ages and increases them at a few ages to better fit the data. This increases the aggregate A/E ratio from 83% to 95%. The r-squared also increases from 83% to 98%.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 75.

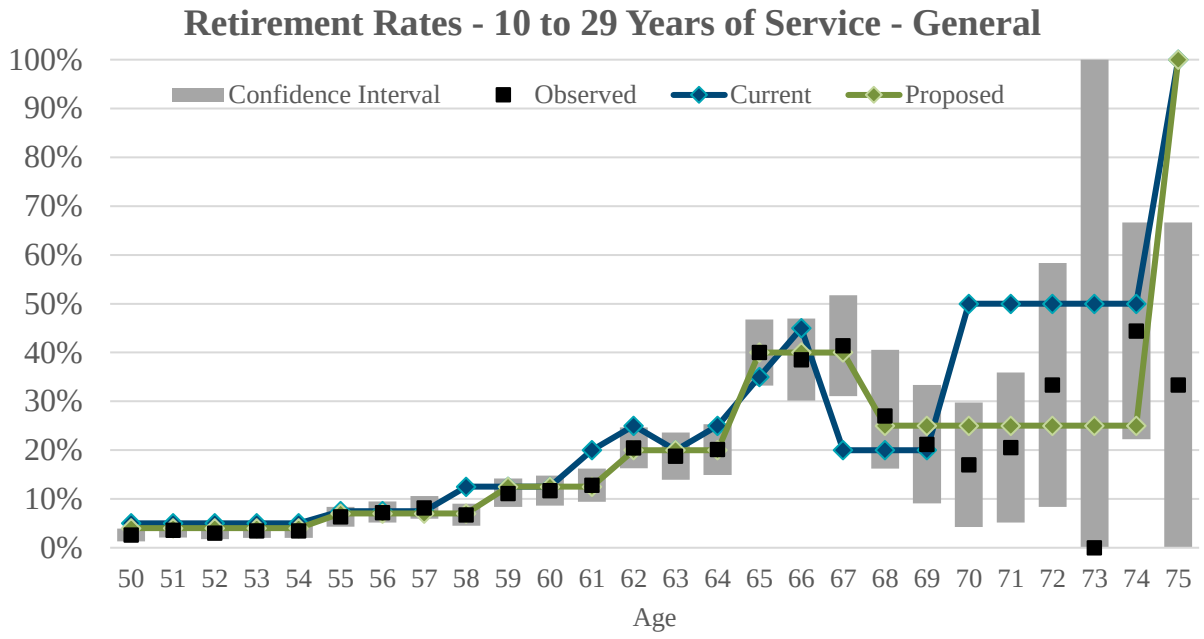
SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Table IV-R4

Retirement Rates - 10 to 29 Years of Service - General									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
50	386	10	19	15	2.6%	5.0%	4.0%	52%	65%
51	388	14	19	16	3.6%	5.0%	4.0%	72%	90%
52	400	12	20	16	3.0%	5.0%	4.0%	60%	75%
53	403	14	20	16	3.5%	5.0%	4.0%	70%	87%
54	403	14	20	16	3.5%	5.0%	4.0%	70%	87%
55	396	25	30	28	6.3%	7.5%	7.0%	84%	90%
56	390	28	29	27	7.2%	7.5%	7.0%	96%	103%
57	369	30	28	26	8.1%	7.5%	7.0%	109%	116%
58	356	24	45	25	6.7%	12.5%	7.0%	54%	96%
59	324	36	41	41	11.1%	12.5%	12.5%	89%	89%
60	291	34	36	36	11.7%	12.5%	12.5%	94%	94%
61	266	34	53	33	12.8%	20.0%	12.5%	64%	102%
62	240	49	60	48	20.5%	25.0%	20.0%	82%	102%
63	187	35	37	37	18.8%	20.0%	20.0%	94%	94%
64	154	31	39	31	20.1%	25.0%	20.0%	81%	101%
65	133	53	46	53	40.0%	35.0%	40.0%	114%	100%
66	83	32	37	33	38.6%	45.0%	40.0%	86%	96%
67	58	24	12	23	41.4%	20.0%	40.0%	207%	103%
68	37	10	7	9	27.0%	20.0%	25.0%	135%	108%
69	33	7	7	8	21.2%	20.0%	25.0%	106%	85%
70	24	4	12	6	17.0%	50.0%	25.0%	34%	68%
71	20	4	10	5	20.5%	50.0%	25.0%	41%	82%
72	12	4	6	3	33.3%	50.0%	25.0%	67%	133%
73	8	0	4	2	0.0%	50.0%	25.0%	0%	0%
74	9	4	5	2	44.4%	50.0%	25.0%	89%	178%
75	6	2	6	6	33.3%	100.0%	100.0%	33%	33%
TOTAL	**5,371**	**534**	**647**	**562**	**9.9%**	**12.0%**	**10.5%**	**83%**	**95%**
Confidence Interval %			**58%**	**92%**					
R-squared			**83%**	**98%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Chart IV-R4



While we have not specifically examined retirement experience for members with less than ten years of service, such members are eligible to retire after attaining age 70. These proposed rates at ages 70 and above apply to those members as well.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Table IV-R4 shows the calculation of actual-to-expected ratios and the r-squared statistic for General members with 30 or more years of service, and Chart IV-R4 shows the information graphically along with the 90% confidence interval.

The data shows lower actual retirement rates than expected under the current assumption. The proposed assumption decreases the assumed rate of retirement from ages 55 to 60 and sets ages 61 to 74 to a 30% assumption, ending with an ultimate retirement age of 75. This would increase the aggregate A/E ratio from 77% to 97%. The r-squared also increases from 82% to 94%.

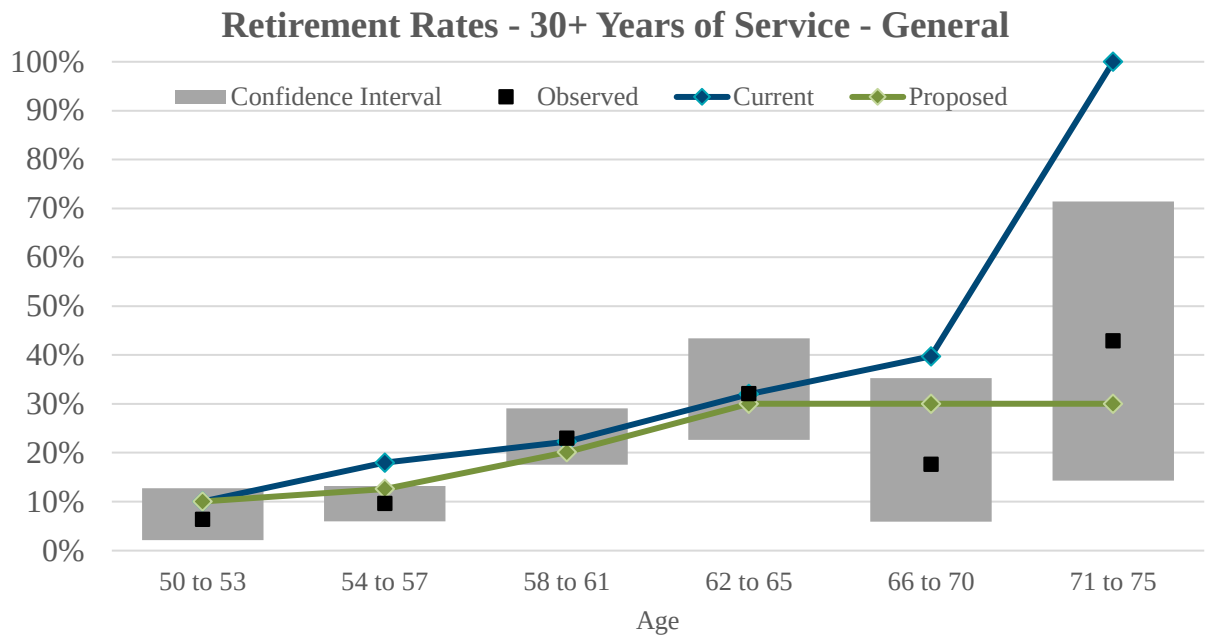
See Appendices A and B for a full listing of the proposed and prior rates.

Table IV-R4

Retirement Rates - 30+ Years of Service - General									
		Retirements			Retirement Rates			A/E Ratios	
Age	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
50 to 53	47	3	5	5	6.4%	10.0%	10.0%	64%	64%
54 to 57	167	16	30	21	9.6%	18.0%	12.6%	53%	76%
58 to 61	148	34	33	30	23.0%	22.3%	20.1%	103%	114%
62 to 65	53	17	17	16	32.1%	32.0%	30.0%	100%	107%
66 to 70	17	3	7	5	17.6%	39.7%	30.0%	44%	59%
71 to 75	7	3	7	2	42.9%	100.0%	30.0%	43%	143%
Total	**439**	**76**	**98**	**79**	**17.3%**	**22.4%**	**17.9%**	**77%**	**97%**
Confidence Interval %			**50%**	**100%**					
R-squared			**82%**	**94%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
RETIREMENT RATES

Chart IV-R4



SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Termination rates reflect the frequency at which active members leave employment for reasons other than retirement, death, or disability. Currently, there is one set of service-based termination rates for Safety members, and one set for General members. The General experience was analyzed separately for males and females, but previously a single set of termination rates was used for both groups and based on the recent data we recommend continuing this approach.

Table IV-T1 shows the calculation of actual-to-expected ratios and the r-squared statistic for Safety members, and Chart IV-T1 shows the information graphically along with the 90% confidence interval.

The data shows actual termination rates lower than those expected under the current assumptions. Lower rates are proposed for most service levels to bring the assumption more in line with experience. The aggregate A/E ratio increases from 76% to 89%. The r-squared also increases from 92% to 97%.

