Ventura County Employees'
Retirement Association (VCERA)

Actuarial Experience Study

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

Segal

Segal

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June 5, 2024

Board of Retirement
Ventura County Employees' Retirement Association
1190 South Victoria Avenue, Suite 200
Ventura, CA 93003-6572

Re: Review of Actuarial Assumptions for the June 30, 2024 Actuarial Valuation

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience for the Ventura County Employees' Retirement Association. This study utilizes the census data for the period July 1, 2020 to June 30, 2023 as well as prior periods for some assumptions, and provides the proposed actuarial assumptions, both economic and demographic, to be used in the June 30, 2024 valuation.

We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

We look forward to reviewing this report with you and answering any questions you may have.

Sincerely,

Paul Angelo, FSA, MAAA, FCA, EA
Senior Vice President and Actuary

Molly Calcagno, ASA, MAAA, EA
Senior Actuary

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Senior Vice President and Actuary

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Table of Contents

Section 1: Introduction, Summary, and Recommendations

To project the cost and liabilities of the Retirement Association, assumptions are made about all future events that could affect the amount and timing of the benefits to be paid and the assets to be accumulated. Each year actual experience is compared against the projected experience, and to the extent there are differences, the future contribution requirement is adjusted.

If assumptions are modified, contribution requirements are adjusted to take into account a change in the projected experience in all future years. There is a great difference in both philosophy and cost impact between recognizing the actuarial deviations as they occur annually and changing the actuarial assumptions. Taking into account one year's gains or losses without making a change in the assumptions means that year's experience is treated as temporary and that, over the long run, experience will return to what was originally assumed. For example, the actuarial assumptions used in the most recent valuation did not include any possible short-term or long-term impacts on mortality of the covered population that emerged due to COVID-19.[1] Changing assumptions reflects a basic change in thinking about the future, and has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

The use of realistic actuarial assumptions is important in maintaining adequate funding, while paying the promised benefit amounts to participants already retired and to those near retirement. The actuarial assumptions used do not determine the "actual cost" of the plan. The actual cost is determined solely by the benefits and administrative expenses paid out, offset by investment income received. However, it is desirable to estimate as closely as possible what the actual cost will be so as to permit an orderly method for setting aside contributions today to provide benefits in the future, and to maintain equity among generations of participants and taxpayers.

This study was undertaken in order to review the economic and demographic actuarial assumptions and to compare the actual experience with that expected under the current assumptions during the three-year experience period from July 1, 2020 through June 30, 2023. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27 "Selection of Economic Assumptions for Measuring Pension Obligations"[2] and ASOP No. 35 "Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations." These Standards of Practice provide guidance for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected future experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for investment return, merit and promotion salary increases, pre-retirement mortality, post-retirement healthy and disabled life mortality, beneficiary mortality, disability (non-service connected and service connected), termination

[1] An analysis of the ongoing impact of the COVID-19 pandemic is beyond the scope of the current experience study.

[2] References made later in this report are with respect to the revised ASOP 27 adopted in June 2020.

(refunds and deferred vested retirements), retirement from active employment, retirement age for deferred vested members, in-service redemptions, percent of future deferred vested General members expected to be covered by a reciprocal system, and unknown gender.

Our recommendations for the major actuarial assumption categories are as follows:

Pg #	Actuarial Assumption Category	Recommendation
13	**Inflation:** Future increases in the Consumer Price Index (CPI), which drives investment returns and active member salary increases.	Maintain the inflation assumption at 2.50% per annum as discussed in *Section 3(A)*.
15	**Retiree cost-of-living increases:** Future increases in the cost-of-living adjustment for retirees.	Maintain the retiree cost-of-living assumption at 2.75% per annum (based on our recommended inflation assumption of 2.50% plus a margin for adverse deviation of 0.25%) as discussed in *Section 3(A)*.
17	**Investment return:** The estimated average future net rate of return on current and future assets of the Association as of the valuation date. This rate is used to discount liabilities.	Reduce the investment return assumption from 7.00% to 6.75% per annum as discussed in *Section 3(B)*.
26	**Individual salary increases:** Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components: • Inflationary salary increases • Real "across the board" salary increases • Merit and promotion increases	Maintain the inflationary salary increase assumption at 2.50% and maintain the real "across the board" salary increase assumption at 0.50%. This means that the combined inflationary and real "across the board" salary increases will remain unchanged at 3.00%. Adjust the merit and promotion rates of salary increase as developed in *Section 3(C)* to reflect past experience. This includes introducing separate rates of merit and promotion salary increases for non-PEPRA and PEPRA members. Future merit and promotion salary increases are higher in most service categories under the proposed assumptions. The recommended total rates of salary increase anticipate higher increases overall than the current assumptions for both General and Safety members.

Pg #	Actuarial Assumption Category	Recommendation
35	**Mortality rates - healthy:** The probability of dying at each age for non-disabled members. Mortality rates are used to project life expectancies.	**Healthy retirees** *Current and recommended base table for General members*: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 5% for females *Current base table for Safety members:* Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table *Recommended base table for Safety members:* Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates decreased by 5% for males **Beneficiaries** *Current base table for all beneficiaries:* Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table with rates increased by 10% for females *Recommended base table for beneficiaries in pay status at the valuation:* Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table with rates increased by 5% for males and females *Recommended base table for beneficiaries not in pay status at the valuation:* For the purposes of the actuarial valuations (for funding and financial reporting), when calculating the liability for the continuance to a beneficiary of a surviving member we recommend that the General Healthy Retiree mortality tables be used for beneficiary mortality both before and after the expected death of the General or Safety member. **Pre-retirement mortality** *Current and recommended base table for General members:* Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table *Current and recommended base table for Safety members:* Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table **Mortality projection** *Current projection:* All current tables are projected generationally with the two-dimensional mortality improvement scale MP-2020. *Recommended projection:* All recommended tables are projected generationally with the two-dimensional mortality improvement scale MP-2021. This is the most recent projection scale, as

Pg #	Actuarial Assumption Category	Recommendation
		an updated projection scale was not published in 2022 nor 2023. For member contribution rates, optional forms, and reserves: change the mortality rates to those developed in *Section 4(A)*.
44	**Mortality rates - disabled:** The probability of dying at each age for disabled members. Mortality rates are used to project life expectancies.	**Disabled retirees** *Current base table for General members:* Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table *Recommended base table for General members:* Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table with rates decreased by 5% for males *Current and recommended base table for Safety members:* Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table **Mortality projection** *Current projection:* All current tables are projected generationally with the two-dimensional mortality improvement scale MP-2020. *Recommended projection:* All recommended tables are projected generationally with the two-dimensional mortality improvement scale MP-2021. This is the most recent projection scale, as an updated projection scale was not published in 2022 nor 2023.
48	**Disability incidence rates:** The probability of becoming disabled at each age.	Adjust the disability rates to those developed in *Section 4(C)* to reflect slightly lower incidence of disability overall for General and slightly higher incidence of disability overall for Safety members.
52	**Termination rates:** The probability of leaving employment at each age and receiving either a refund of member contributions or a deferred vested retirement benefit.	Adjust the termination rates to those developed in *Section 4(D)* to reflect a slightly higher incidence of termination overall for both General and Safety members.
58	**Retirement rates:** The probability of retirement at each age at which participants are eligible to retire. Includes retirement age for deferred vested members.	For active members, adjust the current retirement rates to those developed in *Section 4(E)*. For deferred vested members, maintain the deferred vested retirement age assumption at age 60 for all General members. For Safety members, increase to age 53 for those who are not covered by a reciprocal system and maintain the assumption at age 55 for those who are covered by a reciprocal system.
69	**In-service redemptions:** Additional pay elements that are expected to be received during the member's final average earnings period.	Maintain the current in-service redemption assumption for General Tier 1, increase the current in-service redemption assumption for General Tier 2, and increase the current in-service redemption assumption for non-PEPRA Safety, as developed in *Section 4(F)*.

Pg #	Actuarial Assumption Category	Recommendation
70	**Miscellaneous assumptions including:** • Reciprocity • Future benefit accruals • Unknown data for members • Form of payment • Percent married • Age and gender of spouse • Average entry age (for member contributions) – Used for determining contribution rates for non-PEPRA members hired after November 1974 who are not contributing fifty percent of normal cost.	Decrease the current proportion of future deferred vested members expected to be covered by a reciprocal system from 45% to 40% for General members and maintain the assumption at 60% for Safety members. In addition, increase the reciprocal salary increase assumption from 3.75% to 4.00% for General members and increase from 4.00% to 4.25% for Safety members. Maintain the current future benefit accrual assumption, update the unknown data for members assumption, and maintain the form of payment assumptions as outlined in *Section 4(G).* For active and deferred vested members, maintain the current percent married at retirement assumption at 70% for males and 55% for females. Maintain the spouse age difference assumption that male retirees are three years older than their spouses and that female retirees are two years younger than their spouses. Maintain the current average entry age assumption for General and Safety members as developed in *Section 4(G).*

We have estimated the impact of all the recommended economic and demographic assumptions as if they were applied to the June 30, 2023 actuarial valuation. The table below shows the changes in the employer and member contribution rates due to the proposed assumption changes separately for the recommended economic assumption changes (as recommended in *Section 3* of this report which include the recommended merit and promotion salary increases) and the recommended demographic assumption changes (as recommended in *Section 4* of this report).

Cost Impact of the Recommended Assumptions Based on June 30, 2023 Actuarial Valuation

Assumption	Impact on Average Employer Contribution Rates
Increase due to changes in economic assumptions	3.20%
Increase due to changes in demographic assumptions	0.68%
Total increase in average employer rate	**3.88%**
Total estimated increase in annual dollar amount ($ in '000s)[1]	**$36,589**

Assumption	Impact on Average Member Contribution Rates
Increase due to changes in economic assumptions	0.91%
Increase due to changes in demographic assumptions	0.04%
Total increase in average member rate	**0.95%**
Total estimated increase in annual dollar amount ($ in '000s)[1]	**$8,962**

Assumption	Impact on UAAL ($ in '000s)
Increase due to changes in economic assumptions	$278,449
Increase due to changes in demographic assumptions	85,969
Total increase in UAAL	**$364,418**

	Impact on Funded Percentage on VVA Basis
Change in Funded Percentage	97.08% to 92.78%

[1] Based on June 20, 2023 projected compensation as determined under each set of assumptions.

Of the various assumption changes, the most significant rate increase is due to the change in the investment return assumption, followed by the mortality assumptions and merit and promotion salary increase assumptions.

Assumption	Impact on Average Employer Contribution Rates	Impact on Average Member Contribution Rates	Impact on UAAL ($ millions)
Increase due to increases in merit and salary promotion	0.62%	0.28%	$32,076
Increase due to decrease in investment return assumption (discount rate)	2.58%	0.63%	246,373
Increase due to changes in economic assumptions	**3.20%**	**0.91%**	**$278,449**
Increase due to changes in mortality	0.60%	0.04%	$69,625
Change due to changes in all other demographic assumptions	0.08%	0.00%	16,344
Increase due to changes in demographic assumptions	**0.68%**	**0.04%**	**$85,969**
Total increase due to all assumption changes	**3.88%**	**0.95%**	**$364,418**

Section 2 provides some background on the basic principles and methodology used for the experience study and for the review of the economic and demographic actuarial assumptions. A detailed discussion of each assumption and reasons for the proposed changes are found in *Section 3* for the economic assumptions and *Section 4* for the demographic assumptions. The cost impact of the proposed changes is detailed in *Section 5*.

Section 2: Background and Methodology

In this report, we analyzed both economic and demographic ("non-economic") assumptions. The primary economic assumptions reviewed are inflation, investment return, and salary increases. Demographic assumptions include the probabilities of certain events occurring in the population of members, referred to as "decrements," e.g., termination from service, disability retirement, service retirement, and death before and after retirement. In addition to decrements, other demographic assumptions reviewed in this study include the percent of members assumed to go on to work for a reciprocal system, reciprocal salary increases, percentage of members with an eligible spouse or domestic partner, spousal age difference, in-service redemptions and average entry age for member contributions.

Economic assumptions

Economic assumptions consist of:

- **Inflation:** Increases in the price of goods and services. The inflation assumption reflects the basic return that investors expect from securities markets. It also reflects the expected basic salary increase for active employees and drives increases in the allowances of retired members (if any).
- **Investment return:** Expected long-term rate of return on the Association's investments after accounting for certain investment expenses and all administrative expenses. This assumption has a significant impact on contribution rates.
- **Salary increases:** In addition to inflationary increases, it is assumed that salaries will also grow by real "across the board" pay increases in excess of price inflation. It is also assumed that employees will receive raises above these average increases as they advance in their careers. These are commonly referred to as merit and promotion increases. Payments to amortize any Unfunded Actuarial Accrued Liability (UAAL) are assumed to increase each year by the price inflation rate plus any real "across the board" pay increases that are assumed.

The setting of these economic assumptions is described in *Section 3*.

Demographic assumptions

In order to determine the probability of an event occurring, we examine the "decrements" and "exposures" of that event. For example, taking termination from service, we compare the number of employees who actually terminate in a certain age and/or service category (i.e., the number of "decrements") with those who could have terminated (i.e., the number of "exposures"). For example, if there were 500 active employees in the 20-24 age group at the beginning of the year and 50 of them left during the year, we would say the probability of termination in that age group is 50 ÷ 500 or 10%.

The reliability of the resulting probability is highly dependent on both the number of decrements and the number of exposures. For example, if there are only a few people in a high age

category at the beginning of the year (number of exposures), we would not lend as much credibility to the probability of termination developed for that age category, especially if it is out of line with the pattern shown for the other age groups. Similarly, if we are considering the death decrement, there may be a large number of exposures in the age 20-24 category, but very few decrements (actual deaths); therefore, we would not be able to rely heavily on the probability developed for that category.

One reason we use several years of experience for such a study is to have more exposures and decrements, and therefore more statistical reliability. Another reason for using several years of data is to smooth out fluctuations that may occur from one year to the next. However, we also calculate the rates on a year-to-year basis to check for any trend that may be developing in the later years.

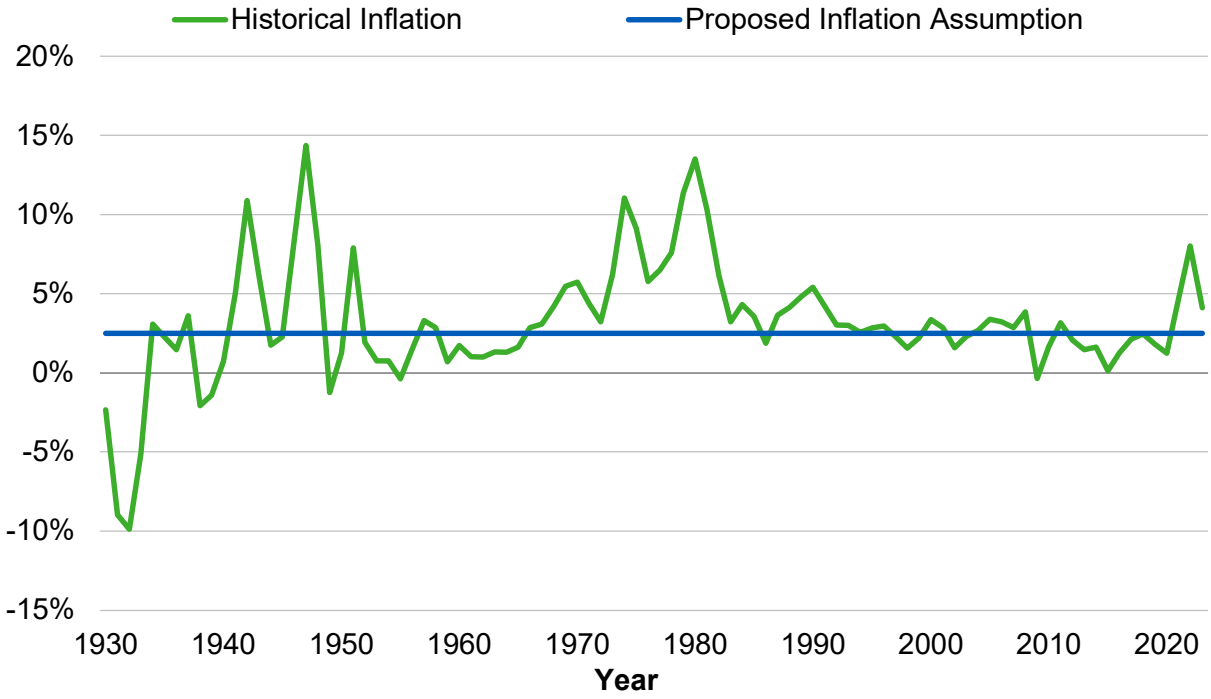
Section 3: Economic Assumptions

A. Inflation

Unless an investment grows at least as fast as prices increase, investors will experience a reduction in the inflation-adjusted value of their investment. There may be times when "riskless" investments return more or less than inflation, but over the long term, investment market forces will generally require an issuer of fixed income securities to maintain a minimum return which protects investors from inflation.

The inflation assumption is long term in nature, so our analysis begins with a review of historical information. Following is a graph showing historical inflation rates and a comparison with the inflation assumption of 2.50% that we recommend in this report:

Historical Consumer Price Index – 1930 to 2023[1]
(U.S. City Average - All Urban Consumers)



There was a spike in inflation that started in the second quarter of 2021 and continued into 2022. However, the rate of inflation, while still elevated, has leveled off and started to decline since the Federal Reserve began to increase interest rates starting around the second quarter of 2022. In particular, the change in the CPI from December 2022 to December 2023 was 3.1%.

Based on information found in the Public Plans Database, which is produced in partnership with the National Association of State Retirement Administrators (NASRA), the median inflation assumption used by 210 large public retirement funds in their 2022 fiscal year valuations was

[1] Source: Bureau of Labor Statistics – Based on CPI for All Items in U.S. city average, all urban consumers, not seasonally adjusted (Series ID: CUUR0000SA0).

2.50%.[1] In California, CalSTRS and four[2] 1937 Act CERL systems currently use an inflation assumption of 2.75%, the other sixteen 1937 Act CERL systems use an inflation assumption of 2.50%[3] (including VCERA) and CalPERS uses an inflation assumption of 2.30%.

VCERA's investment consultant, New England Pension Consultants (NEPC), anticipates an annual inflation rate of 2.60% over a 30-year horizon, while the average inflation assumption provided by NEPC and five other investment advisory firms retained by Segal's California public sector clients, as well as Segal's investment advisory division (Segal Marco Advisors),[4] was 2.50%. Note that, in general, investment consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation.[5]

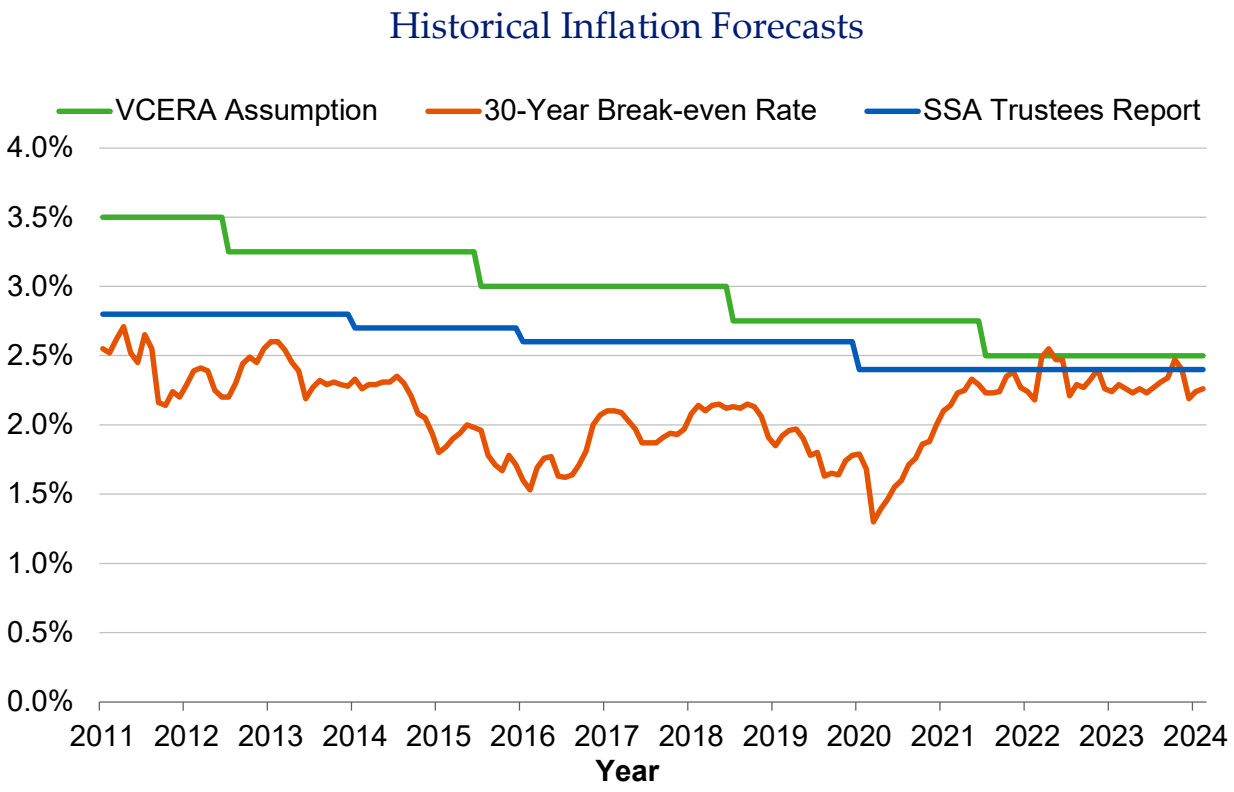
To find a forecast of inflation based on a longer time horizon, we referred to the Social Security Administration's (SSA) 2024 report on the financial status of the Social Security program.[6] The projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.40%. The SSA report also includes alternative projections using lower and higher inflation assumptions of 1.80% and 3.00%, respectively.

We also compared the yields on the thirty-year inflation indexed U.S. Treasury bonds to comparable traditional U.S. Treasury bonds.[7] This "break-even rate" is commonly regarded as a market-based gauge of future inflation expectations. As of April 2024, the difference in yields is about 2.35% which provides a measure of market expectations of inflation. It is worth noting that even during the peak of the recent inflation spike this break-even rate exceeded 2.50% in only a single month, April 2022. This market expectation for long-term inflation can be quite volatile, which is illustrated in the table below.

Observation Month	Difference in Yields	Observation Month	Difference in Yields
January 2022	2.24%	March 2023	2.26%
February 2022	2.18%	April 2023	2.23%
March 2022	2.49%	May 2023	2.26%
April 2022	2.55%	June 2023	2.23%
May 2022	2.47%	July 2023	2.27%
June 2022	2.47%	August 2023	2.31%
July 2022	2.21%	September 2023	2.34%
August 2022	2.29%	October 2023	2.47%
September 2022	2.27%	November 2023	2.40%
October 2022	2.33%	December 2023	2.19%
November 2022	2.40%	January 2024	2.24%
December 2022	2.26%	February 2024	2.26%
January 2023	2.24%	March 2024	2.27%
February 2023	2.29%	April 2024	2.35%

[1] Among 227 large public retirement funds, the 2022 fiscal year inflation assumption was not available for 17 of the public retirement funds in the survey data as of March 2024.
[2] We note that none of these four 1937 Act CERL Systems are served by Segal.
[3] Eight of these 1937 Act CERL systems use a 2.50% inflation assumption with a 2.75% COLA assumption.
[4] We note that this is the first time we have included inflation and real rate of return assumptions used by Segal Marco Advisors in our review of economic assumptions for VCERA.
[5] The time horizon used by the six investment consultants included in our review, with the exception of one investment consultant that uses a 1-year horizon, generally ranges from 20 years to 30 years, with NEPC using a 30-year horizon.
[6] Source: Social Security Administration: The 2024 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds.
[7] Source: Board of Governors of the Federal Reserve System.

The following graph shows VCERA's historical and current proposed inflation assumptions compared to the two other metrics just discussed, going back to 2010. In effect, this compares VCERA's assumption to two separate independent forecasts, one based on market observations and one developed by economists at the SSA. The graph shows that over the observed period, VCERA's assumption has been higher but consistently moving towards these other forecasts and seems to be in a stable place at this point in time.



The setting of the inflation assumption using the information outlined above is a somewhat subjective process, and Segal does not apply a specific weight to each of the metrics in determining our recommended inflation assumption. Based on a consideration of all the above metrics, beginning in 2021 we have been recommending the same 2.50% inflation assumption in our experience studies for our California public retirement system clients.

Based on all of the above information, we recommend maintaining the annual inflation assumption at 2.50%.

Retiree cost-of-living increases

Retiree cost-of-living adjustments (COLAs) for all General Tier 1 and Safety members are based on actual changes in CPI and are subject to a 3.00% maximum change per year. In our last experience study as of June 30, 2021, the Board adopted a 2.75% COLA for all General Tier 1 and Safety members which included a 0.25% margin above the 2.50% inflation assumption.[1]

[1] We will continue to assume in the valuation that retired members and beneficiaries with a COLA bank on the date of the valuation will continue to receive the maximum COLA until the balances in their COLA banks are used up.

Note that General Tier 2 members with a COLA provision are entitled to receive a fixed 2% COLA, not limited to actual changes in the CPI, that applies to future service after March 2003 for Service Employees International Union (SEIU) members and July 2023 for California Nurses Association (CNA) members.

In the table below, we continue to observe that the changes in the December CPI based on Los Angeles-Long Beach-Anaheim area used by the Board to set COLAs have exceeded those of the changes in the December CPI for the U.S. City Average during the most recent 10-year, 15-year and 20-year periods.

	Change in December CPI for Los Angeles-Long Beach-Anaheim Area	Change in December CPI for U.S. City Average
5-year period	3.86%	4.07%
10-year period	3.08%	2.79%
15-year period	2.61%	2.55%
20-year period	2.78%	2.58%

We recommend maintaining the current assumptions to value the post-retirement COLA benefit at 2.75% per year which includes a 0.25% margin above our recommended inflation assumption.

In developing the COLA assumption, we also considered the results of a stochastic approach that would attempt to account for the possible impact of low inflation that could occur before COLA banks are able to be established for the member. Although the results of this type of analysis might justify the use of a lower COLA assumption, we are not recommending that at this time. The reasons for this conclusion include the following:

- The results of the stochastic modeling are significantly dependent on assuming that lower levels of inflation will persist in the early years of the projections. If this is not assumed, then the stochastic modeling will produce results similar to our proposed COLA assumptions. Given the inflation spike of the last few years and general buildup of member's COLA banks, this consideration seems less relevant today.
- Using lower long-term COLA assumptions based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption of 2.50% (before considering the 0.25% margin on top of the inflation assumption for COLA) is met in a year. We question the reasonableness of this result.

We do not see the stochastic possibility of COLAs averaging less than those predicted by the assumed rate of inflation as a reliable source of cost savings that should be anticipated in our COLA assumptions. Therefore, we continue to recommend setting the COLA assumption consistent with the COLA assumption we have used in prior years.

B. Investment return

The investment return assumption is comprised of two primary components, inflation and real rate of investment return, with adjustments for certain expenses and risk.

Real rate of investment return

This component represents the portfolio's incremental investment market returns over inflation. Generally, when an investor takes on greater investment risk, the return on the investment is expected to also be greater, at least in the long run. This additional risk and return is expected to vary by asset class and empirical data supports that expectation. For that reason, the real rate of return assumptions are developed by asset class. Therefore, the real rate of return assumption for a retirement plan's portfolio will vary with the Board's asset allocation among asset classes.

The Association's current target asset allocation and the assumed real rate of return assumptions by asset class are shown in the following table. The first column of real rate of return assumptions are determined by reducing NEPC's total or "nominal" 2024 return assumptions by their assumed 2.60% inflation rate. The second column of returns (except certain asset classes as noted in the table) represents the average of a sample of real rate of return assumptions. The sample includes the expected annual real rate of return provided to us by NEPC and five other investment advisory firms retained by Segal's public sector clients, as well as Segal's investment advisory division. We believe these averages are a reasonable consensus forecast of long-term future market returns in excess of inflation.[1]

[1] Note that, just as for the inflation assumption, in general the time horizon used by the investment consultants in determining the real rate of return assumption is shorter than the time horizon encompassed by the actuarial valuation.

VCERA'S Target Asset Allocation and Assumed Arithmetic Net Real Rate of Return Assumptions by Asset Class and for the Portfolio

Asset Class	Percentage of Portfolio	NEPC's Assumed Net Real Rate of Return[1]	Average Assumed Net Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[2]
U.S. Large-Cap Equity	22.00%	5.40%	5.77%
U.S. Small/Mid-Cap Equity	4.00%	6.70%	6.56%
Non-U.S. Developed Equity	9.00%	5.50%	6.44%
Non-U.S. Developed Small-Cap Equity	3.00%	5.50%	6.57%
Emerging Market Equity	3.00%	9.90%	8.32%
Global Equity	9.00%	6.10%	6.59%
Private Equity	18.00%	10.30%	9.48%
U.S. Aggregate Bond	4.00%	2.40%	2.26%
Private Debt	8.00%	7.00%	6.60%
U.S. Treasury Bond	2.00%	2.50%	2.00%
Real Estate - Core	6.00%	4.50%	4.53%
Absolute Return Fixed Income	4.00%	3.40%	3.40%[3]
Real Estate - Non-Core	2.00%	7.10%	7.10%[3]
Natural Resources	2.00%	10.30%	10.30%[3]
Infrastructure	4.00%	5.20%	5.20%[3]
Total	**100.00%**	**6.48%**	**6.48%**

Generally, the above are representative of "indexed" returns for securities that are publicly traded, returns net of fees for securities that are non-publicly traded and do not include any additional returns ("alpha") from active management. Consideration of returns without alpha is consistent with the Actuarial Standard of Practice No. 27, Section 3.8.3.d, which states:

> "Investment Manager Performance - Anticipating superior (or inferior) investment manager performance may be unduly optimistic (or pessimistic). The actuary should not assume that superior or inferior returns will be achieved, net of investment expenses, from an active investment management strategy compared to a passive investment management strategy unless the actuary has reason to believe, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the long term."

[1] The rates shown have been estimated by Segal by taking NEPC's nominal arithmetic returns and reducing by NEPC's assumed 2.60% inflation rate to develop the assumed real rate of return shown. These return assumptions are net of any applicable investment management expenses.

[2] These are based on the projected arithmetic returns provided by NEPC and five other investment advisory firms serving the county retirement system of VCERA and 16 other city and county retirement systems in California, as well as Segal's investment advisory division. These return assumptions are net of any applicable investment management expenses.

[3] For these asset classes, NEPC's assumption is applied in lieu of the average because there is a larger disparity in returns for these asset classes among the firms surveyed and using NEPC's assumption should more closely reflect the underlying investments made specifically for VCERA.

The following are some observations about the returns provided above:

1. The investment consultants to our California public sector clients, as well as Segal's investment advisory division, have each provided us with their expected real rates of return for each asset class, over various future periods of time. However, in general, the returns available from investment consultants are projected over time periods that are shorter than the durations of a retirement plan's liabilities.
2. As discussed in the next section, the real rates of return provided this year by the investment consultants reflect a change in how investment expenses are reported.
3. Using a sample average of expected real rate of returns allows VCERA's investment return assumption to reflect a broader range of capital market information and should help reduce year to year volatility in the investment return assumption.
4. Therefore, we recommend that the 6.48% portfolio net real rate of return be used to determine VCERA's investment return assumption, but with some caution. This return is 0.42% higher than the 6.06% gross return that was used three years ago in the review of the recommended investment return assumption for the June 30, 2021 valuation even before we consider the approximately 0.30% in investment management expense that, as discussed in the next section, will no longer be subtracted from the 6.48% gross return.
5. The 0.42% increase in the portfolio net real rate of return since 2021 is due to changes in the real rate of return assumptions provided to us by the investment advisory firms (+0.27% under the 2021 asset allocation), changes in the VCERA's target asset allocation (+0.17%) and the interaction effect between these changes (-0.02%). We believe the increase in the real rates of return provided to us by the investment advisory firms may be due to the very low returns earned in the 2021-2022 plan year, as well as the increase in the federal funds rate during 2022, and so should be used with caution in selecting a long-term investment return assumption.

Association expenses

For funding purposes, the real rate of return assumption for the portfolio needs to be adjusted for investment expenses expected to be paid from investment income. Current practice for VCERA also adjusts for expected administrative expenses. In the prior experience studies, we have adjusted the gross real rate of return developed using the target asset allocation by the investment expenses expected to be paid by VCERA.

However, as prevailing practice by investment advisory firms is to provide us with the real rates of return net of expected investment expenses, especially for active portfolio management, we now need to make adjustments only for investment consulting fees, custodian fees and other miscellaneous investment expenses but excluding investment manager fees.

The following table provides these investment and administrative expenses in relation to the actuarial value of assets for the five years ending June 30, 2023.

Investment and Administrative Expenses as a Percentage of Actuarial Value of Assets *($ in '000s)*

Year Ending June 30	Actuarial Value of Assets[1]	Investment Expenses[2,3]	Administrative Expenses	Investment and Administrative Expenses
2018	$4,963,653	$1,184	$7,695	0.18%
2019	5,385,146	1,296	7,738	0.17%
2020	5,664,610	1,226	7,950	0.16%
2021	6,044,102	1,187	8,573	0.16%
2022	6,648,218	1,586	9,104	0.16%
2023	7,279,668	1,567	9,263	0.15%

Investment and Administrative Expenses Averages and Assumptions

Averaging Period and Assumption	Investment and Administrative Expenses
Three-year average (2021 – 2023)	0.16%
Six-year average (2018 – 2023)	0.16%
Current assumption (including investment management fees)	**0.50%**
Proposed assumption (excluding investment management fees)	**0.20%**

Based on the above experience, we recommend reducing the investment and administrative expense component of the investment return assumption from 0.50% to 0.20%.

Note related to investment expenses paid to active managers – As cited above, under Section 3.8.3.d of ASOP No. 27, the effect of an active investment management strategy should be considered "net of investment expenses…unless the actuary believes, based on relevant data, that such superior or inferior returns represent a reasonable expectation over the measurement period."

We have not performed a detailed analysis to measure how much of the investment expenses paid to active managers might have been offset by additional returns ("alpha") earned by that active management. For this study, we will continue to use the current approach that any "alpha" that may be identified would be treated as an increase in the risk adjustment and corresponding confidence level that are discussed in the next section. However, as discussed above, the real return assumptions provided by the investment advisory firms assume that active management will generate additional returns to cover the expense of such management, an assumption that is consistent with ASOP No. 27.

[1] As of beginning of plan year.
[2] Equals the sum of investment consulting fees, custodian fees and other miscellaneous investment expenses. Excludes investment manager fees.
[3] Net of securities lending expenses. Because we do not assume any additional net return for this program, we effectively assume that any securities lending expenses will be offset by related income.

Risk adjustment

The real rate of return assumption for the portfolio is adjusted to reflect the potential risk of shortfalls in the return assumptions. VCERA's asset allocation determines this portfolio risk, since risk levels are driven by the variability of returns for the various asset classes and the correlation of returns among those asset classes. This portfolio risk is incorporated into the real rate of return assumption through a risk adjustment.

The purpose of the risk adjustment (as measured by the corresponding confidence level) is to increase the likelihood of achieving the actuarial investment return assumption in the long term.[1] This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not.

The 6.48% expected real rate of return developed earlier in this report was based on expected arithmetic average returns. A retirement system using an expected arithmetic average return as the discount rate in a funding valuation is expected on average to have no surplus or asset shortfall relative to its expected obligations assuming all other actuarial assumptions are met in the future.[2] That is the basis used in Segal's previous experience studies for VCERA.

Beginning with this study, in addition to no longer including an explicit adjustment for investment management fees, we are converting the portfolio's expected arithmetic average return to an expected geometric average return. A retirement system using an expected geometric average return as the discount rate in a funding valuation will, over long periods of time, have an equal likelihood of having a surplus or asset shortfall relative to its expected obligations assuming all actuarial assumptions are met in the future.[3]

Under either the arithmetic or geometric model, the confidence level associated with a particular risk adjustment represents a relative likelihood that future investment earnings would equal or exceed the assumed earnings over a 15-year period. The 15-year time horizon represents an approximation of the "duration" of the fund's liabilities, where the duration of a liability represents the sensitivity of that liability to interest rate variations.