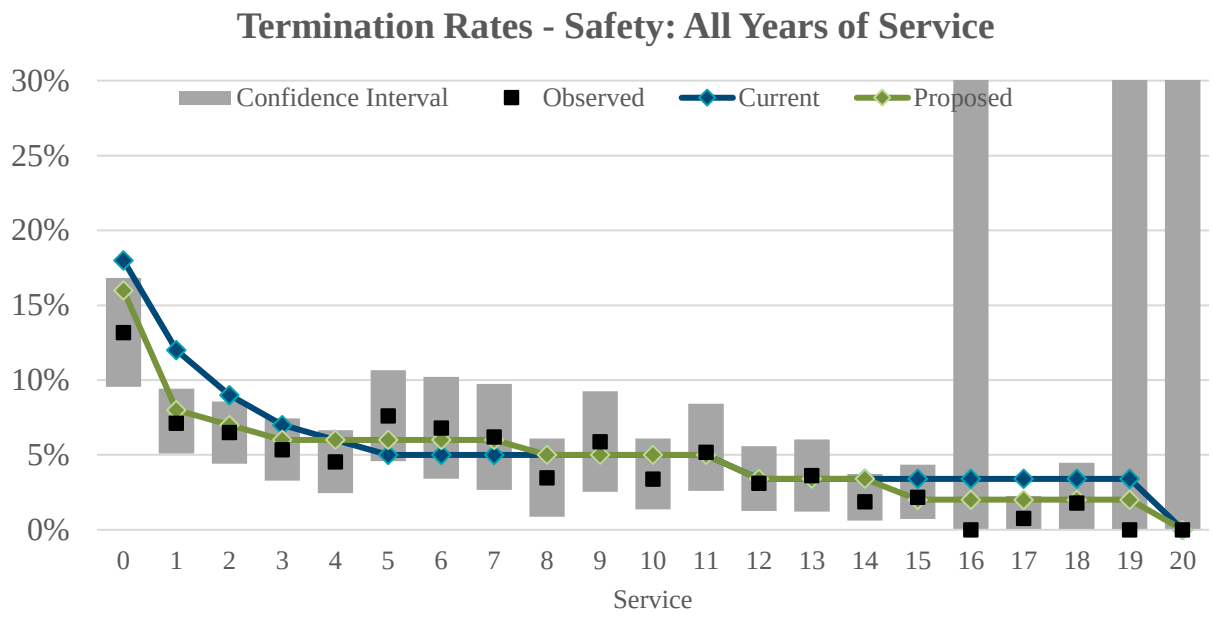
See Appendices A and B for a full listing of the rates.

Table IV-T1

Termination Rates - Safety: All Years of Service									
		Terminations			Termination Rates			A/E Ratios	
Service	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
0	220	29	40	35	13.18%	18.00%	16.00%	73%	82%
1	393	28	47	31	7.12%	12.00%	8.00%	59%	89%
2	385	25	35	27	6.49%	9.00%	7.00%	72%	93%
3	336	18	24	20	5.36%	7.00%	6.00%	77%	89%
4	286	13	17	17	4.55%	6.00%	6.00%	76%	76%
5	197	15	10	12	7.61%	5.00%	6.00%	152%	127%
6	147	10	7	9	6.80%	5.00%	6.00%	136%	113%
7	113	7	6	7	6.19%	5.00%	6.00%	124%	103%
8	115	4	6	6	3.48%	5.00%	5.00%	70%	70%
9	119	7	6	6	5.88%	5.00%	5.00%	118%	118%
10	148	5	7	7	3.39%	5.00%	5.00%	68%	68%
11	155	8	8	8	5.18%	5.00%	5.00%	104%	104%
12	161	5	5	5	3.11%	3.40%	3.40%	91%	91%
13	166	6	6	6	3.61%	3.40%	3.40%	106%	106%
14	161	3	5	5	1.86%	3.40%	3.40%	55%	55%
15	138	3	5	3	2.17%	3.40%	2.00%	64%	109%
16	131	0	4	3	0.00%	3.40%	2.00%	0%	0%
17	133	1	5	3	0.75%	3.40%	2.00%	22%	38%
18	112	2	4	2	1.79%	3.40%	2.00%	53%	89%
19	51	0	2	1	0.00%	3.40%	2.00%	0%	0%
20	0	0	0	0	0.00%	0.00%	0.00%	0%	0%
21	0	0	0	0	0.00%	0.00%	0.00%	0%	0%
22	0	0	0	0	0.00%	0.00%	0.00%	0%	0%
23	0	0	0	0	0.00%	0.00%	0.00%	0%	0%
24	0	0	0	0	0.00%	0.00%	0.00%	0%	0%
25	0	0	0	0	0.00%	0.00%	0.00%	0%	0%
TOTAL	**3,665**	**189**	**248**	**213**	**5.16%**	**6.75%**	**5.81%**	**76%**	**89%**
Confidence Interval %			**85%**	**100%**					
R-squared			**92%**	**97%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Chart IV-T1



SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Table IV-T2 shows the calculation of actual-to-expected ratios and the r-squared statistic for Male General members, and Chart IV-T2 shows the information graphically along with the 90% confidence interval.

The data shows that actual terminations are higher than the current assumptions. Higher rates are proposed that would bring the assumption more in line with experience. The aggregate A/E ratio decreases from 106% to 104%. The r-squared also increases from 97% to 99%.

See Appendices A and B for a full listing of the rates.

Table IV-T2

Termination Rates - General - Male: All Years of Service									
		Terminations			Termination Rates			A/E Ratios	
Service	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
0	325	68	59	59	20.92%	18.00%	18.00%	116%	116%
1	583	89	82	82	15.27%	14.00%	14.00%	109%	109%
2	492	47	58	44	9.55%	11.70%	9.00%	82%	106%
3	391	29	37	31	7.42%	9.40%	8.00%	79%	93%
4	337	22	24	24	6.53%	7.10%	7.00%	92%	93%
5	227	12	11	16	5.29%	5.00%	7.00%	106%	76%
6	155	12	8	11	7.74%	5.00%	7.00%	155%	111%
7	131	6	7	9	4.58%	5.00%	7.00%	92%	65%
8	141	14	7	10	9.93%	5.00%	7.00%	199%	142%
9	122	8	6	7	6.58%	4.90%	6.00%	134%	110%
10	115	6	4	6	5.24%	3.50%	5.00%	150%	105%
11	121	7	4	6	5.81%	3.40%	5.00%	171%	116%
12	123	5	4	6	4.07%	3.40%	5.00%	120%	81%
13	104	3	3	5	2.90%	3.30%	5.00%	88%	58%
14	88	3	3	4	3.43%	3.30%	5.00%	104%	69%
15	75	3	2	2	4.00%	2.90%	3.00%	138%	133%
16	75	4	2	2	5.37%	2.80%	3.00%	192%	179%
17	73	1	2	2	1.38%	2.80%	3.00%	49%	46%
18	66	0	2	2	0.00%	2.70%	3.00%	0%	0%
19	60	3	2	2	5.04%	2.60%	3.00%	194%	168%
20	48	1	1	1	2.08%	1.50%	3.00%	139%	69%
21	33	1	0	1	3.08%	1.50%	3.00%	205%	103%
22	20	2	0	1	10.26%	1.40%	3.00%	733%	342%
23	9	0	0	0	0.00%	1.40%	3.00%	0%	0%
24	5	0	0	0	0.00%	1.30%	3.00%	0%	0%
25	5	0	0	0	0.00%	1.30%	3.00%	0%	0%
26	3	0	0	0	0.00%	1.20%	1.20%	0%	0%
27	2	0	0	0	0.00%	1.20%	1.20%	0%	0%
28	1	0	0	0	0.00%	1.20%	1.20%	0%	0%
29	1	0	0	0	0.00%	1.20%	1.20%	0%	0%
TOTAL	**3,924**	**346**	**327**	**334**	**8.82%**	**8.33%**	**8.51%**	**106%**	**104%**
Confidence Interval %			**96%**	**100%**					
R-squared			**97%**	**99%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Chart IV-T2

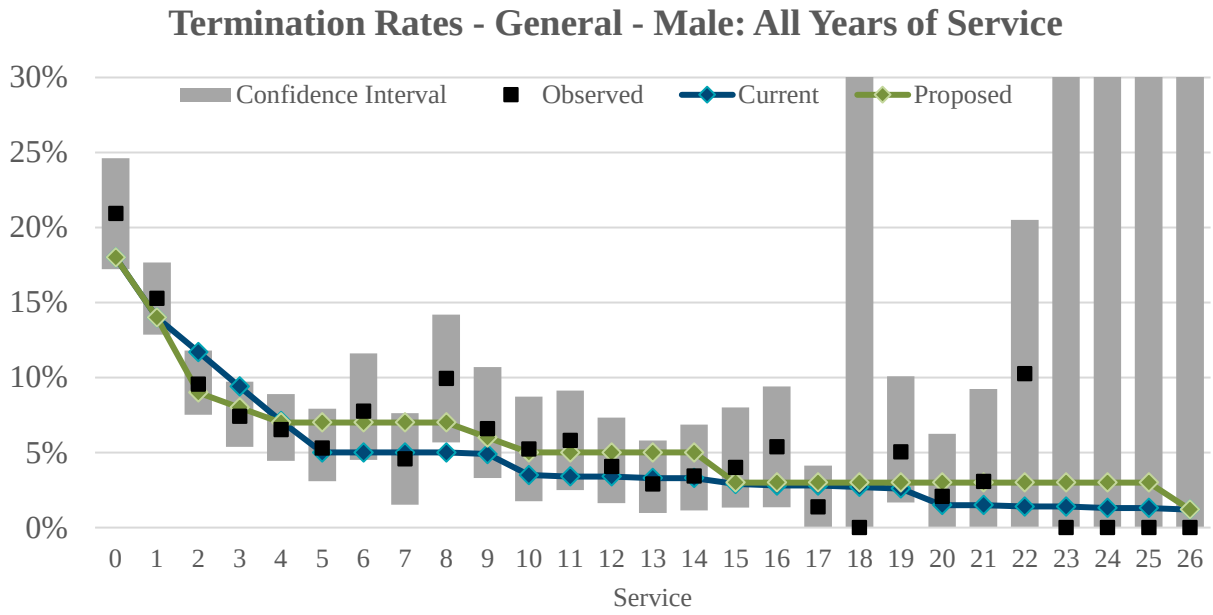


Table IV-T3 on the next page shows the calculation of actual-to-expected ratios and the r-squared statistic for Female General members, and Chart IV-T3 shows the information graphically along with the 90% confidence interval.

The data shows that actual terminations are higher than the current assumptions. Higher rates are proposed that would bring the assumption more in line with experience. The aggregate A/E ratio decreases from 107% to 105%. The r-squared also increases from 95% to 99%. We note that the proposed rates are the same as the rates proposed for the male members.

See Appendices A and B for a full listing of the rates.