For comparison purposes we first consider how the earlier model would look if used in this year's study. Three years ago, the Board adopted an investment return assumption of 7.00%. Under the model used in that experience study, that return implied a risk adjustment of 1.06%, corresponding to a 15-year confidence level of 60%, based on an annual portfolio return standard deviation of 15.10% provided by NEPC in 2021.

If we use the same 60% 15-year confidence level from our last study to set this year's risk adjustment and the current annual portfolio return standard deviation of 15.93% provided by NEPC, the corresponding risk adjustment would be 1.12%. Together with the other investment return components (including for this comparison updated expected arithmetic average returns and the same expense adjustment as used in the prior study), this would result in an investment return assumption of 7.36%, which is higher than the current assumption of 7.00%.

Based on the general practice of using one-quarter percentage point increments for economic assumptions, we evaluated the effect on the confidence level of other alternative investment

[1] This type of risk adjustment is referred to in the Actuarial Standards of Practice as a "margin for adverse deviation."
[2] The mathematical terminology for this is that the mean (or average) surplus or asset shortfall is expected to be zero.
[3] The mathematical terminology for this is that over time the median surplus or asset shortfall is expected to be zero.

return assumptions. We also considered that, as discussed above, the increase in the real rates of return provided by the investment consultants may reflect the very low returns earned in the 2021-2022 plan year, as well as the increase in the federal funds rate during 2022, and so could be overly optimistic for use in selecting a long-term investment return assumption. For that reason, for this comparison value we evaluated a net investment return assumption of 6.75% which, together with the other investment return components, would produce a risk adjustment of 1.73% which corresponds to a confidence level of 66% under the model and expense adjustment used in prior studies. We believe this increase in confidence level is appropriate given the concerns stated. For comparison, the current net investment return assumption of 7.00% would have a confidence level of 64% under the model and expense adjustment used in prior studies.

As noted above, beginning with this study, in addition to no longer including an explicit adjustment for investment management fees, we are converting the portfolio's expected arithmetic average return to an expected geometric average return. For any given asset portfolio, the expected geometric average return will be less than expected arithmetic average return.[1] The difference depends on the variability of the portfolio as measured by its standard deviation. Based on the annual portfolio return standard deviation of 15.93% provided by NEPC, the adjustment to an expected geometric average return reduces the expected return by 1.17% to 5.31%. Because VCERA's target asset allocation exhibits a higher risk profile compared to the other California retirement systems that we evaluate using this risk model, this adjustment is larger than for other systems which we have applied the new model of using an expected geometric average return.

Together with the other investment return components (now excluding investment management expenses) and **prior to any risk adjustment**, this would result in a median expected assumption of 7.61%, which is higher than the current assumption of 7.00%. In applying this model to VCERA for the first time, we again evaluated a net investment return assumption of 6.75% which, together with the other investment return components, would produce a risk adjustment of 0.86%, which reflects a confidence level of 58%. For comparison, the current net investment return assumption of 7.00% would have a confidence level of 56% under this model.

Recommended investment return assumption

The following table summarizes the components of the recommended investment return assumption developed in the previous discussion. For comparison purposes, we have also included similar values from the last study as well as the comparison values discussed above that apply the prior year's model to this year's information.

[1] This is because the expected geometric average return reflects expected median outcomes, while the expected arithmetic average return reflects expected average or mean outcomes. Expected median outcomes are lower than expected average outcomes because they are less affected by the possibility of extraordinary ("outlier") favorable outcomes.

Assumption Component	June 30, 2024 Recommended Value	June 30, 2024 Comparison Values	June 30, 2021 Adopted Value
Inflation	2.50%	2.50%	2.50%
Portfolio expected arithmetic real rate of return	6.48%	6.48%	6.06%
Adjustment to expected geometric real rate of return	(1.17)%	N/A	N/A
Expense adjustment	(0.20)%	(0.50)%[1]	(0.50)%
Risk adjustment	(0.86)%	(1.73)%	(1.06)%
Total	**6.75%**	**6.75%**	**7.00%**
Confidence level	**58%**	**66%**	**60%**

Based on this analysis, we recommend that the investment return assumption be reduced from 7.00% to 6.75% per annum.

The table below shows VCERA's recommended investment return assumption and the corresponding risk adjustment and confidence level compared to the similar values for prior studies.

Historical Investment Return Assumptions, Risk Adjustments and Confidence Levels based on Assumptions Adopted by the Board

Years Ending June 30	Investment Return	Risk Adjustment	Corresponding Confidence Level
2003	8.00%	0.48%	57%
2004	8.00%	1.02%	64%
2005	8.00%	0.99%	64%
2006	8.00%	0.85%	61%
2007 - 2008	8.00%	0.82%	61%
2009 - 2011	8.00%	0.57%	57%
2012 - 2014	7.75%	0.41%	54%
2015 - 2017	7.50%	0.36%	54%
2018 - 2020	7.25%	0.61%	57%
2021 - 2023	7.00%	1.06%	60%
2024 (Comparison)	6.75%	1.73%	66%
2024 (Recommended)	6.75%	0.86%	58%

As we have discussed in prior experience studies, the risk adjustment model and associated confidence level is most useful as a means for comparing how VCERA has positioned itself

[1] For purposes of these comparison values, we have assumed the same investment expenses as in the previous study, which included investment management fees.

relative to risk over periods of time.[1] The use of either a 58% or 66% confidence level should be considered in context with other factors, including:

- As noted above, the confidence level is more of a relative measure than an absolute measure, and so can be reevaluated and reset for future comparisons. This is particularly true when comparing confidence levels developed using different models, as we are doing in this transitional year from one model to another.
- The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by NEPC. The standard deviation is a statistical measure of the future volatility of the portfolio and so is itself based on assumptions about future portfolio volatility and can be considered somewhat of a "soft" number.
- We have not taken into account any additional returns ("alpha") that might be earned on active management. This means that if active management generates enough alpha to cover its related expenses, this would increase returns. This aspect of Segal's model is further evaluated below.
- As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the later section on "Comparison with Other Public Retirement Systems."

Comparison with alternative model used to review investment return assumption

In previous studies, we have consistently reviewed investment return assumptions based on our model that incorporates expected arithmetic real returns for the different asset classes and for the entire portfolio as one component of that model.[2] The use of "forward looking expected arithmetic returns" is one of the approaches discussed for use in the Selection of Economic Assumptions for measuring Pension Obligations under Actuarial Standards of Practice (ASOP) No. 27.

Besides using forward looking expected arithmetic returns, ASOP No. 27 also discusses setting investment return assumptions using an alternative "forward looking expected geometric returns" approach, which is the model we have used in this study.[3] Even though as noted earlier expected geometric returns are lower than expected arithmetic returns, public retirement systems that have set investment return assumptions using this geometric approach have in practice adopted investment return assumptions that are comparable to those adopted by the Board for VCERA under the arithmetic approach. This is because under the model used by those retirement systems and by Segal in this report, the investment return assumption is **not** reduced to anticipate future investment management expenses. However, for VCERA, these two changes do not completely offset each other because the future investment management expenses are relatively low, while the standard deviation used to convert from an expected arithmetic return to a median geometric return is relatively high. That is why, as shown earlier,

[1] In particular, it would not be appropriate to use this type of risk adjustment as a measure of determining an investment return rate that is "risk-free."

[2] Again, as discussed earlier in this section, if a retirement system uses the expected arithmetic average return as the discount rate in the funding valuation, that retirement system is expected to have no surplus or asset shortfall relative to its expected obligations assuming all actuarial assumptions are met in the future.

[3] As also noted earlier in slightly different terms, if a retirement system uses the expected geometric average return as the discount rate in the funding valuation, that retirement system is expected to have an asset value that generally converges to the median accumulated value as the time horizon lengthens assuming all actuarial assumptions are met in the future.

the same 6.75% assumption does not have comparable confidence levels under the two models (comparison values and recommended value).

In the interest of still having an alternative model for comparison, we evaluated the recommended 6.75% assumption based on the expected geometric return for the entire portfolio gross of investment management expenses, but using a fully stochastic approach and a different source for capital market assumptions. Under this alternative model, over a 15-year period, there is a 57% likelihood that future average geometric returns will meet or exceed 6.75%[1] developed using the capital market assumptions compiled by Horizon Actuarial Services based their most recent survey published in August 2023. This 57% likelihood of achieving a 6.75% return is lower than the corresponding likelihood of 62% (for achieving a 7.00% return) that we observed in this comparison during the assumption review in 2021.

Comparing with other public retirement systems

One final test of the recommended investment return assumption is to compare it against those used by other public retirement systems, both in California and nationwide.

We note that an investment return of 6.75% or lower is becoming more common among California public sector retirement systems. Of the twenty 1937 Act CERL systems, seven use a 7.00% investment return assumption, eight use 6.75%, three use 6.50%, and one uses 6.25%. The remaining 1937 Act CERL system currently uses a 7.25% investment return assumption. Furthermore, CalSTRS currently uses a 7.00% investment return assumption and CalPERS uses a 6.80% investment return assumption, while the San Jose and San Diego City retirement systems use investment return assumptions of 6.625% and 6.50%, respectively.

The following table compares VCERA's recommended net investment return assumption against those of the 220 large public retirement funds in their 2022 fiscal year valuations based on information found in the Public Plans Database, which is produced in partnership with NASRA:[2]

VCERA's Investment Return vs. Public Plans Database[3] Investment Return Assumptions

Assumption	VCERA	Public Plan Data Low	Public Plan Data Median	Public Plan Data High
Net investment return	6.75%	5.32%	7.00%	8.25%

The detailed survey results show that over 80% of the systems have an investment return assumption in the range of 6.75% to 7.50%. Also, over half of the systems have reduced their investment return assumption from 2017 to 2022. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

[1] We performed this stochastic simulation using the capital market assumptions included in the 2023 survey prepared by Horizon Actuarial Services. That simulation was performed using 10,000 trial outcomes of future market returns, using assumptions from 20-year arithmetic returns, standard deviations and correlation matrix that were found in the 2023 survey that included responses from 42 investment advisors.

[2] Among 227 large public retirement funds, the 2022 fiscal year investment return assumption was not available for 7 of the public retirement funds in the Public Plans Database as of March 2024.

[3] Public Plans Data website – Produced in partnership with the National Association of State Retirement Administrators (NASRA).

C. Salary increase

Salary increases impact plan costs in two ways:

1. Increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and
2. Increasing total active member payroll which in turn generates lower UAAL contribution rates as a percent of payroll.

These two impacts are discussed separately below.

As an employee progresses through his or her career, increases in pay are expected to come from three sources:

1. **Inflation:** Unless pay grows at least as fast as consumer prices grow, employees will experience a reduction in their standard of living. There may be times when pay increases lag or exceed inflation, but over the long term, labor market forces may require an employer to maintain its employees' standards of living.

   As discussed earlier in this report, we recommend maintaining the annual inflation assumption at 2.50%. This inflation component is used as part of the salary increase assumption.

2. **Real "across the board" pay increases:** These increases are typically termed productivity increases since they are considered to be derived from the ability of an organization or an economy to produce goods and services in a more efficient manner. As that occurs, at least some portion of the value of these improvements can provide a source for pay increases. These increases are typically assumed to extend to all employees "across the board". The State and Local Government Workers Employment Cost Index produced by the Department of Labor provides evidence that real "across the board" pay increases have averaged about 0.0% – 0.3% annually during the last ten to twenty years.

   We also referred to the annual report on the financial status of the Social Security program published in May 2024. In that report, real "across the board" pay increases are forecast to be 1.14% per year under the intermediate assumptions.

   The real pay increase assumption is generally considered a more "macroeconomic" assumption that is not necessarily based on individual plan experience. However, recent salary experience with public systems in California as well as anecdotal discussions with plans and plan sponsors indicate lower future real wage growth expectations for public sector employees. We note that for VCERA's active members, the actual average inflation plus "across the board" increase (i.e., wage inflation) over the three-year period ending June 30, 2023 was 2.63%, which is lower than the change in CPI of 4.32% during that same period, largely as a result of the inflation spike discussed above.

Valuation Date	Actual Average Increase[1]	Actual Annual-to-Annual Change in CPI[2]
June 30, 2021	3.73%	1.45%
June 30, 2022	-0.12%	6.57%
June 30, 2023	4.26%	4.93%
Three-year average	**2.63%**	**4.32%**

Based on all of the above information, we recommend maintaining the real "across the board" salary increase assumption at 0.50%. This means that the combined inflation and "across the board" salary increase assumption will remain at 3.00%.

3. **Merit and promotion increases:** As the name implies, these increases come from an employee's career advances. This form of pay increase differs from the previous two, since it is specific to the individual. For VCERA, there are service-specific merit and promotion increase assumptions.

   The annual merit and promotion increases are determined by measuring the actual increases received by members over the experience period, net of the inflationary and real "across the board" pay increases. This is accomplished by:

   a. Measuring each continuing member's actual salary increase over each year of the experience period on a salary-weighted basis, with higher weights assigned to experience from members with larger salaries;
   b. Excluding any members with increases of more than 50% or decreases of more than 10% during any particular year;
   c. Categorizing these increases into groups by years of service;
   d. Removing the wage inflation component from these increases (assumed to be equal to the increase in the members' average salary during the year);
   e. Averaging these annual increases over the experience period; and
   f. Modifying current assumptions to reflect some portion of these measured increases reflective of their "credibility."

   To be consistent with the other economic assumptions, these merit and promotion assumptions should be used in combination with the total 3.00% assumed inflation and real "across the board" increases recommended in this study.

   Merit and promotion increases are measured separately for General and Safety members. Note that beginning with this experience study, we are also recommending separate merit and promotion increase assumptions for non-PEPRA and PEPRA members.

   Due to the high variability of the actual salary increases, we have analyzed this assumption using data for the past six years. We believe that when the experience from the current and prior studies is combined, it provides a more reasonable representation of potential future merit and promotion salary increases over the long term.

   The following table shows the non-PEPRA General members' actual average merit and promotion increases by years of service over the three-year period from July 1, 2020

[1] Reflects the increase in average salary for members at the beginning of the year versus those at the end of the year. It does not reflect the average salary increases received by members who worked the full year.

[2] Based on the change in the December CPI index prior to the valuation date for the Los Angeles-Long Beach-Anaheim Area compared to the December CPI index two years priors to the valuation date.

through June 30, 2023 along with the actual average increases based on combining the current three-year period for non-PEPRA and PEPRA members combined with the three-year period from the prior experience study for non-PEPRA and PEPRA members combined. The current and proposed assumptions are also shown. The actual increases were reduced by the actual average inflation plus "across the board" increase (i.e., wage inflation, estimated as the increase in average salaries) for each year during the experience period (2.73% on average for the most recent three-year period).

Non-PEPRA General—Merit and Promotion Salary Increase Rates (%)

Years of Service	Current Assumption	Actual Average Increase (Last 3 Years, non-PEPRA)	Actual Average Increase (Last 6 Years, PEPRA and non-PEPRA)	Proposed Assumption
Less than 1	7.00	7.28	6.60	7.00
1 – 2	5.25	6.20	5.85	5.25
2 – 3	4.00	2.89	5.03	4.00
3 – 4	3.50	5.29	4.42	3.50
4 – 5	3.00	4.63	4.14	3.00
5 – 6	2.75	3.87	4.31	2.75
6 – 7	2.50	4.37	4.05	2.50
7 – 8	2.25	3.44	3.85	2.40
8 – 9	2.00	3.87	3.40	2.30
9 – 10	1.75	3.32	3.01	2.15
10 – 11	1.50	3.90	3.11	2.00
11 – 12	1.40	3.26	2.62	1.90
12 – 13	1.30	3.03	2.57	1.80
13 – 14	1.20	2.87	2.54	1.70
14 – 15	1.10	2.46	2.23	1.60
15 – 16	1.00	2.48	2.24	1.50
16 – 17	0.95	2.94	2.30	1.40
17 – 18	0.90	2.81	2.18	1.30
18 – 19	0.85	2.22	1.94	1.20
19 – 20	0.80	2.42	1.92	1.10
20 and over	0.75	1.74	1.58	1.00

We are not recommending changes to the merit and promotional salary increases for non-PEPRA General members for years of service less than seven. This is because at those durations relatively limited experience is available for non-PEPRA General members, because most of the members with fewer than seven years of service are PEPRA members.

The following table shows the PEPRA General members' actual average merit and promotion increases by years of service over the three-year period from July 1, 2020 through June 30, 2023 along with the actual average increases based on combining the current three-year period for non-PEPRA and PEPRA members combined with the three-year period from the prior experience study for non-PEPRA and PEPRA members

combined. The current and proposed assumptions are also shown. The actual increases were reduced by the actual average inflation plus "across the board" increase (i.e., wage inflation, estimated as the increase in average salaries) for each year during the experience period (2.73% on average for the most recent three-year period).

PEPRA General—Merit and Promotion Salary Increase Rates (%)

Years of Service	Current Assumption	Actual Average Increase (Last 3 Years, PEPRA)	Actual Average Increase (Last 6 Years, PEPRA and non-PEPRA)	Proposed Assumption
Less than 1	7.00	7.04	6.60	7.00
1 – 2	5.25	7.20	5.85	5.50
2 – 3	4.00	6.38	5.03	4.50
3 – 4	3.50	5.71	4.42	4.00
4 – 5	3.00	5.02	4.14	3.50
5 – 6	2.75	4.91	4.31	3.25
6 – 7	2.50	4.76	4.05	3.00
7 – 8	2.25	4.74	3.85	2.75
8 – 9	2.00	4.11	3.40	2.50
9 – 10	1.75	3.76	3.01	2.25
10 – 11	1.50	N/A	3.11	2.00
11 – 12	1.40	33.57	2.62	1.90
12 – 13	1.30	N/A	2.57	1.80
13 – 14	1.20	N/A	2.54	1.70
14 – 15	1.10	N/A	2.23	1.60
15 – 16	1.00	31.56	2.24	1.50
16 – 17	0.95	N/A	2.30	1.40
17 – 18	0.90	41.84	2.18	1.30
18 – 19	0.85	N/A	1.94	1.20
19 – 20	0.80	N/A	1.92	1.10
20 and over	0.75	N/A	1.58	1.00

We are recommending setting the merit and promotional salary increases for PEPRA General members for years of service greater than ten equal to the recommended increases for non-PEPRA General members. This is because at those durations relatively limited experience is available for PEPRA General members, because most of the members with more than ten years of service are non-PEPRA members.

The following table shows the non-PEPRA Safety members' actual average merit and promotion increases by years of service over the three-year period from July 1, 2020 through June 30, 2023 along with the actual average increases based on combining the current three-year period for non-PEPRA and PEPRA members combined with the three-year period from the prior experience study for non-PEPRA and PEPRA members combined. The actual increases were reduced by the actual average inflation plus "across the board" increase (i.e., wage inflation, estimated as the increase in average salaries) for

each year during the experience period (3.10% on average for the most recent three-year period).

Non-PEPRA Safety—Merit and Promotion Salary Increase Rates (%)

Years of Service	Current Assumption	Actual Average Increase (Last 3 Years, non-PEPRA)	Actual Average Increase (Last 6 Years, PEPRA and non-PEPRA)	Proposed Assumption
Less than 1	9.00	5.97	10.15	9.00
1 – 2	6.25	6.60	5.71	6.25
2 – 3	4.75	2.51	4.85	4.75
3 – 4	4.50	0.85	5.57	4.50
4 – 5	4.25	8.25	6.61	4.25
5 – 6	4.00	6.51	4.79	4.00
6 – 7	2.75	0.49	2.99	2.75
7 – 8	1.75	3.94	2.45	2.25
8 – 9	1.50	3.09	2.87	2.00
9 – 10	1.25	3.38	2.74	1.75
10 – 11	1.20	1.50	2.00	1.70
11 – 12	1.15	3.96	2.74	1.60
12 – 13	1.10	2.05	2.14	1.50
13 – 14	1.05	3.48	2.78	1.40
14 – 15	1.00	2.69	2.30	1.30
15 – 16	1.00	4.05	3.17	1.25
16 – 17	1.00	4.12	3.00	1.25
17 – 18	1.00	3.55	2.78	1.25
18 – 19	1.00	3.65	2.94	1.25
19 – 20	1.00	2.56	2.38	1.25
20 and over	1.00	3.07	2.63	1.25

We are not recommending changes to the merit and promotional salary increases for non-PEPRA Safety members for years of service less than seven. This is because at those durations relatively limited experience is available for non-PEPRA Safety members, because most of the members with fewer than seven years of service are PEPRA members.

The following table shows the PEPRA Safety members' actual average merit and promotion increases by years of service over the three-year period from July 1, 2020 through June 30, 2023 along with the actual average increases based on combining the current three-year period for non-PEPRA and PEPRA members combined with the three-year period from the prior experience study for non-PEPRA and PEPRA members combined. The actual increases were reduced by the actual average inflation plus "across the board" increase (i.e., wage inflation, estimated as the increase in average salaries) for each year during the experience period (3.10% on average for the most recent three-year period).

PEPRA Safety—Merit and Promotion Salary Increase Rates (%)

Years of Service	Current Assumption	Actual Average Increase (Last 3 Years, PEPRA)	Actual Average Increase (Last 6 Years, PEPRA and non-PEPRA)	Proposed Assumption
Less than 1	9.00	8.78	10.15	9.00
1 – 2	6.25	6.40	5.71	6.25
2 – 3	4.75	5.54	4.85	5.00
3 – 4	4.50	5.31	5.57	4.75
4 – 5	4.25	6.93	6.61	4.50
5 – 6	4.00	4.93	4.79	4.25
6 – 7	2.75	3.01	2.99	3.00
7 – 8	1.75	2.47	2.45	2.25
8 – 9	1.50	3.68	2.87	2.00
9 – 10	1.25	7.60	2.74	1.75
10 – 11	1.20	N/A	2.00	1.70
11 – 12	1.15	N/A	2.74	1.60
12 – 13	1.10	N/A	2.14	1.50
13 – 14	1.05	N/A	2.78	1.40
14 – 15	1.00	N/A	2.30	1.30
15 – 16	1.00	N/A	3.17	1.25
16 – 17	1.00	N/A	3.00	1.25
17 – 18	1.00	N/A	2.78	1.25
18 – 19	1.00	N/A	2.94	1.25
19 – 20	1.00	N/A	2.38	1.25
20 and over	1.00	N/A	2.63	1.25

We are recommending setting the merit and promotional salary increases for PEPRA Safety members for years of service greater than ten equal to the recommended increases for non-PEPRA Safety members. This is because at those durations relatively limited experience is available for PEPRA Safety members, because most of the members with more than ten years of service are non-PEPRA members.

Based on this experience, we are proposing increases in the merit and promotion salary increases for non-PEPRA General and non-PEPRA Safety members in all service categories greater than seven. We are also proposing increases in the merit and promotion salary increases for PEPRA General and PEPRA Safety members in most service categories.

Chart 1 and Chart 2 that follow later in the section compare the actual merit and promotion increase experience with the current and proposed assumptions for non-PEPRA General and PEPRA General members, respectively.

Chart 3 and Chart 4 that follow later in the section compare the actual merit and promotion increase experience with the current and proposed assumptions for non-PEPRA Safety and PEPRA Safety members, respectively.

Active member payroll

Projected active member payrolls are used to develop the UAAL contribution rate. Future values are determined as a product of the number of employees in the workforce and the average pay for all employees. The average pay for all employees increases only by inflation and real "across the board" pay increases. The merit and promotion increases are not an influence, because this average pay is not specific to an individual.

Under the Board's current practice, the UAAL contribution rate is developed by assuming that the number of active members will remain the same, so that the total payroll for all active members will increase annually over the amortization periods at the same assumed rates of inflation plus real "across the board" salary increase assumptions as are used to project the members' future benefits. Note this does not include the assumed merit and promotion increases, because longer service members are assumed to be replaced by shorter service members.

As part of reviewing the current practice, we have gone back to the prior valuations and summarized in the table below how the number of active members and their total payrolls have changed during the June 30, 2018 through June 30, 2023 valuations.

Active Members and Total Payroll

Year Ending June 30	Number of Active Members	Total Payroll ($ in '000s)
2018	8,611	$760,815
2019	8,696	785,402
2020	8,644	803,382
2021	8,491	817,636
2022	9,077	873,043
2023	9,384	941,042
Average Compounded Annual Rate of Increase	**1.73%**	**4.34%**

As can be observed from the above table, the average annual rate of increase in the payroll during the above period was 4.34% before accounting for the 1.73% growth in the active workforce (and 2.58% after netting out the impact due to the growth in the active workforce). We note that the average annual rate of increase in the payroll is also affected by the number of PEPRA members who have reached the limit on pensionable compensation imposed by PEPRA. This is because everything else being equal, after those members reached the pensionable compensation limit, their salaries as applied in the computation of the total payroll would only increase by inflation (and not across the board salary increase). However, in the case of VCERA, the proportion of members who have reached the limit was relatively small (less than 3% as of June 30, 2023).

After considering the above factors and experience, consistent with the combined recommended inflation and real "across the board" salary increase assumptions, we recommend maintaining the payroll growth assumption at 3.00% annually.

Chart 1: Merit and Promotion Salary Increase Rates
Non-PEPRA General Member

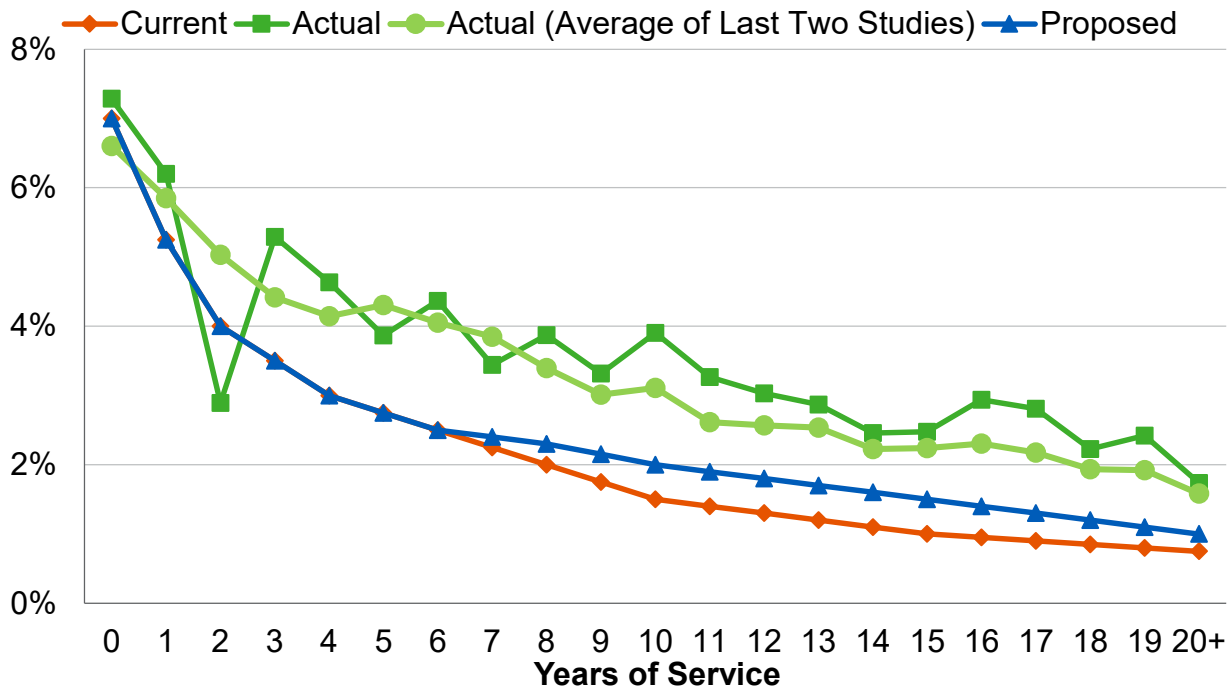


Chart 2: Merit and Promotion Salary Increase Rates
PEPRA General Member

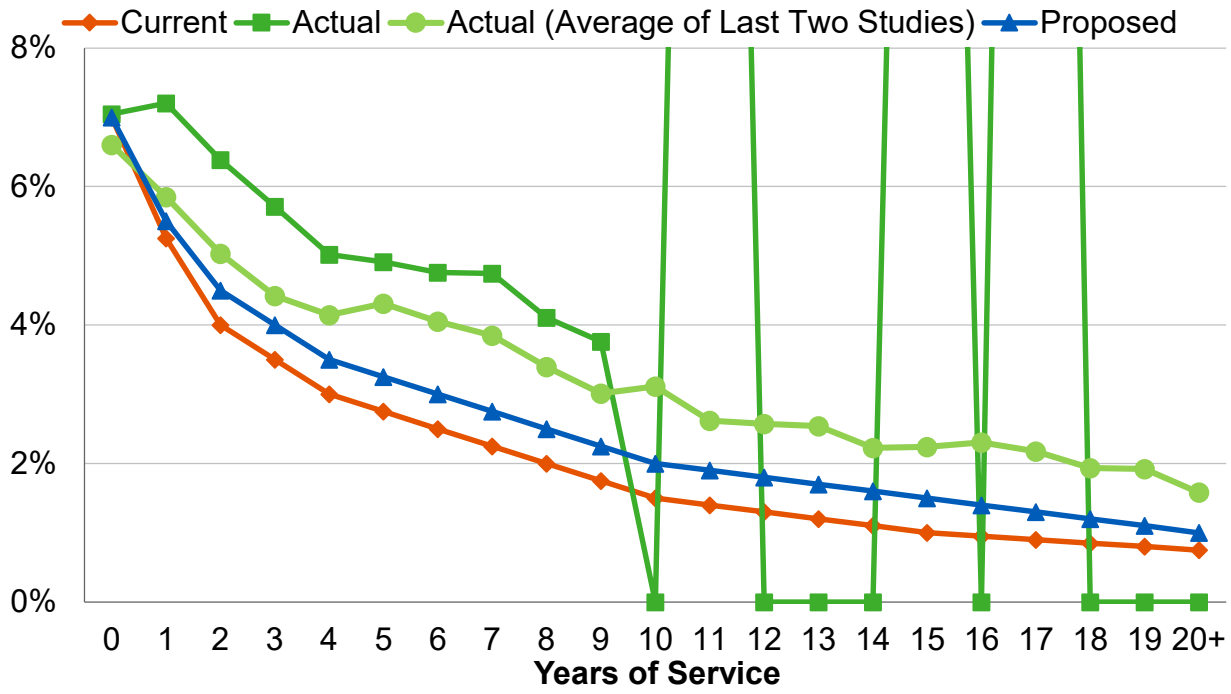


Chart 3: Merit and Promotion Salary Increase Rates
Non-PEPRA Safety Members

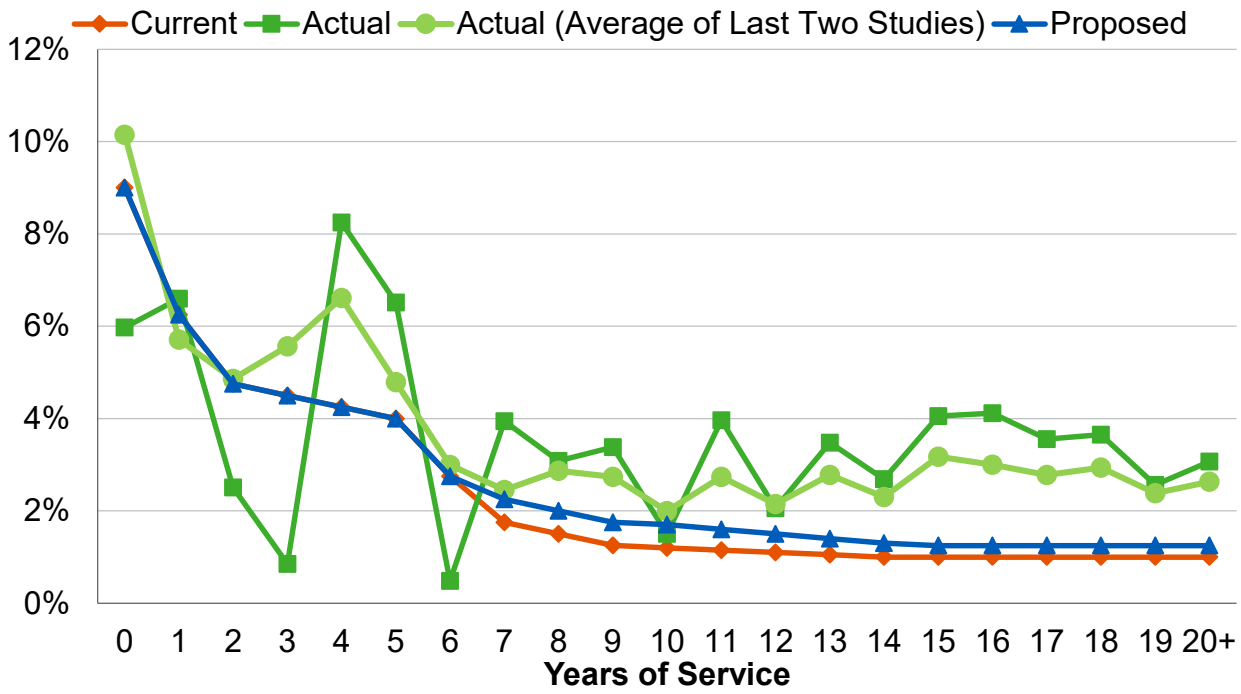
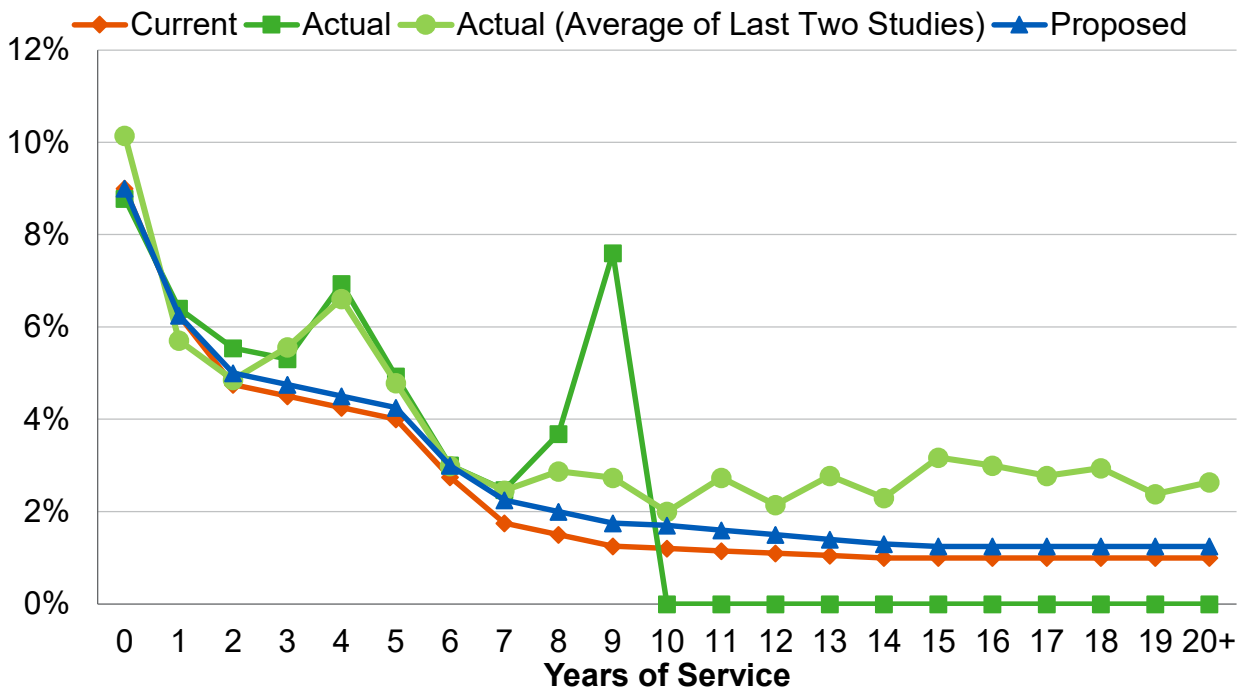


Chart 4: Merit and Promotion Salary Increase Rates
PEPRA Safety Members



Section 4: Demographic Assumptions

A. Mortality rates - healthy

The "healthy" mortality rates project the life expectancy of a member who retires from service (i.e., who did not retire on a disability pension). Also, the "healthy" pre-retirement (employee) mortality rates project what proportion of members will die before retirement.