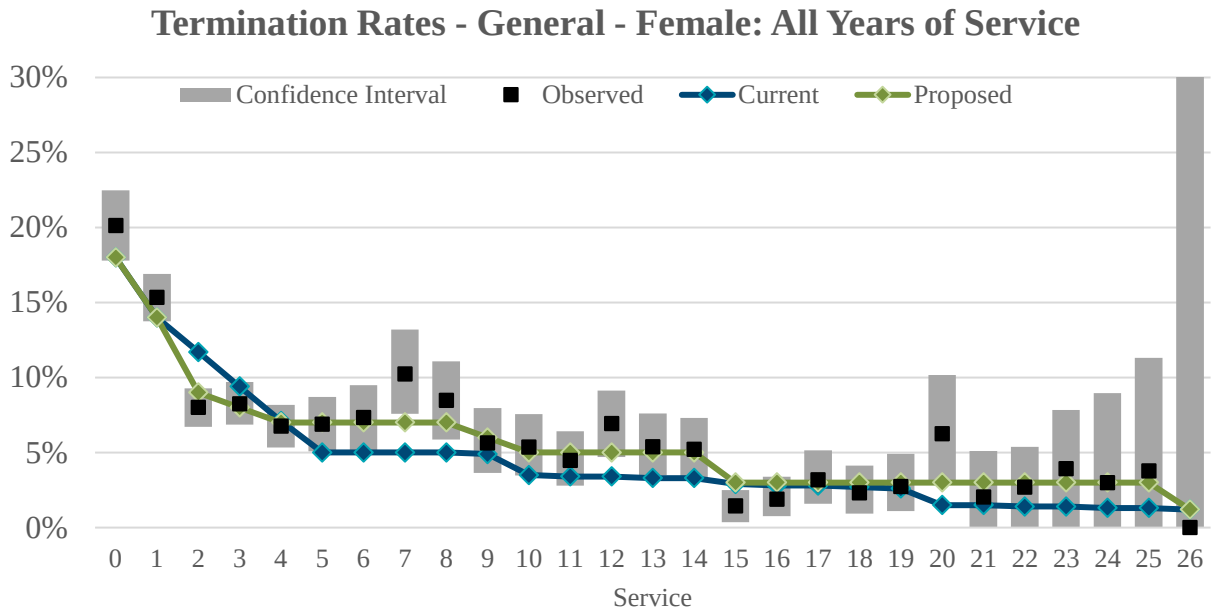
SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Table IV-T3

Termination Rates - General - Female: All Years of Service									
		Terminations			Termination Rates			A/E Ratios	
Service	Exposures	Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
0	770	155	139	139	20.13%	18.00%	18.00%	112%	112%
1	1,462	224	205	205	15.33%	14.00%	14.00%	109%	109%
2	1,250	100	146	113	8.00%	11.70%	9.00%	68%	89%
3	1,020	84	96	82	8.24%	9.40%	8.00%	88%	103%
4	845	57	60	59	6.75%	7.10%	7.00%	95%	96%
5	552	38	28	39	6.88%	5.00%	7.00%	138%	98%
6	369	27	18	26	7.32%	5.00%	7.00%	146%	105%
7	303	31	15	21	10.23%	5.00%	7.00%	205%	146%
8	307	26	15	21	8.47%	5.00%	7.00%	169%	121%
9	302	17	15	18	5.64%	4.90%	6.00%	115%	94%
10	318	17	11	16	5.35%	3.50%	5.00%	153%	107%
11	359	16	12	18	4.46%	3.40%	5.00%	131%	89%
12	362	25	12	18	6.92%	3.40%	5.00%	203%	138%
13	316	17	10	16	5.39%	3.30%	5.00%	163%	108%
14	288	15	9	14	5.22%	3.30%	5.00%	158%	104%
15	280	4	8	8	1.43%	2.90%	3.00%	49%	48%
16	266	5	7	8	1.88%	2.80%	3.00%	67%	63%
17	253	8	7	8	3.17%	2.80%	3.00%	113%	106%
18	218	5	6	7	2.30%	2.70%	3.00%	85%	77%
19	183	5	5	5	2.73%	2.60%	3.00%	105%	91%
20	128	8	2	4	6.25%	1.50%	3.00%	417%	208%
21	98	2	1	3	2.04%	1.50%	3.00%	136%	68%
22	75	2	1	2	2.68%	1.40%	3.00%	192%	89%
23	51	2	1	2	3.92%	1.40%	3.00%	280%	131%
24	34	1	0	1	2.99%	1.30%	3.00%	230%	100%
25	27	1	0	1	3.77%	1.30%	3.00%	290%	126%
26	20	0	0	0	0.00%	1.20%	1.20%	0%	0%
27	10	0	0	0	0.00%	1.20%	1.20%	0%	0%
28	4	0	0	0	0.00%	1.20%	1.20%	0%	0%
29	2	0	0	0	0.00%	1.20%	1.20%	0%	0%
TOTAL	**10,465**	**892**	**832**	**852**	**8.52%**	**7.95%**	**8.15%**	**107%**	**105%**
Confidence Interval %			**63%**	**88%**					
R-squared			**95%**	**99%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Chart IV-T3



Refund rates and Reciprocity

When a vested member terminates employment, they have the option of receiving a refund of contributions with interest or a deferred annuity. If an employee terminates employment and works for a reciprocal employer, the employee's retirement benefit is ultimately based on the employee's service with StanCERA and Final Compensation based on employment with any reciprocal employer.

For this study we analyzed the percentage of those retiring from a deferred vested status during the study period who appeared to have established reciprocity after leaving StanCERA. To do this, we included both those who previously reported reciprocity to StanCERA, as well as those who had a final average pay in the retirement data that exceeded the final average pay most recently reported in the member's active data file from StanCERA by 20% or more.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Table IV-T4 shows the results of our analysis of transfers for General and Safety, for the period from July 1, 2018 through June 30, 2021 as well as the prior three years of experience, from July 1, 2015 to June 30, 2018. For members with less than 10 years of service we are proposing an increase in the percentage of members assumed to establish reciprocity among those who terminate and do not withdraw their contributions: 60% of General members and 75% of Safety members are assumed to establish reciprocity, up from 50% and 65%, respectively. For members with 10 or more years of service we are proposing a decrease for General and increase for Safety: 40% of General members and 70% of Safety members are assumed to establish reciprocity, compared to the prior assumption of 50% and 65%, respectively.

Table IV-T4

	Transfers as a % of Non-Withdrawals		
	< 10 Years of Service	10+ Years of Service	All Service
Observed			
General	64%	39%	53%
Safety	78%	73%	76%
Current Assumption			
General	50%	50%	50%
Safety	65%	65%	65%
Proposed Assumption			
General	60%	40%	N/A
Safety	75%	70%	N/A

Additionally, we propose that reciprocal members are assumed to receive annual pay increases of 3.25% for General and 3.75% for Safety from the date of transfer to the assumed retirement date. These annual increases are equal to wage inflation (2.75%) plus the ultimate merit salary increase rate (0.50% for General and 1.00% for Safety). Currently, both General and Safety reciprocal members are assumed to receive annual pay increases of 3.75%.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Table IV-T5 shows the results of our analysis of rates of withdrawal for those who terminated service. We have not changed our approach for this analysis – continuing to compare the number of those who terminated and withdraw their contributions and analyzing the data separately for those with greater or less than 10 years of service. We are proposing lower rates of withdrawals for General members as shown below. We are not proposing changes to this assumption for Safety members.

Table IV-T5

Withdrawals as % of Terminations	< 10 Years of Service	10+ Years of Service
Observed		
General	40.71%	13.37%
Safety	37.82%	6.06%
Current Assumption		
General	50.00%	20.00%
Safety	35.00%	10.00%
Proposed Assumption		
General	45.00%	15.00%
Safety	35.00%	10.00%

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
TERMINATION RATES

Table IV-T6 shows the results of our analysis of the age at which vested terminated and transferred members decide to retire. We are recommending a split of Safety into Tiers 4 & 5 and 2 & 6 for the purposes of this assumption, with an assuming retirement age of 51 for the former group and 54 for the latter. We are not recommending any change to the assumptions for General members.

Table IV-T6

	Age at Retirement From Vested Status	Age at Retirement From Transferred Status	All Service
Observed			
General	58.21	60.70	59.53
Safety (Tiers 4 and 5)	52.21	50.67	51.23
Safety (Tiers 2 and 6)	N/A	54.06	54.06
Current Assumption			
General	58.00	61.00	
Safety	53.00	53.00	
Proposed Assumption			
General	58.00	61.00	
Safety (Tiers 4 and 5)	51.00	51.00	
Safety (Tiers 2 and 6)	54.00	54.00	

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
DISABILITY RATES

This section analyzes the incidence of disability by the age of the employee. There are separate sets of assumptions for nonservice-connected disabilities and service-connected disabilities. Both sets of assumptions for Safety members are unisex, while General rates vary by gender. The disability decrement is only applied after members are eligible for disability benefits.

To improve the credibility of the data, we have aggregated the experience of the past three years with that of prior experience studies (2009-2018). The amount of disability experience is fairly limited; only 44 duty-related and 24 non duty-related disabilities have occurred during the last twelve years for Safety and General members combined.

Table IV-D1 shows the calculation of actual-to-expected ratios and the r-squared statistic for service-connected disabilities for Safety members. The 90% confidence interval is not shown because of a lack of credible data.

The data shows that the aggregate number of disabilities has been reasonably close to the number expected under the current assumptions. We are not proposing any change to the service-connected disability assumption for Safety members.

See Appendix A or B for a full listing of the rates.

Table IV-D1

Service Disability Rates - Safety - All									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
< 35	3,440	4.0	5.3	5.3	0.12%	0.15%	0.15%	76%	76%
35 - 39	1,615	8.0	4.9	4.9	0.50%	0.30%	0.30%	164%	164%
40 - 44	1,428	6.0	5.7	5.7	0.42%	0.40%	0.40%	106%	106%
45 - 49	1,166	5.0	5.8	5.8	0.43%	0.49%	0.49%	87%	87%
50 - 54	608	2.0	3.6	3.6	0.33%	0.59%	0.59%	56%	56%
55 - 59	288	3.0	2.0	2.0	1.04%	0.69%	0.69%	151%	151%
60 - 64	118	1.0	0.9	0.9	0.85%	0.80%	0.80%	106%	106%
Subtotal	**5,223**	**25.0**	**22.8**	**22.8**	**0.48%**	**0.44%**	**0.44%**	**109%**	**109%**
65 +	37	1.0	0.3	0.3	2.70%	0.92%	0.92%	295%	295%
TOTAL	**8,700**	**30.0**	**28.4**	**28.4**	**0.34%**	**0.33%**	**0.33%**	**105%**	**105%**
Confidence Interval %			**100%**	**100%**					
R-squared			**62%**	**62%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
DISABILITY RATES

Tables IV-D2 and IV-D3 below show the calculation of actual-to-expected ratios and the r-squared statistic for male and female General members. Charts are not shown since the lack of credible data does not produce meaningful information.

The data shows that the aggregate number of disabilities has been reasonably close to the number expected under the current assumptions. We are not proposing any change to the service-connected disability assumption for General members.

See Appendix A or B for a full listing of the rates.

Table IV-D2

Service Disability Rates - General - Male									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
< 35	2,150	0.0	0.4	0.4	0.00%	0.02%	0.02%	0%	0%
35 - 39	1,440	0.0	0.5	0.5	0.00%	0.03%	0.03%	0%	0%
40 - 44	1,426	0.0	0.7	0.7	0.00%	0.05%	0.05%	0%	0%
45 - 49	1,482	0.0	1.1	1.1	0.00%	0.07%	0.07%	0%	0%
50 - 54	1,653	0.0	1.7	1.7	0.00%	0.10%	0.10%	0%	0%
55 - 59	1,505	1.0	2.1	2.1	0.07%	0.14%	0.14%	48%	48%
60 - 64	950	5.0	1.7	1.7	0.53%	0.18%	0.18%	297%	297%
Subtotal	**8,456**	**6.0**	**7.7**	**7.7**	**0.07%**	**0.09%**	**0.09%**	**78%**	**78%**
65 +	383	1.0	0.0	0.0	0.26%	0.00%	0.00%	0%	0%
TOTAL	**10,989**	**7.0**	**8.1**	**8.1**	**0.06%**	**0.07%**	**0.07%**	**86%**	**86%**
Confidence Interval %			**83%**	**83%**					
R-squared			**19%**	**19%**					

Table IV-D3

Service Disability Rates - General - Female									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
< 35	5,865	0.0	0.1	0.1	0.00%	0.00%	0.00%	0%	0%
35 - 39	4,052	0.0	0.1	0.1	0.00%	0.00%	0.00%	0%	0%
40 - 44	4,267	0.0	0.3	0.3	0.00%	0.01%	0.01%	0%	0%
45 - 49	4,346	0.0	0.5	0.5	0.00%	0.01%	0.01%	0%	0%
50 - 54	4,546	3.0	0.9	0.9	0.07%	0.02%	0.02%	340%	340%
55 - 59	4,225	1.0	1.2	1.2	0.02%	0.03%	0.03%	82%	82%
60 - 64	2,449	2.0	0.9	0.9	0.08%	0.04%	0.04%	216%	216%
Subtotal	**23,885**	**6.0**	**4.0**	**4.0**	**0.03%**	**0.02%**	**0.02%**	**150%**	**150%**
65 +	654	1.0	0.0	0.0	0.15%	0.00%	0.00%	0%	0%
TOTAL	**30,404**	**7.0**	**4.1**	**4.1**	**0.02%**	**0.01%**	**0.01%**	**173%**	**173%**
Confidence Interval %			**83%**	**83%**					
R-squared			**43%**	**43%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
DISABILITY RATES

Table IV-D4 below shows the calculation of actual-to-expected ratios and the r-squared statistic for nonservice-connected disabilities for Safety members. A chart is not shown since the lack of credible data does not produce meaningful information.

The data shows that the number of disabilities has been lower than expected under the current assumption. In this context, however, the 28% A/E ratio does not mean much; there was only one nonservice-connected disability among all safety members in the last twelve years, while we expected less than four disabilities. We are not proposing any changes to this assumption, continuing to use the CalPERS Public Agency Police Non-Industrial Disability table.

See Appendices A and B for a full listing of the rates.

Table IV-D4

Ordinary Disability Rates - Safety - All									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
< 35	2,411	0.0	0.4	0.4	0.00%	0.02%	0.02%	0%	0%
35 - 39	1,487	0.0	0.5	0.5	0.00%	0.03%	0.03%	0%	0%
40 - 44	1,387	1.0	0.6	0.6	0.07%	0.04%	0.04%	165%	165%
45 - 49	1,146	0.0	0.7	0.7	0.00%	0.06%	0.06%	0%	0%
50 - 54	579	0.0	0.6	0.6	0.00%	0.10%	0.10%	0%	0%
55 - 59	277	0.0	0.4	0.4	0.00%	0.16%	0.16%	0%	0%
60 - 64	116	0.0	0.2	0.2	0.00%	0.20%	0.20%	0%	0%
Subtotal	**4,990**	**1.0**	**3.0**	**3.0**	**0.02%**	**0.06%**	**0.06%**	**33%**	**33%**
65 +	35	0.0	0.1	0.1	0.00%	0.20%	0.20%	0%	0%
TOTAL	**7,436**	**1.0**	**3.5**	**3.5**	**0.01%**	**0.05%**	**0.05%**	**28%**	**28%**
Confidence Interval %			**100%**	**100%**					
R-squared			**9%**	**9%**					

The Table IV-D5 on the next page shows the calculation of actual-to-expected ratios and the r-squared statistic for nonservice-connected disabilities for male General members. A chart is not shown since the lack of credible data does not produce meaningful information.

The data shows that the number of disabilities has been lower than expected under the current assumption. In this context, however, the 27% A/E ratio does not mean much; there were only three nonservice-connected disabilities. We are not proposing any changes to this assumption, continuing to use the CalPERS Public Agency Miscellaneous Non-Industrial Disability table for Males.

See Appendices A and B for a full listing of the rates.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
DISABILITY RATES

Table IV-D5

Ordinary Disability Rates - General - Male									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
< 35	1,390	0	0	0	0.00%	0.02%	0.02%	0%	0%
35 - 39	1,171	0	1	1	0.00%	0.06%	0.06%	0%	0%
40 - 44	1,199	0	2	2	0.00%	0.13%	0.13%	0%	0%
45 - 49	1,352	2	2	2	0.15%	0.16%	0.16%	94%	94%
50 - 54	1,522	1	2	2	0.07%	0.16%	0.16%	42%	42%
55 - 59	1,403	0	2	2	0.00%	0.16%	0.16%	0%	0%
60 - 64	878	0	1	1	0.00%	0.14%	0.14%	0%	0%
Subtotal	**7,524**	**3**	**10**	**10**	**0.04%**	**0.14%**	**0.14%**	**29%**	**29%**
65 +	361	0	0	0	0.00%	0.12%	0.12%	0%	0%
TOTAL	**9,274**	**3**	**11**	**11**	**0.03%**	**0.12%**	**0.12%**	**27%**	**27%**
Confidence Interval %			**100%**	**100%**					
R-squared			**31%**	**31%**					

Table IV-D6 shows the calculation of actual-to-expected ratios and the r-squared statistic for nonservice-connected disabilities for female General members. A chart is not shown since the lack of credible data does not produce meaningful information.

The data shows that the number of disabilities has been lower than expected under the current assumption. In this context, however, the 59% A/E ratio does not mean much; there were only 20 nonservice-connected disabilities. We are not proposing any changes to this assumption, continuing to use the CalPERS Public Agency Miscellaneous Non-Industrial Disability table for Females.

See Appendices A and B for a full listing of the rates.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
DISABILITY RATES

Table IV-D6

Ordinary Disability Rates - General - Female									
Age Band	Exposures	Disabilities			Average Disability Rates			A/E Ratios	
		Actual	Current	Proposed	Actual	Current	Proposed	Current	Proposed
< 35	3,836	0	1	1	0.00%	0.03%	0.03%	0%	0%
35 - 39	3,364	1	3	3	0.03%	0.10%	0.10%	31%	31%
40 - 44	3,774	6	6	6	0.16%	0.16%	0.16%	102%	102%
45 - 49	3,993	5	8	8	0.13%	0.20%	0.20%	63%	63%
50 - 54	4,222	4	8	8	0.09%	0.18%	0.18%	52%	52%
55 - 59	3,989	4	5	5	0.10%	0.13%	0.13%	77%	77%
60 - 64	2,344	0	2	2	0.00%	0.10%	0.10%	0%	0%
Subtotal	**21,684**	**20**	**32**	**32**	**0.09%**	**0.15%**	**0.15%**	**62%**	**62%**
65 +	635	0	1	1	0.00%	0.09%	0.09%	0%	0%
TOTAL	**26,155**	**20**	**34**	**34**	**0.08%**	**0.13%**	**0.13%**	**59%**	**59%**
Confidence Interval %			**83%**	**83%**					
R-squared			**70%**	**70%**					

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Post-retirement mortality assumptions are typically developed separately by gender for both healthy annuitants and disabled annuitants. Pre-retirement mortality assumptions are developed separately for males and females. Unlike most of the other demographic assumptions that rely exclusively on the experience of the plan, for mortality, standard mortality tables and projection scales serve as the primary basis for the assumption.

In the prior study, StanCERA adopted the following assumptions:

Active members

- CalPERS 2017 Preretirement Non-Industrial Mortality, adjusted by 97.2% for males and 101.6% for females.
- CalPERS 2017 Preretirement Industrial Mortality (Line-of-Duty Mortality for Safety only).

Healthy retirees and beneficiaries

- CalPERS 2017 Healthy Annuitant Mortality, adjusted by 97.2% for males and 104.1% for females.

Service-Connected Disabled members

- CalPERS 2017 Industrially Disabled Annuitant Mortality, adjusted by 101.9% for males and no adjustment for females.

Nonservice-Connected Disabled members

- CalPERS 2017 Non-Industrially Disabled Annuitant Mortality, no adjustment for males and adjusted by 104.5% for females.

StanCERA also adopted the approach of projecting these base tables generationally using the MP-2018 mortality improvement scale for all types of mortality except Line-of-Duty Mortality for Safety members. No mortality projection was used for Line-of-Duty Mortality for Safety members.

The Society of Actuaries recently released a comprehensive study of U.S. public sector mortality experience, which included the publication of new mortality tables, with separate tables for teachers, safety members, and other public employees. However, when we compared these tables to StanCERA's recent experience, we did not find them to be a better fit than the most recent CalPERS tables (updated in 2021), therefore we have continued to use the CalPERS tables as the basis for our analysis.

The Society of Actuaries has also continued to update their mortality improvement projection scale. We used 80% of the MP-2020 Scale for the basis of our analysis and projections, the same scale CalPERS adopted for their most recent experience study. CalPERS provided evidence that 80% of MP-2020 represented a reasonably proxy for their recent improvement experience in their most recent study.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

The steps in our analysis are as follows:

1. Select a standard mortality table that is, based on experience, most closely matching the anticipated experience of StanCERA.
2. Compare actual StanCERA experience 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 StanCERA 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.

As we have done in prior experience studies, we have combined the experience of the most recent three-year period with that of the prior nine years in order to have a more robust dataset to review.

Even with the use of twelve years of data, the StanCERA is only partially credible, based on standard statistical theory. We therefore recommend partially adjusting the CalPERS base tables to fit StanCERA's experience to develop a new base table. The rates for each age in the standard table are adjusted by a factor, where the factor is determined by multiplying the actual-to-expected ratio for the group (such as male retirees) by a credibility factor for the group. The credibility factor is equal to the square root of the number of deaths divided by 1,082, which is the number of deaths needed for full credibility (defined by a 90% probability that the observed rate is within 5% of the true rate). Where the adjustment is very close to 100%, we have elected not to recommend any adjustment to the base table.