The Public Retirement Plans Mortality tables (Pub-2010) were published by the Retirement Plans Experience Committee (RPEC) of the SOA in 2019. These were the first published mortality tables based exclusively on public sector pension plan experience in the United States. Within the Pub-2010 family of mortality tables, there are separate tables by job categories of General, Safety and Teachers. Included with the mortality tables is the analysis prepared by RPEC that continues to observe that benefit amount for healthy retirees and salary for employees are the most significant predictors of mortality differences within the job categories. Therefore, Pub-2010 includes mortality rates developed on an "amount weighted" basis, with higher credibility assigned to experience from annuitants and employees receiving larger benefits and salaries, respectively.

A generational mortality table provides dynamic projections of mortality experience for each cohort of retirees. For example, the mortality rate for someone who is 65 next year will be slightly less than for someone who is 65 this year. In general, using generational mortality anticipates increases in the cost of the plan over time as participants' life expectancies are projected to increase and is now the established practice within the actuarial profession.

Periodically[1] RPEC publishes updates to their mortality improvement scales. The two-dimensional mortality improvement scale MP-2021 is the latest improvement scale available as of the date of this report.

We continue to recommend using the "amount weighted" above-median version of the Pub-2010 mortality tables (adjusted for VCERA experience as discussed herein).

We also continue to recommend that the mortality improvement scale be adopted and applied generationally where each future year has its own mortality table that reflects the forecasted improvements. We recommend that the MP-2021 mortality improvement scale be used.

In order to reflect more VCERA experience in our analysis of the mortality assumption, we have used experience over a fourteen-year period by using data from the current experience study period (from July 1, 2020 through June 30, 2023 and the last four experience study periods

[1] We understand that RPEC generally publishes an update to their mortality improvement scale annually based on the newest mortality data available. However, the mortality data observed during 2020 (which would have been the newest data available to develop a mortality improvement scale for 2022) was severely impacted by the COVID-19 pandemic and RPEC elected to not release a new mortality improvement scale for 2022 that would have incorporated the substantially higher rate of mortality experience from 2020. Therefore, the MP-2021 remains the most recent mortality improvement scale published.

(from July 1, 2017 through June 30, 2020; from July 1, 2014 through June 30, 2017; from July 1, 2011 through June 30, 2014; and from July 1, 2008 through June 30, 2011). Based on our analysis of the July 1, 2020 through June 30, 2021 data, we decided to not include it in the mortality analysis, because it appears the data was severely impacted by COVID and showed substantially higher rates of population mortality experience during this one-year period.

In 2008 the SOA published an article recommending that mortality assumptions include an adjustment for credibility. Under this approach, the number of deaths needed for full credibility for a headcount-weighted mortality table is just over 1,000,[1] where full credibility means a 90% confidence that the actual experience will be within 5% of the expected value. In our recommended assumptions, we have adjusted the Pub-2010 mortality tables to fit VCERA's experience based on the partial credibility for the given retiree group.

Post-retirement mortality (service retirements)

The current mortality tables used for post-retirement mortality are as follows:

- **General members:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2020.
- **Safety members:** Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020.

The following table shows the observed benefit weighted deaths for heathy retired members based on the actual experience during the fourteen years studied. Also shown are the expected benefit weighted deaths under the current and proposed assumptions. This information is shown separately by gender. As shown in the table below, the proposed mortality tables have an actual to expected ratio of 100% and 90% for General and Safety, respectively, after adjustments for partial credibility. In future years the ratios should remain around 100% and 90% for General and Safety, respectively, as long as actual mortality improves at the same rates as anticipated by the generational mortality tables.

As discussed, we continue to recommend the use of a generational mortality table, which incorporates a more explicit assumption for future mortality improvement. Accordingly, the goal is to start with a mortality table that closely matches the current experience (without a margin for future mortality improvement), and then reflect mortality improvement by projecting lower mortality rates in future years.

[1] The number of deaths needed for full credibility for an "amount" weighted mortality table is generally higher and based on the dispersion of the benefit amount for a given retiree group.

Healthy Retiree Mortality Experience – Benefit Weighted

($ in millions)

Gender	General Current Expected Weighted Deaths	General Actual Weighted Deaths	General Proposed Expected Weighted Deaths	Safety Current Expected Weighted Deaths	Safety Actual Weighted Deaths	Safety Proposed Expected Weighted Deaths
Male	$18.69	$18.38	$18.63	$10.42	$8.96	$9.86
Female	15.08	15.33	15.01	0.55	0.41	0.54
Total	**$33.77**	**$33.71**	**$33.64**	**$10.97**	**$9.37**	**$10.41**
Actual / Expected	**100%**		**100%**[1]	**85%**		**90%**[2]

Notes:

1. Experience shown above is weighted by annual benefit amounts for deceased members.
2. Expected amounts under the current and proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the year the death occurred (or was expected to occur).
3. Results may not add due to rounding.

Based on standard statistical theory, the data used in our analysis is only partially credible under the recommended "amount-weighted" basis when dispersion of retirees' benefit amounts is considered, particularly for the Safety cost groups. Therefore, the proposed mortality tables reflect only a partial adjustment for actual VCERA experience. In future experience studies, more data will be available which may further increase the credibility of the VCERA experience.

We recommend updating the mortality tables used for post-retirement mortality to the following:

- **General members:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **Safety members:** Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates decreased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Chart 5 compares the number of actual to expected deaths on an amount-weighted basis for General service retirement members over the fourteen-year period for the current and proposed assumptions.

Chart 6 compares the number of actual to expected deaths on an amount-weighted basis for Safety service retirement members over the fourteen-year period for the current and proposed assumptions.

[1] If we use the benchmark Pub-2010 General table without any adjustment, the proposed actual to expected ratio would be 102%.
[2] If we use the benchmark Pub-2010 Safety table without any adjustment, the proposed actual to expected ratio would be 86%.

Chart 7 shows the life expectancies (i.e., expected future lifetime) under the current and proposed tables for General service retirement members on an amount-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age as of 2023. In practice, assumed life expectancies will increase in accordance with the mortality improvement scale.

Chart 8 shows the life expectancies (i.e., expected future lifetime) under the current and proposed tables for Safety service retirement members on an amount-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age as of 2023. In practice, assumed life expectancies will increase in accordance with the mortality improvement scale.

Beneficiary Mortality

The current mortality table used for beneficiary mortality is as follows:

- **All beneficiaries:** Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2020.

In studying the mortality for the beneficiaries in our prior and the current studies, we reviewed the actual deaths compared to the expected deaths and recommended using the Pub-2010 Contingent Survivor mortality tables for the beneficiaries. The Pub-2010 Contingent Survivor mortality tables are developed based only on beneficiary data **after** the death of the member. This is consistent with the mortality experience that we have available for beneficiaries. The Pub-2010 Contingent Survivor mortality rates are comparable to VCERA's actual mortality experience for beneficiaries.

The following table shows the observed benefit weighted deaths for beneficiaries based on the actual experience during the fourteen years studied. Also shown are the expected benefit weighted deaths under the current and proposed assumptions. This information is shown separately by gender. As shown in the table below, the proposed mortality table has an actual to expected ratio of 114% after adjustments for partial credibility. In future years the ratio should remain around 114% as long as actual mortality improves at the same rates as anticipated by the generational mortality tables.

Beneficiary Mortality Experience – Benefit Weighted
($ in millions)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$1.45	$1.84	$1.52
Female	7.01	7.50	6.67
Total	**$8.46**	**$9.34**	**$8.19**
Actual / Expected	**110%**		**114%[1]**

Notes:

1. Experience shown above is weighted by annual benefit amounts for deceased beneficiaries.
2. Expected amounts under the current and proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the year the death occurred (or was expected to occur).
3. Results may not add due to rounding.

The proposed mortality table reflects current experience to the extent that the experience is credible based on standard statistical theory. For VCERA, there is less data available for beneficiaries, so it is given little credibility and the proposed tables are only slightly adjusted.

We recommend updating the mortality table used for beneficiary mortality to the following:

- **Not in pay status at the valuation:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **In pay status at the valuation:** Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

As noted above, we have continued to recommend the Pub-2010 Contingent Survivor mortality tables (with higher mortality rates) for beneficiaries **after** the death of the member, but the General Healthy Retirees tables (with lower mortality rates) for beneficiaries **before** the death of the member.

For the purposes of the actuarial valuations (for funding and financial reporting), when calculating the liability for the continuance to a beneficiary of a surviving member, we recommend that the General Healthy Retiree mortality tables be used for beneficiary mortality both before and after the expected death of the member unadjusted for males and increased by

[1] If we used the benchmark Pub-2010 Contingent Survivor table without any adjustment, the proposed actual to expected ratio would be 120%.

5% females. Upon the actual death of the member (i.e., for all beneficiaries in pay status as of the valuation date), we recommend for the purposes of the actuarial valuations that we use the Contingent Survivor mortality tables increased by 5% for males and females. We note that the use of different mortality tables (before and after the death of the member) has been found by the RPEC to be reasonable.

Pre-retirement mortality

The current mortality tables used for pre-retirement mortality are as follows:

- **General members:** Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020.
- **Safety members:** Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020.

The table below shows the observed salary weighted deaths for active based on the actual experience during the fourteen years studied. Also shown are the expected salary weighted deaths under the current and proposed assumptions. This information is shown separately by gender. As shown in the table below, the proposed mortality tables have an actual to expected ratio of 129% and 123% for General and Safety, respectively, after adjustments for partial credibility. In future years the ratios should remain around 129% and 123% for General and Safety, respectively, as long as actual mortality improves at the same rates as anticipated by the generational mortality tables.

Pre-Retirement Mortality Experience – Salary Weighted
($ in millions)

Gender	General Current Expected Weighted Deaths	General Actual Weighted Deaths	General Proposed Expected Weighted Deaths	Safety Current Expected Weighted Deaths	Safety Actual Weighted Deaths	Safety Proposed Expected Weighted Deaths
Male	$48.74	$65.26	$48.67	$19.61	$20.92	$19.58
Female	48.00	59.52	47.75	2.48	6.16	2.46
Total	**$96.74**	**$124.78**	**$96.42**	**$22.08**	**$27.08**	**$22.04**
Actual / Expected	**129%**		**129%**	**123%**		**123%**

Notes:

1. Experience shown above is weighted by annual salary for deceased members.
2. Expected amounts under the current and proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the year the death occurred (or was expected to occur).
3. Results may not add due to rounding.

The proposed mortality tables reflect current experience to the extent that the experience is credible based on standard statistical theory. For VCERA, there is less data available for actives, so it is given little credibility and the proposed tables are only slightly adjusted.

We recommend updating the mortality tables used for pre-retirement mortality to the following:

- **General members:** Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **Safety members:** Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

Currently, our assumption is that all General and Safety member pre-retirement deaths are non-service connected (ordinary). Based on the actual experience during the last three years of 37 total deaths, there were none due to service-connected (duty) causes. Therefore, we recommend maintaining the current assumption for both General and Safety members.

Mortality table for member contributions, optional forms of payment and reserves

There are administrative reasons why a generational mortality table is more difficult to implement for determining member contributions for the legacy tiers (i.e., non-PEPRA), optional forms of payment and reserves. For determining member contributions, one emerging practice is to approximate the use of a generational mortality table by the use of a static table with projection of the mortality improvement from the measurement year over a period that is close to the duration of the benefit payments for active members. We would recommend the use of this approximation for determining member contributions for employees in the legacy tiers.

We recommend updating the mortality tables used for determining contributions to the following:

- **General members:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected 30 years (from 2010) with the two-dimensional mortality improvement scale MP-2021, weighted 30% male and 70% female.
- **Safety members:** Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates decreased by 5% for males, projected 30 years (from 2010) with the two-dimensional mortality improvement scale MP-2021, weighted 80% male and 20% female.

For optional forms of payment and reserves, there are some administrative issues that we may need to resolve with VCERA and its vendor maintaining the pension administration software before we would recommend a comparable generational scale to anticipate future mortality improvement. We will provide a recommendation to VCERA for use in reflecting mortality improvement for determining optional forms of payment after we have those discussions with VCERA and its vendor.

Chart 5: Post-Retirement Benefit-Weighted Deaths ($ in millions)

Service Retired General Members (July 1, 2008 through June 30, 2023)[1]

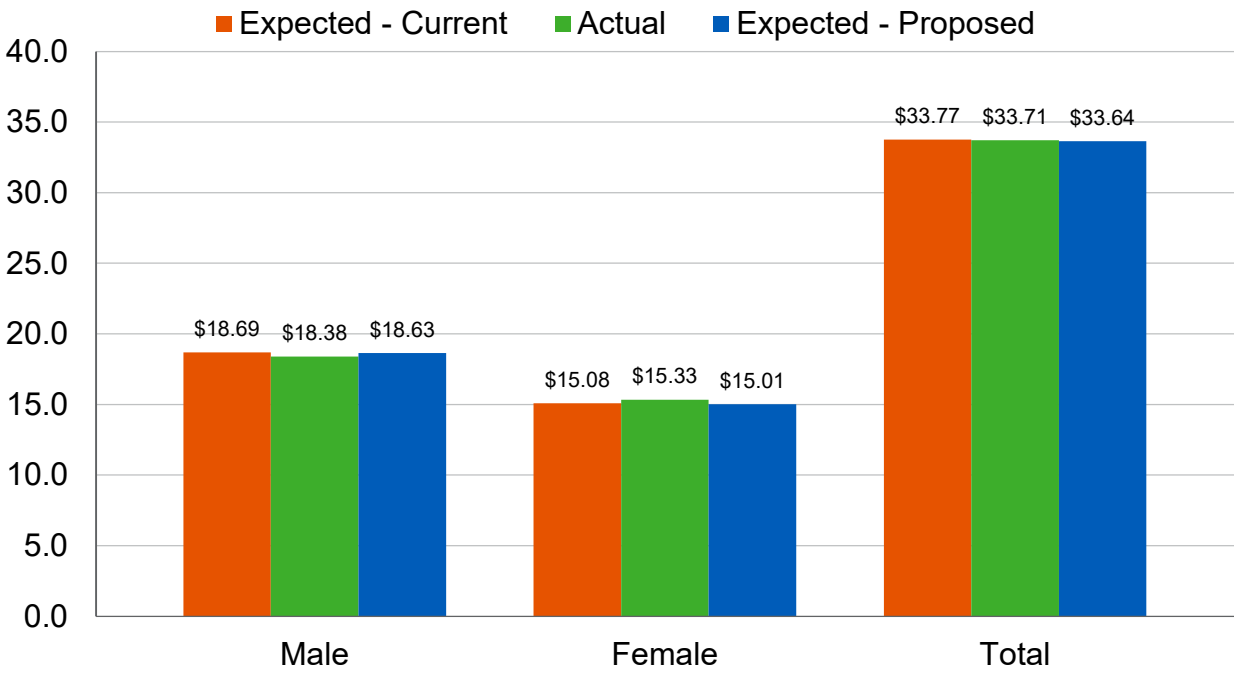
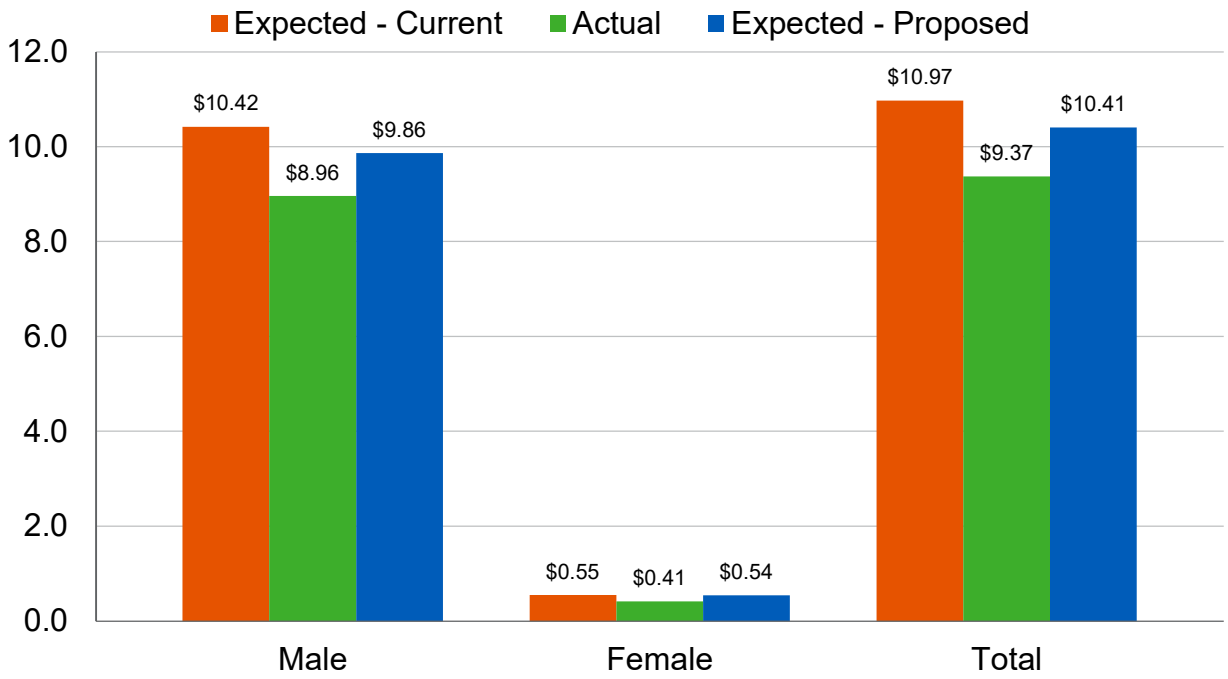


Chart 6: Post-Retirement Benefit-Weighted Deaths ($ in millions)

Service Retired Safety Members (July 1, 2008 through June 30, 2023)[1]



[1] Excludes July 1, 2020 through June 30, 2021.