Based on these adjustments, we are recommending the following base mortality table assumptions:

Active members

- For General members, CalPERS 2021 Preretirement Non-Industrial Mortality, adjusted by 102.2% for males and 110.2% for females.
- For Safety members, CalPERS 2021 Preretirement Non-Industrial Mortality, adjusted by 102.6% for males and 100.9% for females.
- CalPERS 2021 Preretirement Industrial Mortality (Line-of-Duty Mortality for Safety only), adjusted by 102.6% for males and 100.9% for females.

Healthy retirees and beneficiaries

- CalPERS 2021 Healthy Annuitant Mortality, adjusted by 107.6% for males and 115.3% for females.

Service-Connected Disabled members

- CalPERS 2021 Industrially Disabled Annuitant Mortality, no adjustment for males and adjusted by 105.0% for females.

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Nonservice-Connected Disabled members

- CalPERS 2021 Non-Industrially Disabled Annuitant Mortality, no adjustment for males or females.

We also recommend projecting these base tables generationally using 80% of the MP-2020 mortality improvement scale described above for all types of mortality.

As shown in Table IV-M1 on the following page, our proposed mortality rates for healthy annuitants are close to recent experience. To perform our comparisons, the CalPERS base rates (without projection) were projected from their base year (2017) to the midpoint of the combined twelve year study period (2015).

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Table IV-M1

Mortality Experience (2009-2021)	Exposures	Actual Deaths	Weighted Exposures	Actual Weighted Deaths	Actual Weighted Rates	Current Expected Weighted Deaths	Proposed Expected Weighted Deaths	Current Weighted A/E Ratio	Recommended Weighted A/E Ratio
Active Members									
Male	17,941	25	1,219,305,274	1,797,131	0.15%	1,841,625	1,519,498	98%	118%
Female	32,126	43	1,739,845,948	2,159,303	0.12%	1,906,149	1,569,996	113%	138%
Total Actives	50,067	68	2,959,151,221	3,956,434	0.13%	3,747,774	3,089,494	106%	128%
Retired and Surviving Spouse									
Male	13,808	392	525,395,291	12,112,403	2.31%	12,005,082	11,559,195	101%	105%
Female	22,987	632	594,643,376	12,377,806	2.08%	11,613,849	11,886,922	107%	104%
Total Ret/Surv	36,795	1,024	1,120,038,667	24,490,209	2.19%	23,618,930	23,446,117	104%	104%
Disabled									
Nonservice-Connected Male	281	12	4,603,718	180,703	3.93%	163,285	169,410	111%	107%
Nonservice-Connected Female	708	24	11,458,736	279,907	2.44%	267,045	294,283	105%	95%
Service-Connected Male	1,763	35	58,943,372	1,011,830	1.72%	996,081	991,350	102%	102%
Service-Connected Female	935	19	23,797,442	477,411	2.01%	304,387	363,016	157%	132%
Total Disabled	3,687	90	98,803,268	1,949,851	1.97%	1,730,799	1,818,060	113%	107%
TOTAL (Excluding Actives)	40,482	1,114	1,218,841,935	26,440,060	2.17%	25,349,729	25,264,177	104%	105%

SECTION IV – DEMOGRAPHIC ASSUMPTIONS
MORTALITY RATES

Rather than weighting the experience based on the number of members living and dying, we have weighted the experience based on benefit size (salary for current active members). This approach has been recommended by the Society of Actuaries' Retirement Plans Experience Committee (RPEC), since members with larger benefits are expected to live longer, and a benefit-weighted approach helps avoid underestimating the liabilities. The match between the actual and expected experience across all statuses (active, retired, and disabled) is reasonably close under the proposed assumptions: 107%.

Mortality Assumptions for Employee Contribution Rates

For purposes of determining employee contribution rates, the use of generational mortality improvements is impractical from an administrative perspective. Therefore, we recommend using the base mortality tables described above (various CalPERS tables with StanCERA-specific adjustments) projected using 80% of Scale MP-2020 from 2017 to 2042 for General Members and to 2043 for Safety Members. These static projections are intended to approximate generational mortality improvements.

The projection periods are based upon the duration of active liabilities for the respective impacted groups (General Tiers 1, 2, 4, 5, and Safety Tiers 2, 4, and 5) as of June 30, 2021 and the period during which the associated employee contribution rates will be in use. The rates also are blended using a male/female weighting of 25% male/75% female for General Members and 80% male/20% female for Safety members.

We anticipate that these mortality assumptions will be used to determine the employee contribution rates in effect for the period of July 1, 2022 through June 30, 2025. We also anticipate that the mortality assumptions for this purpose will be updated again after the next experience study covering the period from July 1, 2021 through June 30, 2024.

TERMINAL PAY

The current assumptions increase the liability for retirement benefits for Safety active participants by 1.75% and for General active participants by 1.00% to account for the impact of unused vacation time. 1/3 of this load applies for members with a 36-month final average service period. No other adjustment is made to the liability for anticipated future service purchases.

The data provided by StanCERA includes the vacation pay cashed out at retirement for each member who retired from active status after July 1, 2018. We also included the data from the prior experience analysis from July 1, 2015 to June 30, 2018. We compared the total vacation pay for retirees to their final average pay. For the 644 General retirees with a 12-month final average service period, the vacation pay represented 3.7%; for Safety, the average was 4.3% for 131 retirees.

StanCERA also provided the amount of vacation pay cashed out each year by all active members. This averaged 0.25% for General members and 0.41% for all Safety members who were under age 47 (and therefore would not be expected to retire in the next three years) across all actives working full time.

After backing out these average non-retiree cash outs, we recommend a load of 3.00% on final average compensation for all members, to reflect the fact that the load should only capture the additional cash outs that are expected to occur during the final average pay period.

There were only 35 retirees with a 36-month final average service period, so we excluded them from the analysis. For future retirees with a 36-month final average service period, we recommend loading the final average compensation by 1/3 of the load for those with 12-month final average pay periods. No load will be applied to the benefits of PEPRA members, as vacation cash outs are not included in their pensionable compensation.

FAMILY COMPOSITION

The current assumption is that 80% of active male and 50% of active female StanCERA participants who retire, become disabled, or die during active service have beneficiaries and that male members are three years older than their spouses, and female members are two years younger than their spouses. Based on the experience of the last six years, we recommend two small changes to these assumptions: 60% of active female StanCERA participants who retire, become disabled, or die during active service have beneficiaries, and male members are two years older than their spouses.

	Retirees	Number Married	Percent Married	Member Age	Spouse Age	Difference
Male	432	348	81%	58.49	56.23	2.26
Female	678	396	58%	59.40	61.13	-1.73

Average ages shown are for married retirees.

We also reviewed the percent of married retirees who elect the joint and survivor form of payment option.

	Retirees	Number w/ Unmod+Sps	Percent	Percent of Married / Unmod
Male	432	314	73%	90%
Female	678	375	55%	95%

We previously assumed all married members elected the joint and survivor option. We propose assuming 90% of married male members and 95% of married female members elect the joint and survivor option.

Finally, we reviewed the data for spouses of members currently in receipt of the unmodified option. Spouses of members with the unmodified options receive 60% (50% for Tier 3) survivor benefits upon the member's death. Previously we assumed that spouses reported on the data survived through the valuation date. Upon review, we determined that StanCERA accurately reports a spouse date of death when the spouse predeceases the member. We propose relying on the spouse date of death instead of using the prior assumption.

PLAN EXPENSES

An allowance of $2,983,171 for Plan administrative expenses was included in the annual cost calculation in the prior valuation. The inflation adjusted average of the Plan's administrative expenses during the last six years have averaged approximately $3,000,000. We recommend changing the Plan's assumed administrative expenses for 2021 to $3,100,000 (the inflation-adjusted six-year average), increasing each year at the assumed rate of inflation.

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

The demographic assumptions are based on an experience study covering the period from July 1, 2018 through June 30, 2021.

1. **Rate of Return**
   The annual rate of return on all Plan assets is assumed to be 6.75%, net of investment expenses.

2. **Cost of Living**
   The cost of living as measured by the Consumer Price Index (CPI) will increase at the rate of 2.50% per year.

3. **Administrative Expenses**
   An allowance of $3,100,000 for Plan administrative expenses for the current year has been included in the annual cost calculated. The administrative expense amount has been assumed to increase in future years at the rate of the Cost of Living assumption (2.50%).

4. **Interest Credited to Employee Accounts**
   The employee accounts are credited with 0.25% interest annually.

5. **Increases in Pay**
   Base salary increase: 2.75%

   Assumed pay increases for active Members consist of increases due to base salary adjustments (as noted above), plus service-based increases due to longevity and promotion, as shown below.

Longevity & Promotion Increases		
Service	**General**	**Safety**
0	5.00%	5.00%
1	5.00%	5.00%
2	5.00%	5.00%
3	5.00%	4.50%
4	5.00%	4.50%
5	3.50%	2.00%
6	2.50%	1.75%
7	1.50%	1.50%
8	1.25%	1.50%
9	1.00%	1.25%
10	0.75%	1.00%
11+	0.50%	1.00%

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

6. PEPRA Compensation Limit

The assumption used for increasing the compensation limit that applies to PEPRA members is 2.50%

7. Post Retirement COLA

For those with the 3% COLA benefit (i.e. 100% of CPI up to 3% annually with banking), 2.40% annual increases are assumed. Increases are assumed to occur on April 1.

8. Social Security Wage Base

General Plan 3 members have their benefits offset by an assumed Social Security Benefit. For projecting the Social Security Benefit, the annual Social Security Wage Base increase is assumed to be 2.75% per year.

9. Internal Revenue Code Section 415 Limit

The Internal Revenue Code (IRC) Section 415 maximum benefit limitations have been applied to the benefits for members currently in pay status, as the limited benefits have been provided by StanCERA for valuation purposes. Future projected benefits for members in active and deferred statuses have not been reduced for potential Section 415 limits in the current valuation, though any actual limitations for these members will result in actuarial gains upon their actual retirement, which will reduce future contributions.

10. Internal Revenue Code Section 401(a)(17)

The IRC Section 401(a)(17) maximum compensation limitation for active members is not reflected in the valuation for funding purposes; limitations are reflected after retirement.

11. Family Composition

Percentage married for all active members who retire, become disabled, or die during active service is shown in the following table.