Chart 7: Benefit-Weighted Life Expectancies
Service Retired General Members

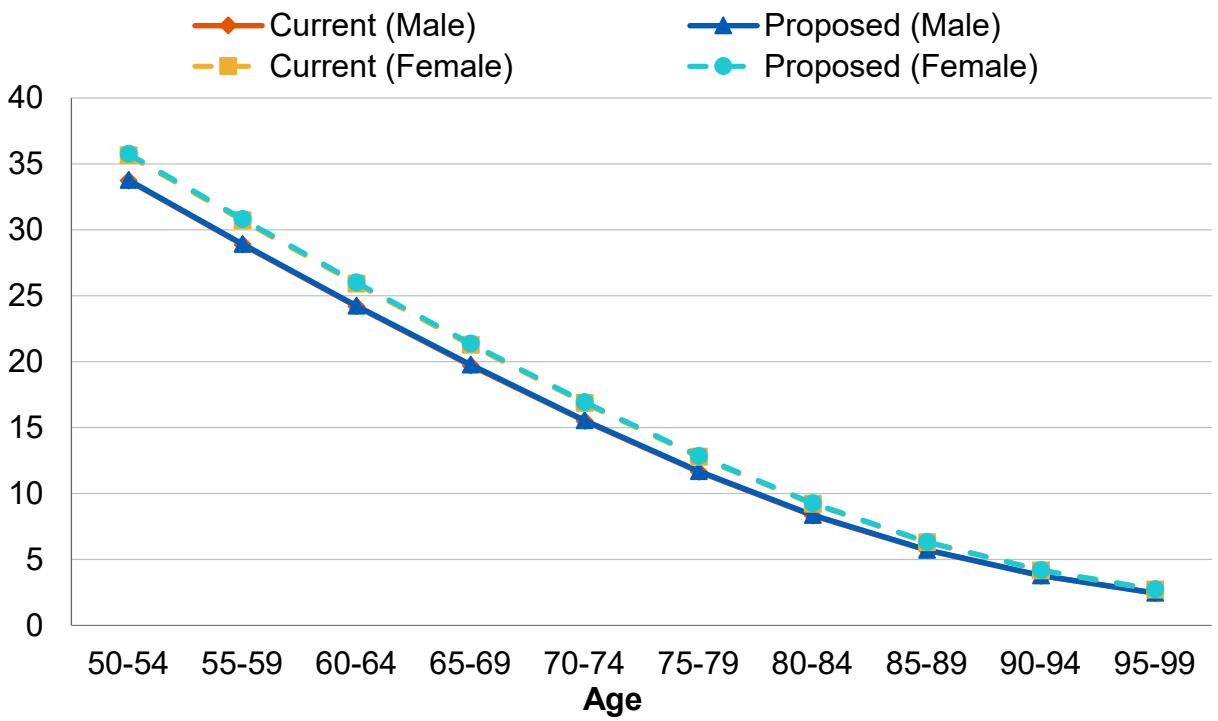
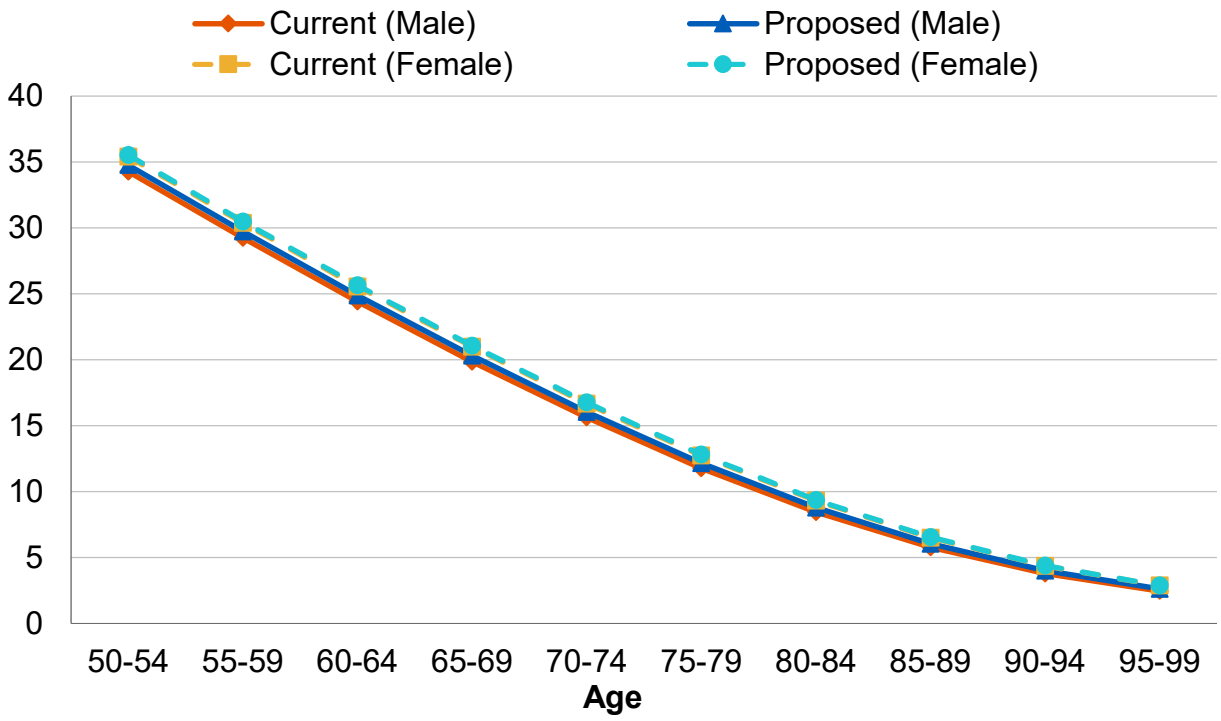


Chart 8: Benefit-Weighted Life Expectancies
Service Retired Safety Members



B. Mortality rates - disabled

Since mortality rates for disabled members can vary from those of healthy members, a different mortality assumption is often used.

The current mortality tables used for disabled mortality are as follows:

- **General members:** Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020.
- **Safety members:** Pub-2010 Safety Disabled Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020.

The following table shows the observed benefit weighted deaths for disabled retired members based on the actual experience during the fourteen years studied. Also shown are the expected benefit weighted deaths under the current and proposed assumptions. This information is shown separately by gender. As shown in the table below, the proposed mortality tables have an actual to expected ratio of 93% and 94% for General and Safety, respectively, after adjustments for partial credibility. In future years the ratios should remain around 93% and 94% for General and Safety, respectively, as long as actual mortality improves at the same rates as anticipated by the generational mortality tables.

Disabled Retiree Mortality Experience – Benefit Weighted

($ in millions)

Gender	General Current Expected Weighted Deaths	General Actual Weighted Deaths	General Proposed Expected Weighted Deaths	Safety Current Expected Weighted Deaths	Safety Actual Weighted Deaths	Safety Proposed Expected Weighted Deaths
Male	$1.94	$1.60	$1.84	$5.88	$5.49	$5.86
Female	2.02	1.99	2.01	0.24	0.21	0.24
Total	**$3.97**	**$3.59**	**$3.86**	**$6.12**	**$5.71**	**$6.10**
Actual / Expected	**90%**		**93%[1]**	**93%**		**94%**

Notes:

1. Experience shown above is weighted by annual benefit amounts for deceased members.
2. Expected amounts under the current and proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the year the death occurred (or was expected to occur).
3. Results may not add due to rounding.

Similar to mortality rates for service retirees, the proposed mortality tables reflect current experience to the extent that the experience is credible based on standard statistical theory. For

[1] If we use the benchmark Pub-2010 General disabled table without any adjustment, the proposed actual to expected ratio would be 91%.

VCERA, there is less data available for disabled retirees, so it is given little credibility and the proposed tables are only slightly adjusted.

We recommend updating the mortality tables used for disabled mortality to the following:

- **General members:** Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates decreased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021.
- **Safety members:** Pub-2010 Safety Disabled Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

Chart 9 compares the number of actual to expected deaths on an amount-weighted basis for disabled General members over the fourteen-year period for the current and proposed assumptions.

Chart 10 compares the number of actual to expected deaths on an amount-weighted basis for disabled Safety members over the fourteen-year period for the current and proposed assumptions.

Chart 11 shows the life expectancies (i.e., expected future lifetime) under the current and proposed tables for disabled General members on an amount-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age as of 2023. In practice, assumed life expectancies will increase in accordance with the mortality improvement scale.

Chart 12 shows the life expectancies (i.e., expected future lifetime) under the current and proposed tables for disabled Safety members on an amount-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age as of 2023. In practice, assumed life expectancies will increase in accordance with the mortality improvement scale.

Chart 9: Post-Retirement Benefit-Weighted Deaths ($ in millions)

Disabled General Members (July 1, 2008 through June 30, 2023)[1]

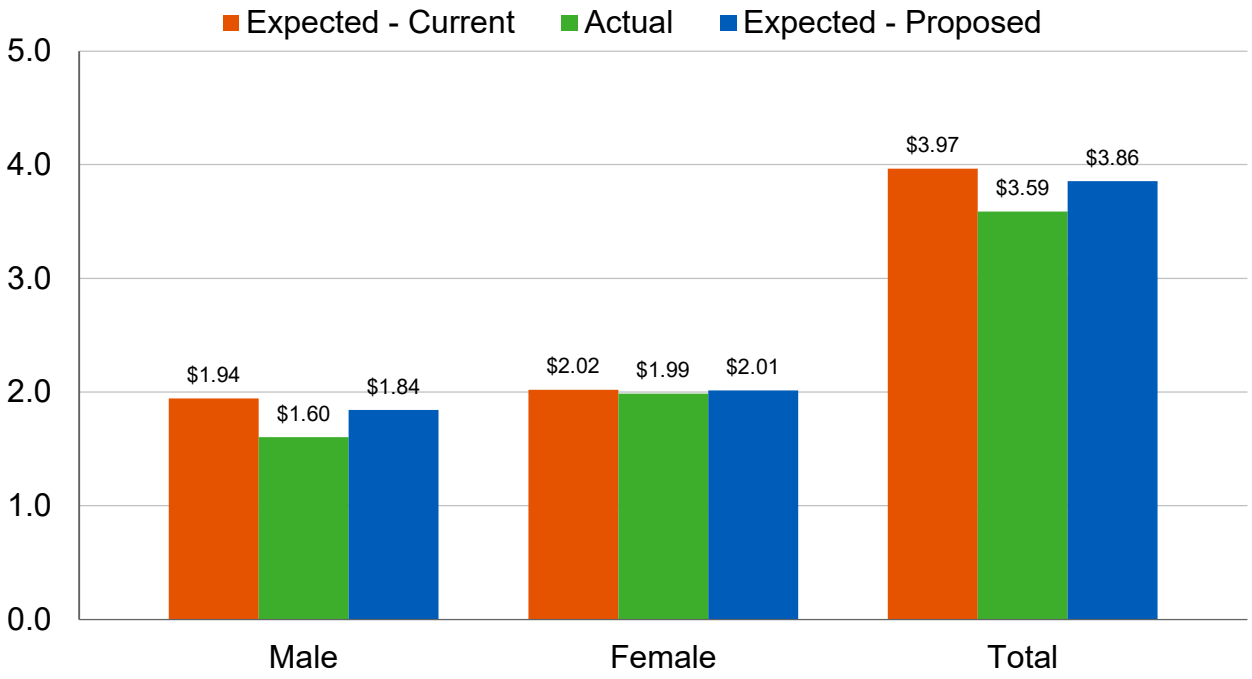
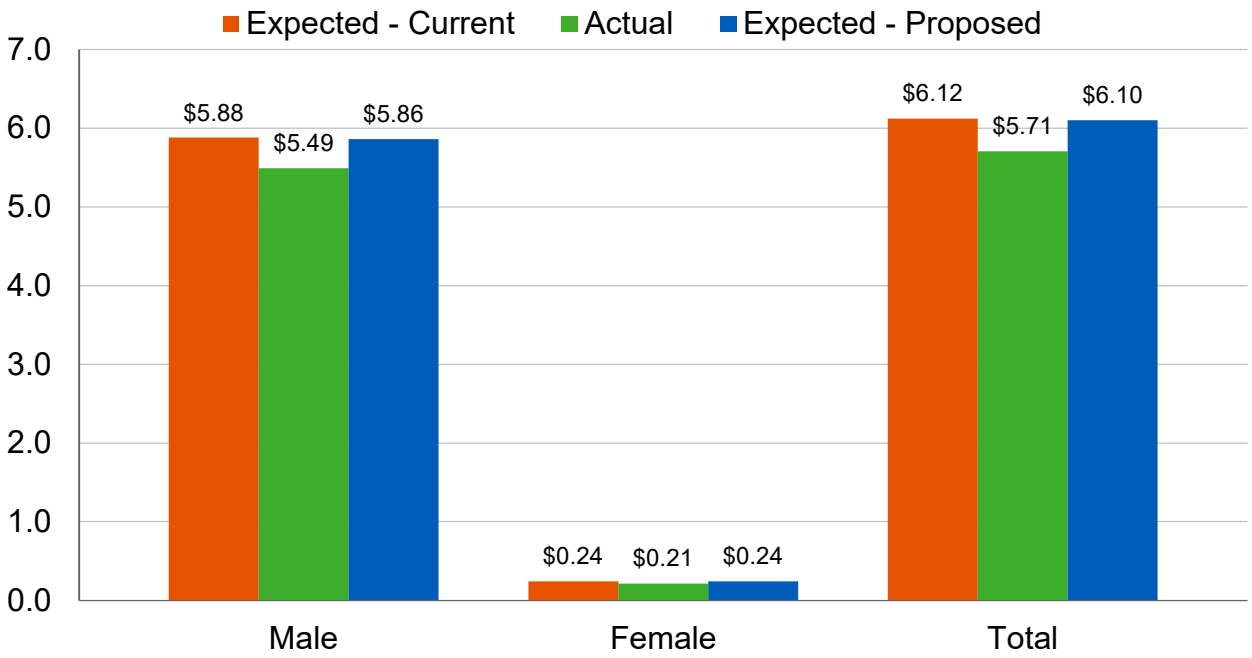


Chart 10: Post-Retirement Benefit-Weighted Deaths ($ in millions)

Disabled Safety Members (July 1, 2008 through June 30, 2023)[1]



[1] Excludes July 1, 2020 through June 30, 2021.

Chart 11: Benefit-Weighted Life Expectancies
Disabled General Members

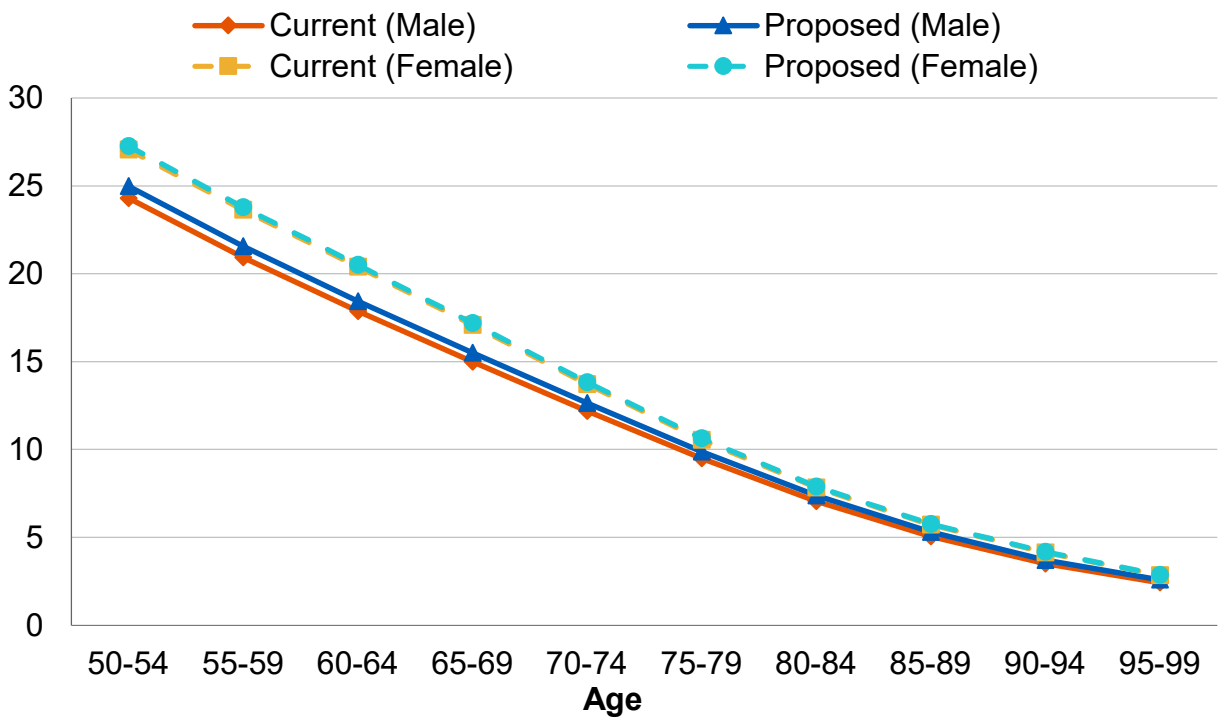
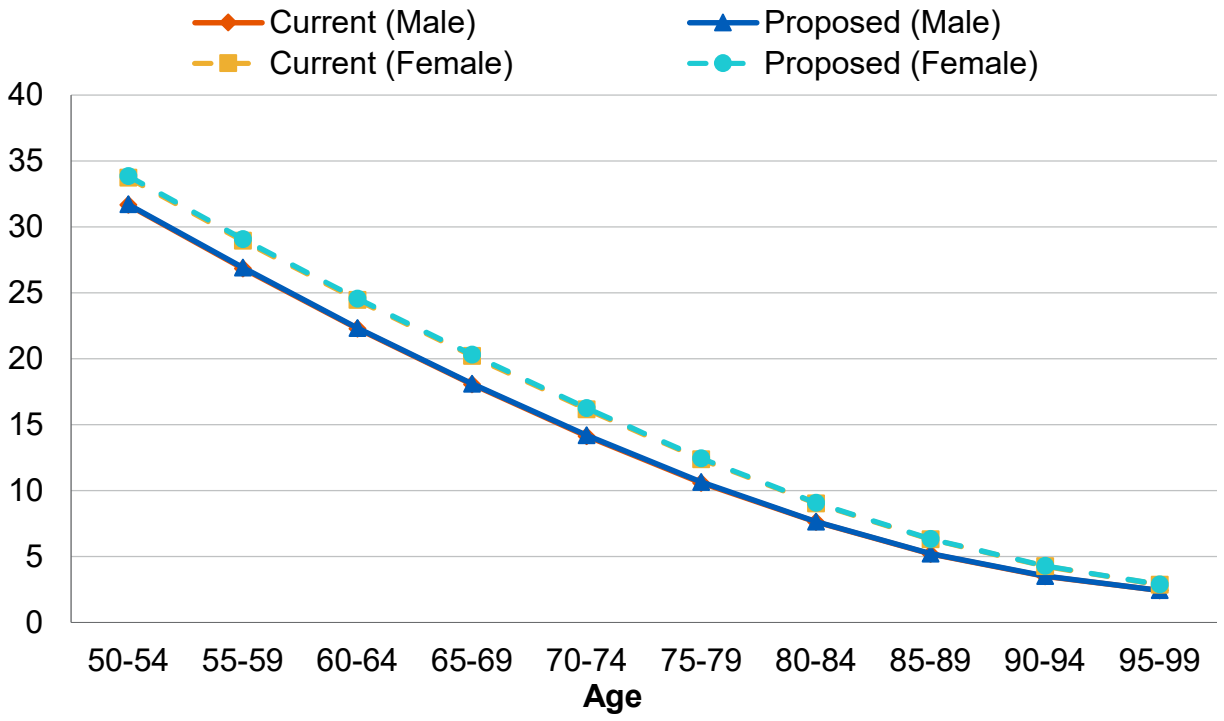


Chart 12: Benefit-Weighted Life Expectancies
Disabled Safety Members



C. Disability incidence rates

When a member becomes disabled, he or she may be entitled to at least a 50% of pay pension (service connected disability), or a pension that depends upon the member's years of service (non-service connected disability).