Percentage Married	
Gender	Percentage
Males	80%
Females	60%

Spouses of male members are assumed to be two years younger than the member and spouses of female members are assumed to be two years older than the member.

12. Accumulated Vacation Time Load

Active members' service retirement and related benefits are loaded by 3.00% for Safety Members and 3.00% for General Members for conversion of vacation time. 1/3 of this load applies for members with a 36-month final average service period. No other adjustment is made to the liabilities for anticipated future service purchases.

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

13. Rates of Separation

Rates of termination apply to all active Members who terminate their employment.

Separate rates of termination are assumed among Safety and General Members.

Termination Rates		
Years of Service	General All	Safety All
0	18.0%	16.0%
1	14.0%	8.0%
2	9.0%	7.0%
3	8.0%	6.0%
4	7.0%	6.0%
5	7.0%	6.0%
10	5.0%	5.0%
15	3.0%	2.0%
20	3.0%	0.0%
25	3.0%	0.0%
30+	0.0%	0.0%

Termination rates do not apply once a member is eligible for retirement.

14. Withdrawal

Rates of withdrawal apply to active Members who terminate their employment and withdraw their member contributions, forfeiting entitlement to future Plan benefits. Separate rates of withdrawal are assumed among Safety and General Members and are based on service. The rates do not overlap with the service retirement rates.

45% of all General Member terminations with less than 10 years of service are assumed to take a refund of contributions, as well as 15% of those with 10 or more years of service.

35% of all Safety Member terminations with less than 10 years of service are assumed to take a refund of contributions, and 10% of those with 10 or more years of service.

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

15. Vested Termination and Reciprocal Transfers

Rates of vested termination apply to active Members who terminate their employment after five years of service and leave their member contributions on deposit with the Plan. Alternatively, those who terminate their employment with less than five years of service can leave their member contributions with the Plan and transfer to a reciprocal employer, therefore retaining entitlement to future Plan benefits.

Vested terminated Tier 3 General Members are assumed to begin receiving benefits at age 65 while all other General Members are assumed to begin at age 58, unless they have reciprocity, in which case they are assumed to begin at age 61; terminated Safety Members are assumed to begin receiving benefits at age 51 for Tiers 4 and 5 and at age 54 for all others.

60% of vested terminated General Members with less than 10 years of service are assumed to be reciprocal, as well as 40% of those with 10 or more years of service.

75% of vested terminated Safety Members with less than 10 years of service are assumed to be reciprocal, as well as 70% of those with 10 or more years of service.

Reciprocal members are assumed to receive annual pay increases of 3.25% for General and 3.75% for Safety from the date of transfer to the assumed retirement date.

16. Form of Benefit

Upon retirement, 90% of male married members and 95% of female married members are assumed to elect the normal payment form (joint & 50% survivor annuity for Tier 3 and joint & 60% survivor annuity for all other tiers). Non-married members are assumed to elect a single life annuity.

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

17. Rates of Service-Connected Disability

Separate rates of duty disability are assumed among Safety and General Members; rates for both sexes for Safety Members are combined. Safety members are assumed to follow the CalPERS State Safety rates. Sample rates are shown below:

Rates of Service-Connected Disability			
	General		Safety
Age	Male	Female	All
20	0.0043%	0.0002%	0.0020%
25	0.0102%	0.0004%	0.0760%
30	0.0211%	0.0008%	0.1700%
35	0.0284%	0.0024%	0.2640%
40	0.0401%	0.0056%	0.3600%
45	0.0613%	0.0101%	0.4570%
50	0.0897%	0.0162%	0.5570%
55	0.1227%	0.0249%	0.6580%
60	0.1637%	0.0349%	0.7620%
65	0.0000%	0.0000%	0.8690%

18. Rates of Nonservice-Connected Disability

Separate rates of ordinary disability are assumed among Safety and General Members. Rates of ordinary disability for Safety Members are assumed to follow the 2021 CalPERS Public Agency Police Non-Industrial Disability table; rates of ordinary disability for General Members are assumed to follow the 2021 CalPERS Public Agency Miscellaneous Non-Industrial Disability table. The rates shown are applied after five Years of Service. Below are sample rates:

Rates of Non Service-Connected Disability		
	General	
Age	Male	Female
20	0.0170%	0.0100%
25	0.0170%	0.0100%
30	0.0190%	0.0240%
35	0.0390%	0.0710%
40	0.1020%	0.1350%
45	0.1510%	0.1880%
50	0.1580%	0.1990%
55	0.1580%	0.1490%
60	0.1530%	0.1050%
65	0.1280%	0.0880%
70	0.1020%	0.0840%
75+	0.1020%	0.0880%

Rates of Non Service-Connected Disability	
	Safety
Age	All
20	0.0100%
25	0.0100%
30	0.0200%
35	0.0300%
40	0.0400%
45	0.0500%
50	0.0800%
55	0.1300%
60	0.2000%
65+	0.2000%

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

19. Rates of Mortality for Non-Annuitants

Rates of ordinary death for active General members are specified by the 2021 CalPERS Preretirement Non-Industrial Mortality table, adjusted by 102.2% for males and 110.2% for females. Rates of ordinary death for active Safety members are specified by the 2021 CalPERS Preretirement Non-Industrial Mortality table, adjusted by 102.6% for males and 100.9% for females. Duty related mortality rates are only applicable for Safety Active Members and are based on the 2021 CalPERS Preretirement Industrial Death table, adjusted by 102.6% for males and 100.9% for females. These mortality base tables are all projected generationally from 2017 using 80% of SOA Scale MP-2020.

The following table provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

Non-Annuitant Mortality Rates						
	Ordinary Death - General		Ordinary Death	Ordinary Death	Duty Death	Duty Death
Age	Male	Female	Safety Male	Safety Female	Safety Male	Safety Female
20	0.0399%	0.0154%	0.0390%	0.0141%	0.0041%	0.0020%
25	0.0337%	0.0143%	0.0349%	0.0182%	0.0041%	0.0020%
30	0.0450%	0.0209%	0.0431%	0.0252%	0.0051%	0.0030%
35	0.0593%	0.0320%	0.0492%	0.0343%	0.0051%	0.0040%
40	0.0767%	0.0430%	0.0564%	0.0424%	0.0062%	0.0050%
45	0.0950%	0.0595%	0.0677%	0.0535%	0.0072%	0.0061%
50	0.1369%	0.0893%	0.0944%	0.0737%	0.0103%	0.0081%
55	0.2024%	0.1355%	0.1416%	0.1070%	0.0154%	0.0121%
60	0.2933%	0.1973%	0.2267%	0.1524%	0.0257%	0.0172%
65	0.4119%	0.2755%	0.3550%	0.1957%	0.0390%	0.0222%
70	0.6071%	0.4452%	0.6218%	0.3612%	0.0687%	0.0404%

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

20. Rates of Mortality for Nonservice-Connected Disabled Retirees

Rates of mortality for current nonservice-connected disabled Members are specified by the 2021 CalPERS Non-Industrially Disabled Annuitant Mortality table, no adjustment for males or females, with generational mortality improvements projected from 2017 using 80% of SOA Scale MP-2020.

The following table provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

Nonservice-Connected Disabled Mortality Rates		
Age	**Male**	**Female**
45	1.120%	1.019%
50	1.727%	1.439%
55	2.217%	1.734%
60	2.681%	1.962%
65	3.332%	2.276%
70	4.056%	2.910%
75	5.465%	4.160%
80	8.044%	6.112%
85	11.695%	9.385%
90	16.770%	14.3956%

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

21. Rates of Mortality for Service-Connected Disabled Retirees

Rates of mortality for current service-connected disabled Members are specified by the 2021 CalPERS Industrially Disabled Annuitant Mortality table, no adjustment for males and adjusted by 105% for females, with generational mortality improvements projected from 2017 using 80% of SOA Scale MP-2020.

The following table provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

Service-Connected Disabled Mortality Rates		
Age	Male	Female
45	0.314%	0.238%
50	0.437%	0.326%
55	0.623%	0.577%
60	0.935%	0.911%
65	1.393%	1.250%
70	2.189%	1.951%
75	3.498%	3.291%
80	5.932%	5.442%
85	10.244%	8.447%
90	16.739%	13.0557%

22. Rates of Mortality for Emerging Disabled Retirees

Rates of mortality for future General disabled retirees, both nonservice- and service-connected, are specified by mortality tables consisting of blends of the mortality assumptions for current nonservice- and service-connected disabled retirees. The blend for future disabled General retirees is 50% and 50%, respectively. The proportions reflect the expected splits in future disabled retirees between nonservice- and service-connected disablements.

Future disabled Safety retirees are assumed to follow the same rates of mortality as the service-connected disabled retirees indicated in the prior bullet.

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

23. Rates of Mortality for Healthy Annuitants

Rates of mortality for retired Members and their beneficiaries are specified by the 2021 CalPERS Healthy Annuitant table, adjusted by 107.6% for males and 115.3% for females, with generational mortality improvements projected from 2017 using 80% of SOA Scale MP-2020.

The following table provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

Healthy Annuitant Mortality Rates		
Age	Male	Female
45	0.101%	0.063%
50	0.291%	0.229%
55	0.421%	0.375%
60	0.618%	0.525%
65	0.922%	0.705%
70	1.442%	1.149%
75	2.582%	2.056%
80	4.713%	3.923%
85	8.902%	7.110%
90	15.644%	12.7820%

24. Mortality Improvement

As mentioned above, the mortality assumptions employ fully generational mortality improvement projection from base year 2017 using 80% of the Society of Actuaries Scale MP-2020.

25. Rates of Mortality for Purposes of Determining Employee Contribution Rates

The rates are based on the same base tables described above (2021 CalPERS mortality tables with StanCERA-specific adjustments) and are projected using 80% of Scale MP-2020 from 2017 to 2042 for General members and to 2043 for Safety members. The rates are blended using a male/female weighting of 25% male/75% female for General members and 80% male/20% female for Safety members. These assumptions are used only for determining the employee contribution rates for General members in Tiers 1, 2, 4 and 5 and Safety members in Tiers 2, 4 and 5.