The following tables show the observed disability incidence rates based on the actual experience over the past three years. Also shown are the current assumed rates and the rates we propose. Please note that we have combined service and non-service connected disability incidence in the table below. This information is shown separately for General and Safety members.

Disability Incidence Rates (%)—General

Age	Current Rate	Actual Rate	Proposed Rate
20 – 24	0.01	0.00	0.01
25 – 29	0.01	0.00	0.01
30 – 34	0.02	0.00	0.02
35 – 39	0.05	0.00	0.05
40 – 44	0.10	0.10	0.10
45 – 49	0.14	0.11	0.14
50 – 54	0.22	0.14	0.18
55 – 59	0.25	0.19	0.25
60 – 64	0.35	0.38	0.35
65 – 69	0.45	0.15	0.40
70 and over	0.45	0.00	0.40

Disability Incidence Rates (%)—Safety

Age	Current Rate	Actual Rate	Proposed Rate
20 – 24	0.03	0.00	0.03
25 – 29	0.08	0.00	0.08
30 – 34	0.35	0.00	0.35
35 – 39	0.40	0.27	0.40
40 – 44	0.60	0.15	0.60
45 – 49	1.00	1.09	1.00
50 – 54	1.20	1.08	1.20
55 – 59	3.40	4.20	3.60
60 and over	7.50	11.11	8.00

Based upon this experience, we recommend slightly decreasing the disability incidence rate assumption overall for General members and slightly increasing the disability incidence rate assumption overall for Safety members.

Chart 13 compares the actual number of non-service connected and service connected disabilities over the past three years to that expected under both the current and proposed assumptions.

Chart 14 compares the actual disability incidence experience with the current and proposed assumptions for General members while Chart 15 shows the same information for Safety members.

Service vs. non-service connected disability

The following table shows the observed percentage of new disabled members that received a service connected disability based on the actual experience over the past three years for General and Safety separately. Also shown are the current and proposed assumptions.

Disabled Members Receiving a Service Connected Disability

	General	Safety
Current assumption	30%	90%
Actual percentage	58%	100%
Proposed assumption	**50%**	**95%**

Based upon this experience, we recommend increasing the current assumption from 30% and 90% for General and Safety members, respectively, to 50% and 95%, respectively. The remaining percentage are assumed to be non-service connected disabilities (50% for General and 5% for Safety members).

Chart 13: Actual Number of Service and Non-Service Disability Retirements Compared to Expected

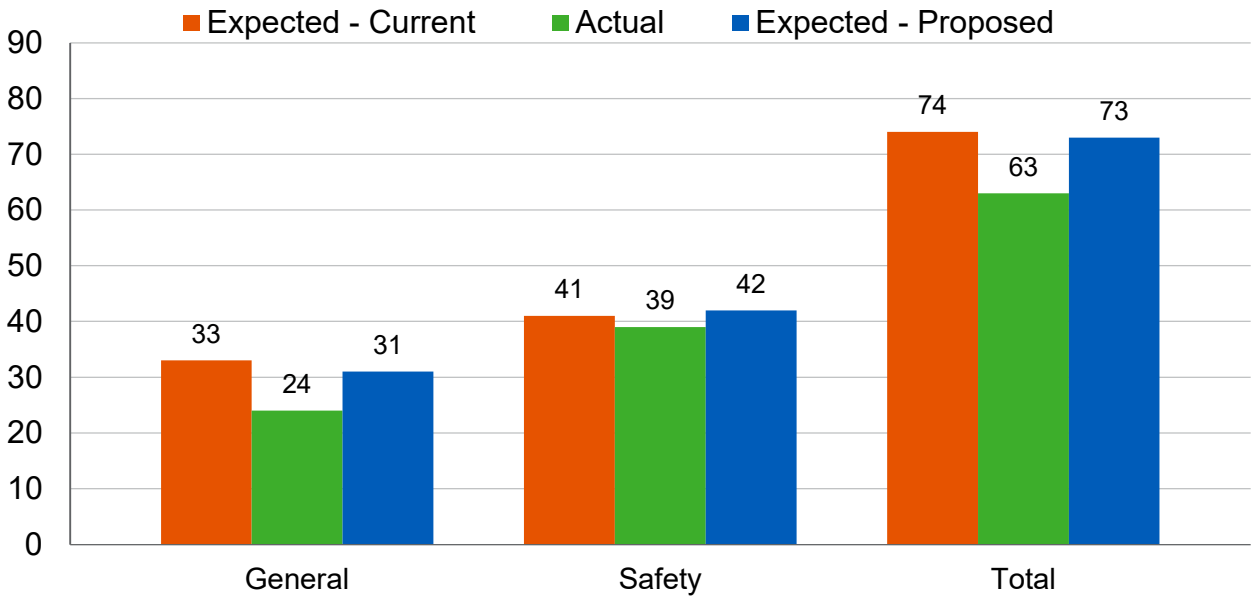


Chart 14: Disability Incidence Rates

General Members

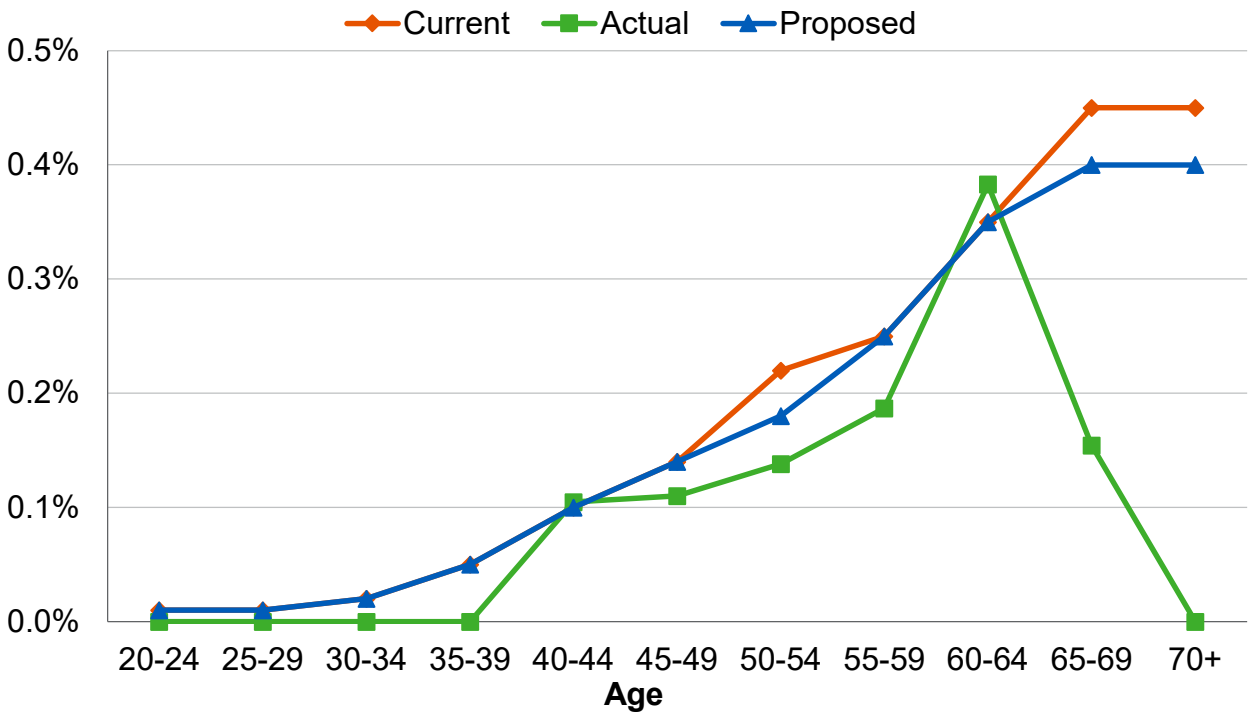
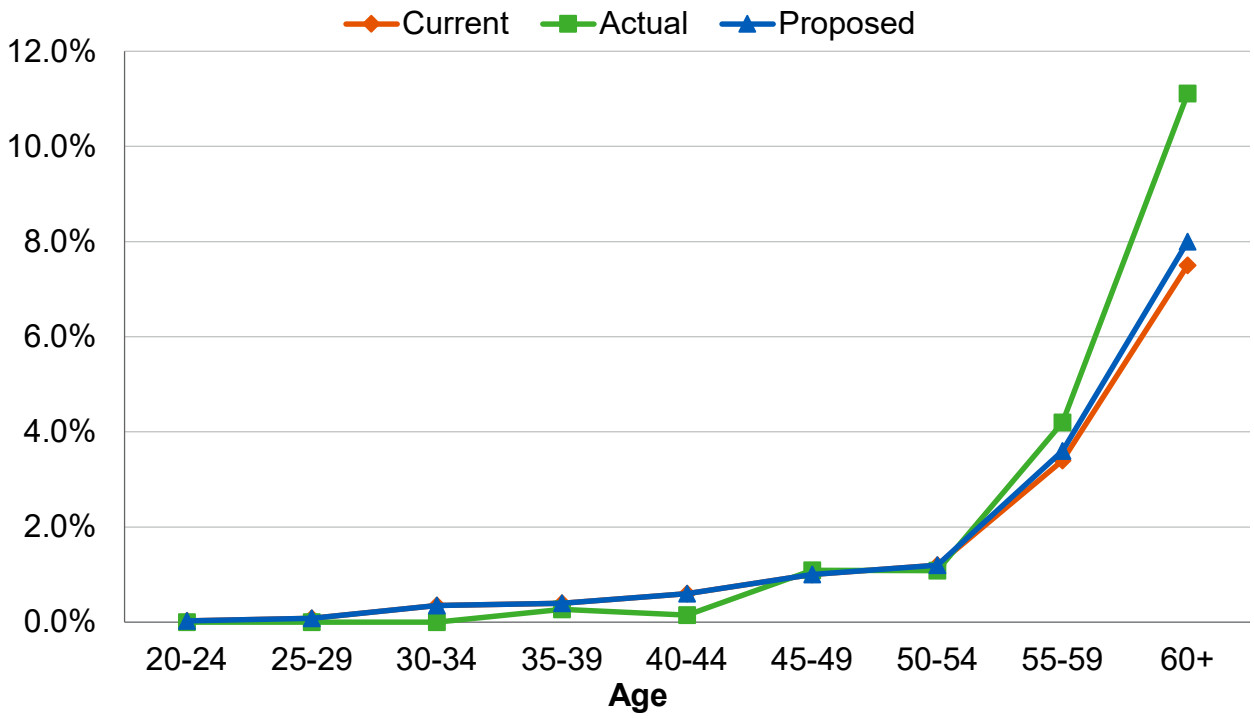


Chart 15: Disability Incidence Rates

Safety Members



D. Termination rates

Termination rates include all terminations for reasons other than death, disability, or retirement. Under the current assumptions there is an overall incidence of termination assumed, combined with an assumption that a member will choose between a refund of contributions and a deferred vested benefit based on which option is more valuable. **With this study, we continue to recommend that this same assumption structure be used.**

Currently, assumed termination rates are a function of years of service. We continue to believe that termination rates are strongly correlated with years of service. **Therefore, we recommend maintaining the current termination assumption structure to develop termination rates as a function of years of service.**

The current termination assumptions are applied until the member is first assumed to retire. That is, we assume that members eligible to retire at termination will retire in accordance with the retirement rate assumptions rather than terminate and defer their benefit. **We recommend maintaining the assumption that members who are eligible to retire will elect to receive their retirement benefit in lieu of a refund of contributions or a deferred vested benefit.**

The following tables show the observed[1] termination rates based on the actual experience over the past three years. We have also included six years of experience in order to improve the credibility of VCERA's termination experience. Also shown are the current assumed rates and the rates we propose. This information is shown separately for General and Safety members.

[1] Please note that we have excluded any members that were eligible for retirement.

Termination Rates (%)—General

Years of Service	Current Rate	Actual Rate (Last 3 Years)	Actual Rate from Current and Prior Studies (Last 6 Years)	Proposed Rate
Less than 1	13.50	15.39	14.27	14.00
1 – 2	9.50	12.29	10.72	10.50
2 – 3	8.50	10.27	9.37	9.00
3 – 4	6.75	7.83	6.95	7.00
4 – 5	5.50	8.82	7.06	6.00
5 – 6	5.00	7.81	6.39	5.50
6 – 7	4.00	6.42	5.39	5.00
7 – 8	3.50	8.72	6.32	4.50
8 – 9	3.50	4.31	3.93	4.00
9 – 10	3.50	5.45	5.00	4.00
10 – 11	3.50	5.12	4.32	4.00
11 – 12	3.25	4.52	4.07	3.50
12 – 13	3.25	4.02	3.84	3.50
13 – 14	3.00	4.07	3.78	3.50
14 – 15	2.75	3.73	3.32	3.25
15 – 16	2.75	4.52	3.97	3.25
16 – 17	2.50	3.63	2.79	3.00
17 – 18	2.50	3.57	3.24	3.00
18 – 19	2.00	3.86	2.30	2.50
19 – 20	1.75	3.52	2.40	2.00
20 and over	1.75	1.69	1.89	1.75

Termination Rates (%)—Safety

Years of Service	Current Rate	Actual Rate (Last 3 Years)	Actual Rate from Current and Prior Studies (Last 6 Years)	Proposed Rate
Less than 1	10.00	14.58	11.08	11.00
1 – 2	5.50	10.92	6.63	6.50
2 – 3	5.25	5.61	5.37	5.50
3 – 4	4.50	3.72	3.77	4.50
4 – 5	4.25	4.72	4.44	4.25
5 – 6	2.50	3.28	2.42	2.50
6 – 7	2.25	3.07	2.32	2.25
7 – 8	2.00	3.23	1.91	2.00
8 – 9	1.80	3.52	2.34	1.90
9 – 10	1.60	0.80	1.08	1.80
10 – 11	1.50	5.21	3.27	1.70
11 – 12	1.40	3.74	3.30	1.60
12 – 13	1.20	2.29	1.68	1.50
13 – 14	1.10	1.21	1.04	1.10
14 – 15	1.00	0.54	1.00	1.00
15 – 16	0.95	0.67	0.79	0.95
16 – 17	0.85	1.77	2.92	0.85
17 – 18	0.75	0.00	0.45	0.75
18 – 19	0.50	0.00	0.00	0.50
19 – 20	0.50	0.00	0.00	0.50
20 and over	0.50	N/A	N/A	0.50

Based upon the recent experience, we recommend increasing the termination rates overall for both General and Safety members.

It is important to note that not every service category has enough exposures and/or decrements such that the results in that category are statistically credible even if we look at six years' worth of experience. This is mainly the case at the highest service categories since most members in those categories are eligible to retire and so have been excluded from our review of this termination experience.

It is our understanding that General Tier 2 COLA members can elect a refund of all or a portion of their Tier 2 COLA member contributions and forgo the Tier 2 COLA upon retirement. Based on the data for the three-year period ending June 30, 2023, about 29% of total General Tier 2 COLA member contributions were refunded for retiring members. We will continue to monitor the experience and conservatively assume that all members retiring with the Tier 2 COLA will elect to have the COLA applied to their benefit in lieu of a refund.

Chart 16 compares the number of actual to expected terminations for General members over the past three years for the current and proposed assumptions.

Chart 17 compares the number of actual to expected terminations for Safety members over the past three years for the current and proposed assumptions.

Chart 18 compares the actual termination experience for General members with the current and proposed assumptions.

Chart 19 compares the actual termination experience for Safety members with the current and proposed assumptions.