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

26. Rates of Retirement

Retirement for members in non-PEPRA Tiers (Tier 6) are assumed to occur among eligible members in accordance with the tables below:

Rates of Retirement General (Non-PEPRA) Years of Service			
Age	0-9	10-29	30+
40-44	0.00%	0.00%	0.00%
45-49	0.00%	0.00%	10.00%
50-54	0.00%	4.00%	10.00%
55	0.00%	7.00%	10.00%
56	0.00%	7.00%	15.00%
57	0.00%	7.00%	15.00%
58	0.00%	7.00%	15.00%
59	0.00%	12.50%	15.00%
60	0.00%	12.50%	22.50%
61	0.00%	12.50%	30.00%
62	0.00%	20.00%	30.00%
63	0.00%	20.00%	30.00%
64	0.00%	20.00%	30.00%
65	0.00%	40.00%	30.00%
66	0.00%	40.00%	30.00%
67	0.00%	40.00%	30.00%
68	0.00%	25.00%	30.00%
69	0.00%	25.00%	30.00%
70	25.00%	25.00%	30.00%
71	25.00%	25.00%	30.00%
72	25.00%	25.00%	30.00%
73	25.00%	25.00%	30.00%
74	25.00%	25.00%	30.00%
75+	100.00%	100.00%	100.00%

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

Rates of Retirement Safety (Non-PEPRA) Years of Service				
Age	0-9	10-14	15-19	20+
40-48	0.00%	0.00%	0.00%	5.00%
49	0.00%	0.00%	0.00%	20.00%
50	0.00%	5.00%	25.00%	40.00%
51	0.00%	5.00%	5.00%	25.00%
52	0.00%	5.00%	5.00%	25.00%
53	0.00%	5.00%	5.00%	25.00%
54	0.00%	5.00%	5.00%	25.00%
55	0.00%	5.00%	5.00%	40.00%
56	0.00%	5.00%	5.00%	40.00%
57	0.00%	5.00%	5.00%	40.00%
58	0.00%	5.00%	5.00%	40.00%
59	0.00%	5.00%	5.00%	40.00%
60	0.00%	25.00%	25.00%	100.00%
61	0.00%	25.00%	25.00%	100.00%
62	0.00%	25.00%	25.00%	100.00%
63	0.00%	25.00%	25.00%	100.00%
64	0.00%	25.00%	25.00%	100.00%
65	0.00%	100.00%	100.00%	100.00%
66	0.00%	100.00%	100.00%	100.00%
67	0.00%	100.00%	100.00%	100.00%
68	0.00%	100.00%	100.00%	100.00%
69	0.00%	100.00%	100.00%	100.00%
70+	100.00%	100.00%	100.00%	100.00%

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

Retirement for members in PEPRA, Tier 6, are assumed to occur among eligible members in accordance with the sample rates below, from the full tables 2021 CALPERS Public Agency Miscellaneous 2% @ 62 table for General and the 2021 CALPERS Public Agency Safety Police 2.7% @ 57 table for Safety:

Rates of Retirement General (PEPRA) Years of Service				
Age	**5**	**10**	**25**	**35**
50-51	0.00%	0.00%	0.00%	0.00%
52	0.50%	0.80%	1.90%	3.80%
53	0.70%	1.10%	2.10%	4.80%
54	0.70%	1.10%	2.30%	5.40%
55	1.00%	1.90%	6.10%	15.20%
56	1.40%	2.60%	7.50%	16.70%
57	1.80%	2.90%	7.40%	14.30%
58	2.30%	3.50%	7.30%	13.50%
59	2.50%	3.80%	9.20%	17.50%
60	3.10%	5.10%	11.10%	18.30%
61	3.80%	5.80%	12.10%	23.20%
62	4.40%	7.40%	16.40%	27.10%
63	7.70%	10.50%	19.20%	26.60%
64	7.20%	10.10%	18.70%	27.60%
65	10.80%	14.10%	23.90%	34.80%
66	13.20%	17.20%	29.20%	42.60%
67	13.20%	17.20%	29.20%	40.50%
68	12.00%	15.60%	26.50%	38.70%
69	12.00%	15.60%	26.50%	36.80%
70	12.00%	15.60%	26.50%	38.70%
71	12.00%	15.60%	26.50%	38.70%
72	12.00%	15.60%	26.50%	38.70%
73	12.00%	15.60%	26.50%	38.70%
74	12.00%	15.60%	26.50%	38.70%
75+	100.00%	100.00%	100.00%	100.00%

APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS

Rates of Retirement Safety (PEPRA) Years of Service				
Age	**5**	**10**	**25**	**35**
50	5.00%	5.00%	5.00%	11.00%
51	4.00%	4.00%	5.75%	13.92%
52	3.80%	3.80%	5.80%	13.21%
53	3.80%	3.80%	7.74%	28.98%
54	3.80%	3.80%	9.31%	33.25%
55	6.84%	6.84%	13.40%	38.76%
56	6.27%	6.27%	12.28%	34.49%
57	6.00%	6.00%	11.75%	32.00%
58	8.00%	8.00%	13.75%	35.00%
59	8.00%	8.00%	14.00%	40.00%
60	15.00%	15.00%	15.00%	35.00%
61	14.40%	14.40%	14.40%	26.40%
62	15.00%	15.00%	15.00%	33.00%
63	15.00%	15.00%	15.00%	40.00%
64	15.00%	15.00%	15.00%	52.50%
65+	100.00%	100.00%	100.00%	100.00%

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

The following are the assumptions used in the actuarial valuation as of June 30, 2020. The economic and demographic assumptions and methods for that valuation are based on the Actuarial Experience Study Report for the period covering July 1, 2015 through June 30, 2018 report. The proposed assumptions were summarized and reviewed with the Board at the January 22, 2019 Board meeting, at which the Board provided direction to proceed with the valuation based on those assumptions. Final adoption of these assumptions was effective with the June 30, 2018 report.

1. **Rate of Return**
   The annual rate of return on all Plan assets is assumed to be 7.00%, net of investment expenses.

2. **Cost of Living**
   The cost of living as measured by the Consumer Price Index (CPI) will increase at the rate of 2.75% per year.

3. **Administrative Expenses**
   An allowance of $2,983,171 for Plan administrative expenses for the current year has been included in the annual cost calculated. The administrative expense amount has been assumed to increase in future years at the rate of the Cost of Living assumption (2.75%).

4. **Interest Credited to Employee Accounts**
   The employee accounts are credited with 0.25% interest annually.

5. **Increases in Pay**
   Base salary increase: 3.00%
   Assumed pay increases for active Members consist of increases due to base salary adjustments (as noted above), plus service-based increases due to longevity and promotion, as shown below.

Longevity & Promotion Increases		
Service	General	Safety
0	5.00%	7.00%
1	5.00%	6.00%
2	5.00%	5.00%
3	5.00%	4.00%
4	5.00%	3.00%
5	3.50%	2.00%
6	2.50%	1.75%
7	1.50%	1.50%
8	1.25%	1.25%
9	1.00%	1.00%
10	0.75%	0.75%
11+	0.50%	0.50%

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

6. PEPRA Compensation Limit

The assumption used for increasing the compensation limit that applies to PEPRA members is 2.75%.

7. Post Retirement COLA

For those with the 3% COLA benefit (i.e. 100% of COP up to 3% annually with banking), 2.60% annual increases assumed. Increases are assumed to occur on April 1.

8. Social Security Wage Base

General Plan 3 members have their benefits offset by an assumed Social Security Benefit. For projecting the Social Security Benefit, the annual Social Security Wage Base increase is assumed to be 3.00% per year.

9. Internal Revenue Code Section 415 Limit

The Internal Revenue Code (IRC) Section 415 maximum benefit limitations have been applied to the benefits for members currently in pay status, as the limited benefits have been provided by StanCERA for valuation purposes. Future projected benefits for members in active and deferred statuses have not been reduced for potential Section 415 limit in the current valuation, though any actual limitations for these members will result in actuarial gains upon their actual retirement, which will reduce future contributions.

10. Internal Revenue Code Section 401(a)(17)

The Internal Revenue Code Section 401(a)(17) maximum compensation limitation is not reflected in the valuation for funding purposes; limitations are reflected after retirement.

11. Family Composition

Percentage married for all active members who retire, become disabled, or die during active service is shown in the following table.

Percentage Married	
Gender	Percentage
Males	80%
Females	50%

Spouses of male members are assumed to be three years younger than the member and spouses of female members are assumed to be two years older than the member.

12. Accumulated Vacation Time Load

Active members' service retirement and related benefits are loaded by 1.75% for Safety Members and 1.0% for General Members for conversion of vacation time. 1/3 of this load applies for members with a 36-month final average service period. No other adjustment is made to the liabilities for anticipated future service purchases.

13. Rates of Separation

Rates of termination apply to all active Members who terminate their employment. Separate rates of termination are assumed among Safety and General Members.

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

Termination Rates		
Years of Service	General All	Safety All
0	18.0%	18.0%
1	14.0%	12.0%
2	11.7%	9.0%
3	9.4%	7.0%
4	7.1%	6.0%
5	5.0%	5.0%
10	3.5%	5.0%
15	2.9%	3.4%
20	1.5%	0.0%
25	1.3%	0.0%
30+	0.0%	0.0%

Termination rates do not apply once a member is eligible for retirement.

14. Withdrawal

Rates of withdrawal apply to active Members who terminate their employment and withdraw their member contributions, forfeiting entitlement to future Plan benefits. Separate rates of withdrawal are assumed among Safety and General Members and are based on service. The rates do not overlap with the service retirement rates.

50% of all General Member terminations with less than 10 years of service are assumed to take a refund of contributions, as well as 20% of those with 10 or more years of service.

35% of all Safety Member terminations with less than 10 years of service are assumed to take a refund of contributions, and 10% of those with 10 or more years are assumed to take a refund.

15. Vested Termination and Reciprocal Transfers

Rates of vested termination apply to active Members who terminate their employment after five years of service and leave their member contributions on deposit with the Plan. Alternatively, those who terminate their employment with less than five years of service can leave their member contributions with the Plan and transfer to a reciprocal employer, therefore retaining entitlement to future Plan benefits.

Vested terminated Tier 3 General Members are assumed to begin receiving benefits at age 65 while all other General Members are assumed to begin at age 58, unless they have reciprocity, in which case they are assumed to begin at age 61; terminated Safety Members are assumed to begin receiving benefits at age 53. 50% of vested terminated General Members are assumed to be reciprocal; 65% of vested terminated Safety Members are assumed to be reciprocal.

Reciprocal members are assumed to receive 3.75% annual pay increases from the date of transfer to the assumed retirement date.

16. Form of Benefit

Upon retirement, all married members are assumed to elect the normal payment form (joint & 50% survivor annuity for Tier 3 and joint & 60% survivor annuity for all other tiers). Non-married members are assumed to elect a single life annuity.

17. Rates of Service-Connected Disability

Separate rates of duty disability are assumed among Safety and General Members; rates for both sexes for Safety Members are combined. Safety members are assumed to follow the 2017 CalPERS State Safety rates. Below are sample rates:

Rates of Service-Connected Disability			
	General		Safety
Age	Male	Female	All
20	0.0043%	0.0002%	0.0020%
25	0.0102%	0.0004%	0.0760%
30	0.0211%	0.0008%	0.1700%
35	0.0284%	0.0024%	0.2640%
40	0.0401%	0.0056%	0.3600%
45	0.0613%	0.0101%	0.4570%
50	0.0897%	0.0162%	0.5570%
55	0.1227%	0.0249%	0.6580%
60	0.1637%	0.0349%	0.7620%
65	0.0000%	0.0000%	0.8690%

18. Rates of Nonservice-Connected Disability

Separate rates of ordinary disability are assumed among Safety and General Members. Rates of ordinary disability for Safety Members are assumed to follow the 2017 CalPERS Public Agency Police Non-Industrial Disability table; rates of ordinary disability for General Members are assumed to follow the 2017 CalPERS Public Agency Miscellaneous Non-Industrial Disability table. The rates shown are applied after five Years of Service. On the next page are sample rates:

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

Rates of Non Service-Connected Disability		
	General	
Age	Male	Female
20	0.0170%	0.0100%
25	0.0170%	0.0100%
30	0.0190%	0.0240%
35	0.0390%	0.0710%
40	0.1020%	0.1350%
45	0.1510%	0.1880%
50	0.1580%	0.1990%
55	0.1580%	0.1490%
60	0.1530%	0.1050%
65	0.1280%	0.0880%
70+	0.1020%	0.0840%

Rates of Non Service-Connected Disability	
	Safety
Age	All
20	0.0100%
25	0.0100%
30	0.0200%
35	0.0300%
40	0.0400%
45	0.0500%
50	0.0800%
55	0.1300%
60	0.2000%
65+	0.2000%

19. Rates of Mortality for Non-Annuitants

Rates of ordinary death for active Members are specified by the 2017 CalPERS Pre-Retirement Non-Industrial Mortality table, adjusted by 97.2% for males and 101.6% for females, with generational mortality improvements projected from 2009 using SOA Scale MP-2018. Duty related mortality rates are only applicable for Safety Active Members and are based on the 2017 CalPERS Pre-Retirement Industrial Death table without adjustment or projection.

The table on the following page provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

Non-Annuitant Mortality Rates			
	Ordinary Death - General and Safety		Duty Death
Age	Male	Female	Safety All
20	0.0320%	0.0215%	0.0030%
25	0.0413%	0.0248%	0.0070%
30	0.0505%	0.0269%	0.0100%
35	0.0588%	0.0378%	0.0120%
40	0.0774%	0.0539%	0.0130%
45	0.1094%	0.0766%	0.0140%
50	0.1600%	0.1079%	0.0150%
55	0.2353%	0.1550%	0.0160%
60	0.3446%	0.2261%	0.0170%
65	0.4949%	0.3324%	0.0180%
70	0.6891%	0.4747%	0.0190%

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

20. Rates of Mortality for Nonservice-Connected Disabled Retirees

Rates of mortality for current nonservice-connected disabled Members are specified by the 2017 CalPERS Non-Industrially Disabled Annuitant Mortality table, adjusted by 104.5% for females (no adjustment for males), with generational mortality improvements projected from 2009 using SOA Scale MP-2018.

The table provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

Nonservice-Connected Disabled Mortality Rates		
Age	Male	Female
45	1.297%	0.892%
50	1.784%	1.285%
55	2.095%	1.327%
60	2.634%	1.578%
65	3.120%	2.138%
70	3.890%	2.941%
75	5.398%	4.041%
80	8.230%	6.287%
85	13.166%	10.327%
90	18.469%	16.806%

21. Rates of Mortality for Service-Connected Disabled Retirees

Rates of mortality for current service-connected disabled Members are specified by the 2017 CalPERS Industrially Disabled Annuitant Mortality table, adjusted by 101.9% for males (no adjustment for females), with generational mortality improvements projected from 2009 using SOA Scale MP-2018.

The table on the next page provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

Service-Connected Disabled Mortality Rates		
Age	Male	Female
45	0.344%	0.298%
50	0.542%	0.495%
55	0.648%	0.460%
60	0.884%	0.633%
65	1.455%	1.066%
70	2.254%	1.775%
75	3.908%	2.952%
80	6.754%	4.978%
85	10.587%	7.959%
90	16.493%	12.335%

22. Rates of Mortality for Emerging Disabled Retirees

Rates of mortality for future General disabled retirees, both nonservice- and service-connected, are specified by mortality tables consisting of blends of the mortality assumptions for current nonservice- and service-connected disabled retirees. The blend for future disabled General retirees is 75% and 25%, respectively. The proportions reflect the expected splits in future disabled retirees between nonservice- and service-connected disablements.

Future disabled Safety retirees are assumed to follow the same rates of mortality as the service-connected disabled retirees indicated in the prior bullet.

23. Rates of Mortality for Healthy Annuitants

Rates of mortality for retired Members and their beneficiaries are specified by the 2017 CalPERS Healthy Annuitant table, adjusted by 97.2% for males and 104.1% for females, with generational mortality improvements projected from 2009 using SOA Scale MP-2018.

The table below provides a sample of the base mortality rates including adjustments but prior to any projections for mortality improvements.

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

Healthy Annuitant Mortality Rates		
Age	Male	Female
45	0.234%	0.221%
50	0.517%	0.515%
55	0.618%	0.479%
60	0.794%	0.556%
65	1.026%	0.779%
70	1.717%	1.317%
75	2.900%	2.283%
80	5.128%	3.847%
85	9.165%	6.949%
90	15.733%	12.841%

24. Mortality Improvement

As mentioned above, the mortality assumptions employ a fully generational mortality improvement projection from base year 2009 using Scale MP-2018.

25. Rates of Retirement

Retirement for members in non-PEPRA Tiers (Tier 6) are assumed to occur among eligible members in accordance with the tables on the next page:

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

Rates of Retirement General (Non-PEPRA) Years of Service			
Age	0-9	10-29	30+
40-44	0.00%	0.00%	0.00%
45-49	0.00%	0.00%	10.00%
50-54	0.00%	5.00%	10.00%
55	0.00%	7.50%	20.00%
56	0.00%	7.50%	20.00%
57	0.00%	7.50%	20.00%
58	0.00%	12.50%	20.00%
59	0.00%	12.50%	20.00%
60	0.00%	12.50%	25.00%
61	0.00%	20.00%	25.00%
62	0.00%	25.00%	40.00%
63	0.00%	20.00%	25.00%
64	0.00%	25.00%	25.00%
65	0.00%	35.00%	35.00%
66	0.00%	45.00%	45.00%
67	0.00%	20.00%	25.00%
68	0.00%	20.00%	25.00%
69	0.00%	20.00%	25.00%
70	50.00%	50.00%	100.00%
71	50.00%	50.00%	100.00%
72	50.00%	50.00%	100.00%
73	50.00%	50.00%	100.00%
74	50.00%	50.00%	100.00%
75+	100.00%	100.00%	100.00%

Rates of Retirement Safety (Non-PEPRA) Years of Service			
Age	0-9	10-19	20+
40-48	0.00%	0.00%	5.00%
49	0.00%	0.00%	20.00%
50	0.00%	10.00%	30.00%
51	0.00%	10.00%	20.00%
52	0.00%	10.00%	20.00%
53	0.00%	10.00%	20.00%
54	0.00%	10.00%	20.00%
55	0.00%	10.00%	30.00%
56	0.00%	10.00%	30.00%
57	0.00%	10.00%	30.00%
58	0.00%	10.00%	30.00%
59	0.00%	10.00%	30.00%
60	0.00%	25.00%	100.00%
61	0.00%	25.00%	100.00%
62	0.00%	25.00%	100.00%
63	0.00%	25.00%	100.00%
64	0.00%	25.00%	100.00%
65	0.00%	100.00%	100.00%
66	0.00%	100.00%	100.00%
67	0.00%	100.00%	100.00%
68	0.00%	100.00%	100.00%
69	0.00%	100.00%	100.00%
70+	100.00%	100.00%	100.00%

APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS

Retirement for members in PEPRA, Tier 6, are assumed to occur among eligible members in accordance with the sample rates below, from the full tables 2017 CALPERS Public Agency Miscellaneous 2% @ 62 table for General and the 2017 CALPERS Public Agency Safety Police 2.7% @ 57 table for Safety:

Rates of Retirement General (PEPRA) Years of Service				
Age	5	10	25	35
50-51	0.00%	0.00%	0.00%	0.00%
52	0.50%	0.80%	1.90%	3.80%
53	0.70%	1.10%	2.10%	4.80%
54	0.70%	1.10%	2.30%	5.40%
55	1.00%	1.90%	6.10%	15.20%
56	1.40%	2.60%	7.50%	16.70%
57	1.80%	2.90%	7.40%	14.30%
58	2.30%	3.50%	7.30%	13.50%
59	2.50%	3.80%	9.20%	17.50%
60	3.10%	5.10%	11.10%	18.30%
61	3.80%	5.80%	12.10%	23.20%
62	4.40%	7.40%	16.40%	27.10%
63	7.70%	10.50%	19.20%	26.60%
64	7.20%	10.10%	18.70%	27.60%
65	10.80%	14.10%	23.90%	34.80%
66	13.20%	17.20%	29.20%	42.60%
67	13.20%	17.20%	29.20%	40.50%
68	12.00%	15.60%	26.50%	38.70%
69	12.00%	15.60%	26.50%	36.80%
70	12.00%	15.60%	26.50%	38.70%
71	12.00%	15.60%	26.50%	38.70%
72	12.00%	15.60%	26.50%	38.70%
73	12.00%	15.60%	26.50%	38.70%
74	12.00%	15.60%	26.50%	38.70%
75+	100.00%	100.00%	100.00%	100.00%

Rates of Retirement Safety (PEPRA) Years of Service				
Age	5	10	25	35
50	5.00%	5.00%	5.00%	11.00%
51	4.00%	4.00%	5.75%	13.92%
52	3.80%	3.80%	5.80%	13.21%
53	3.80%	3.80%	7.74%	28.98%
54	3.80%	3.80%	9.31%	33.25%
55	6.84%	6.84%	13.40%	38.76%
56	6.27%	6.27%	12.28%	34.49%
57	6.00%	6.00%	11.75%	32.00%
58	8.00%	8.00%	13.75%	35.00%
59	8.00%	8.00%	14.00%	40.00%
60	15.00%	15.00%	15.00%	35.00%
61	14.40%	14.40%	14.40%	26.40%
62	15.00%	15.00%	15.00%	33.00%
63	15.00%	15.00%	15.00%	40.00%
64	15.00%	15.00%	15.00%	52.50%
65+	100.00%	100.00%	100.00%	100.00%

Classic Values, Innovative Advice