Chart 16: Actual Number of Terminations Compared to Expected
General Members

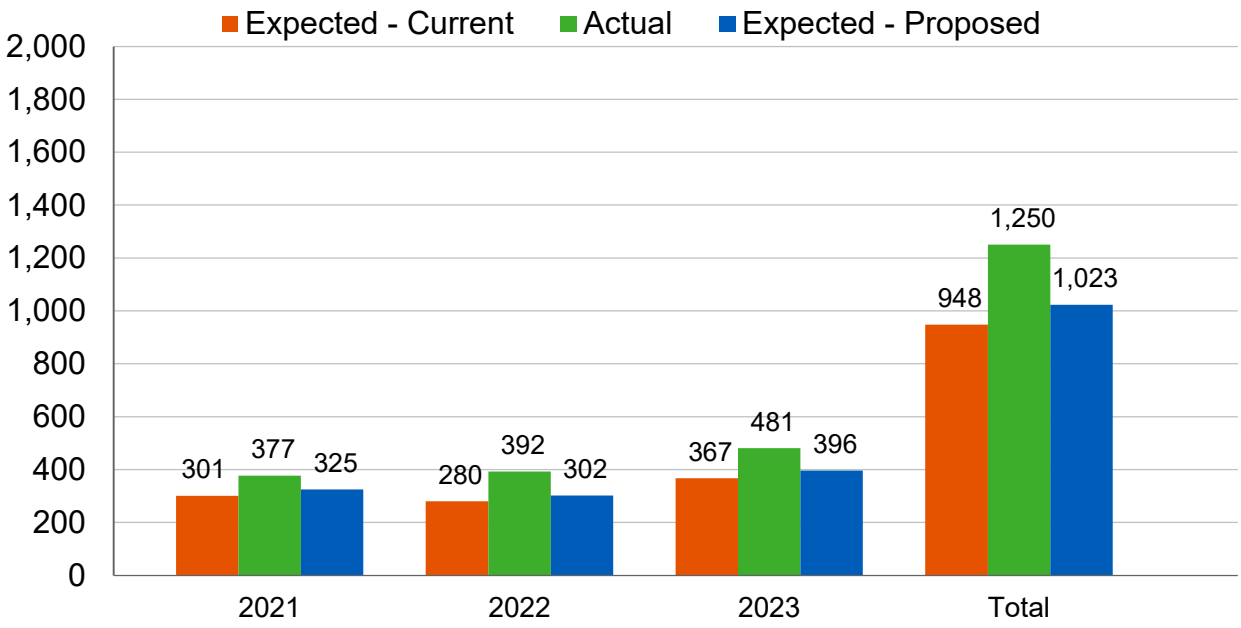


Chart 17: Actual Number of Terminations Compared to Expected
Safety Members

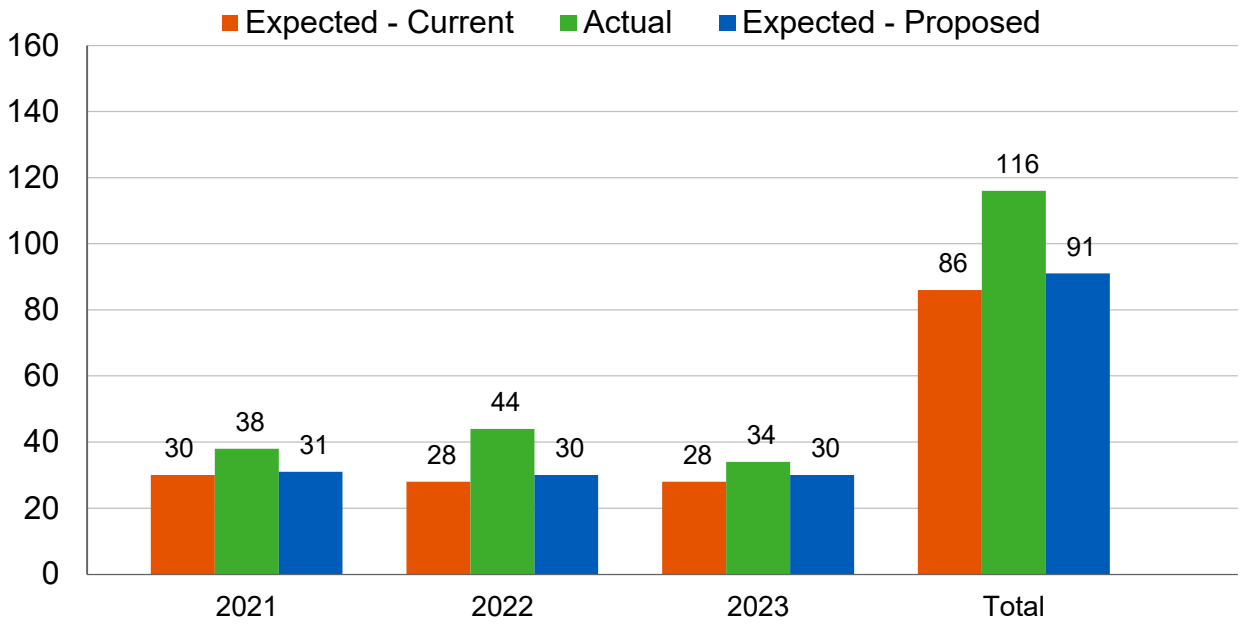


Chart 18: Termination Rates
General Members

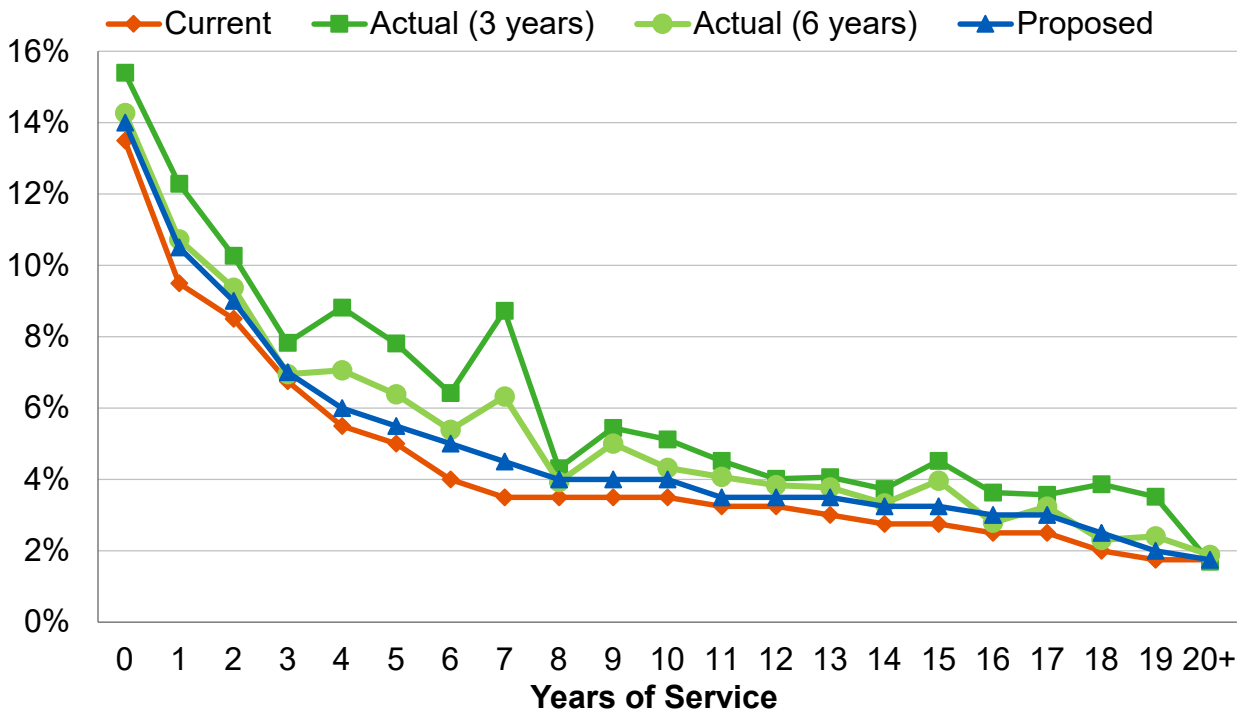
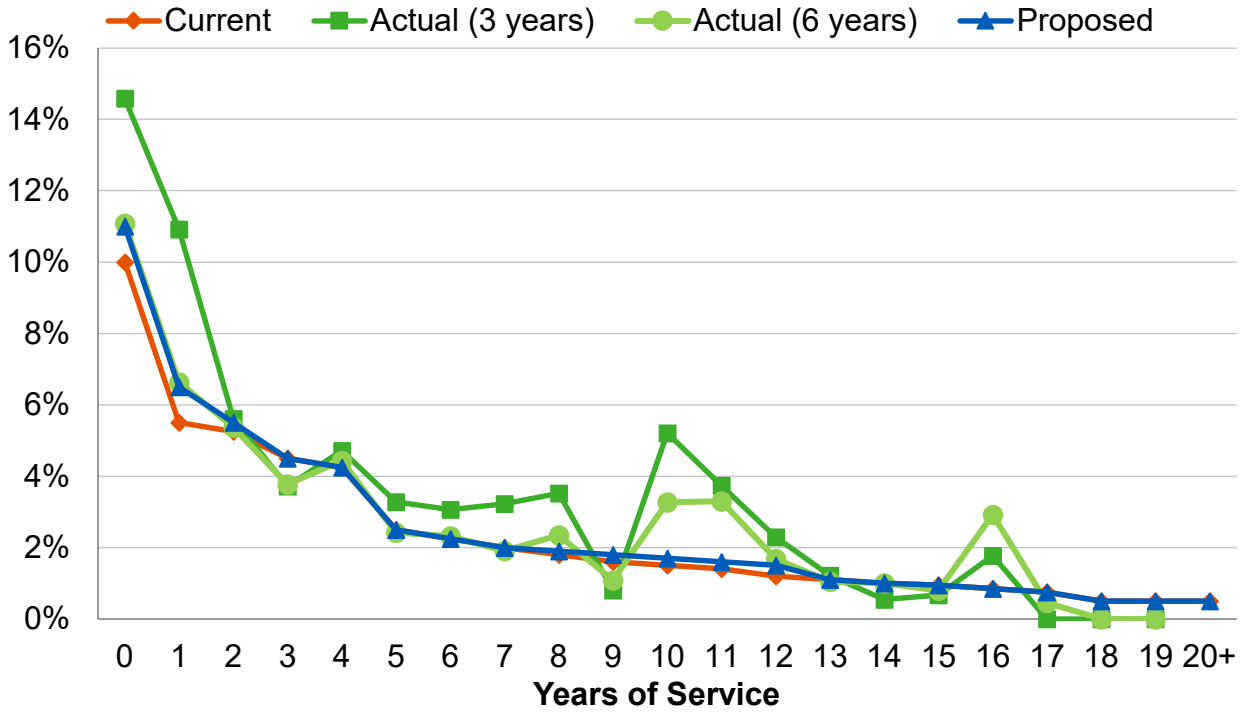


Chart 19: Termination Rates
Safety Members



E. Retirement rates

The age at which a member retires from service (i.e., who did not retire on a disability pension) will affect both the amount of the benefits that will be paid to that member as well as the period over which funding must take place.

Continuing the practice adopted in the last experience study, the retirement assumptions apply different sets of age-based retirement assumptions for those with less than 30 years of service and to those with more than 30 years of service.

Non-PEPRA General tiers

The following table shows the observed service retirement rates for non-PEPRA General members (i.e., General Tiers 1 and 2) based on the actual experience over the past three years, separately for those with less than 30 years of service and more than 30 years of service. The observed service retirement rates were determined by comparing those members who actually retired from service to those eligible to retire from service. Also shown are the current assumed rates and the rates we propose.

Retirement Rates (%)—Non-PEPRA General Tiers
by Years of Service (YOS)

Age	<30 YOS Current Rate	<30 YOS Actual Rate	<30 YOS Proposed Rate	30+ YOS Current Rate	30+ YOS Actual Rate	30+ YOS Proposed Rate
Under 50	0.00	N/A	0.00	50.00	14.29	40.00
50	2.00	3.36	2.00	2.00	0.00	2.00
51	2.25	1.93	2.25	2.25	8.33	2.25
52	2.75	2.05	2.75	2.75	17.65	2.75
53	3.00	2.97	3.00	3.00	0.00	3.00
54	3.25	2.84	3.25	4.00	0.00	4.00
55	4.50	4.78	4.50	5.00	11.36	6.00
56	5.25	3.22	5.00	6.00	16.67	7.00
57	5.50	6.10	5.50	7.00	10.20	8.00
58	6.00	4.52	6.00	9.00	8.77	9.00
59	8.00	7.43	8.00	9.50	12.99	11.00
60	10.50	8.50	10.00	14.00	13.58	14.00
61	13.00	10.89	12.50	20.00	23.17	20.00
62	22.00	15.53	18.00	30.00	35.29	30.00
63	18.00	15.46	18.00	25.00	19.61	25.00
64	18.00	21.94	20.00	25.00	25.64	25.00
65	30.00	32.41	30.00	45.00	33.33	40.00
66	35.00	43.82	35.00	50.00	50.00	50.00
67	35.00	32.69	35.00	47.50	11.11	40.00
68	27.50	21.05	27.50	47.50	16.67	40.00
69	25.00	26.47	25.00	25.00	0.00	25.00
70	25.00	35.48	30.00	25.00	0.00	30.00
71	25.00	40.91	30.00	25.00	50.00	30.00
72	25.00	30.77	30.00	25.00	100.00	30.00
73	25.00	40.00	30.00	25.00	100.00	30.00
74	25.00	18.18	30.00	25.00	0.00	30.00
75 and over	100.00	20.00	100.00	100.00	33.33	100.00

Based on this experience, we recommend decreases in the retirement rates at certain ages and recommend increases in the retirement rates at other ages. Overall, the proposed rates represent a slight decrease overall in the retirement rates for non-PEPRA General members.

The same retirement rates are proposed for both General Tiers 1 and 2 members. This is because retirement experience is largely driven by Tier 2 members as there are very few Tier 1 active members as of the most recent valuation date.

In some age categories limited experience is available, such as those over age 65. For these ages, there is some smoothing of the proposed rates.

Chart 20 compares the number of actual to expected retirements for non-PEPRA General members over the past three years for the current and proposed assumptions. Charts 21, 22, and 23 compares the same information for non-PEPRA Safety, PEPRA General, and PEPRA Safety, respectively.

Chart 24 that follows later in this section compares the actual retirement experience with the current and proposed assumptions for non-PEPRA General members with less than 30 years of service.

Chart 25 compares the actual retirement experience with the current and proposed assumptions for non-PEPRA General members with 30 or more years of service.

Non-PEPRA Safety tier

The following table shows the observed service retirement rates for non-PEPRA Safety members (i.e., Safety Tier 1) based on the actual experience over the past three years, separately for those with less than 30 years of service and more than 30 years of service. Also shown are the current assumed rates and the rates we propose.

Retirement Rates (%)—Non-PEPRA Safety Tier
by Years of Service (YOS)

Age	<30 YOS Current Rate	<30 YOS Actual Rate	<30 YOS Proposed Rate	30+ YOS Current Rate	30+ YOS Actual Rate	30+ YOS Proposed Rate
40	1.50	0.00	1.50	1.50	N/A	1.50
41	1.50	0.00	1.50	1.50	N/A	1.50
42	1.50	15.38	1.50	1.50	N/A	1.50
43	1.50	6.90	1.50	1.50	N/A	1.50
44	1.50	0.00	1.50	1.50	N/A	1.50
45	1.50	0.00	1.50	1.50	N/A	1.50
46	1.50	2.78	1.50	1.50	N/A	1.50
47	1.50	0.00	1.50	1.50	N/A	1.50
48	1.50	3.00	2.00	1.50	N/A	2.00
49	1.50	4.55	2.00	1.50	N/A	2.00
50	2.00	2.72	2.25	2.00	0.00	2.25
51	1.75	4.32	2.25	1.75	12.50	2.50
52	2.25	1.56	2.25	2.25	3.57	3.00
53	3.25	5.77	4.50	3.25	9.38	7.00
54	15.00	19.74	15.00	20.00	46.15	30.00
55	20.00	21.43	20.00	37.00	44.00	40.00
56	20.00	23.53	22.00	25.00	37.04	30.00
57	22.00	15.38	22.00	30.00	38.10	35.00
58	22.00	25.00	22.00	33.00	44.44	35.00
59	22.00	13.33	22.00	35.00	23.08	35.00
60	35.00	42.86	35.00	35.00	25.00	35.00
61	35.00	0.00	35.00	45.00	16.67	40.00
62	35.00	50.00	35.00	45.00	50.00	40.00
63	35.00	0.00	35.00	45.00	0.00	40.00
64	35.00	25.00	35.00	45.00	33.33	40.00
65 and over	100.00	0.00	100.00	100.00	14.29	100.00

Based on this experience, we recommend increases overall in the retirement rates for non-PEPRA Safety members, both with less than 30 years of service and with 30 or more years of service.

Chart 26 compares the actual retirement experience with the current and proposed assumptions for non-PEPRA Safety members with less than 30 years of service.

Chart 27 compares the actual retirement experience with the current and proposed assumptions for non-PEPRA Safety members with 30 or more years of service.

PEPRA General and Safety tiers

On January 1, 2013, new PEPRA formulas were implemented for new General and Safety tiers. With this study, we are beginning to use actual PEPRA retirement experience to propose the retirement rates as the number of PEPRA retirements continues to increase over time. However, it is still the case that relatively limited experience is available, especially for the Safety PEPRA tier, so there is some smoothing of the proposed rates at most ages. This assumption will continue to be monitored in future experience studies, including whether service based retirement rates should also be implemented for PEPRA tiers.

The following tables shows the current assumed rates and the rates we propose for PEPRA General and Safety members.

Retirement Rates (%)—PEPRA General and Safety Tiers

Age	General Current Rate	General Actual Rate	General Proposed Rate	Safety Current Rate	Safety Actual Rate	Safety Proposed Rate
50	0.00	N/A	0.00	4.00	0.00	4.00
51	0.00	N/A	0.00	1.75	0.00	1.75
52	1.50	1.67	1.50	3.25	0.00	3.25
53	1.50	0.00	1.50	5.50	0.00	5.50
54	2.00	0.00	2.00	16.00	50.00	16.00
55	4.00	2.44	3.00	20.00	0.00	20.00
56	4.75	0.00	4.00	20.00	50.00	20.00
57	5.25	4.08	5.00	20.00	0.00	20.00
58	5.50	0.00	5.50	18.00	100.00	18.00
59	6.50	3.03	6.00	25.00	0.00	25.00
60	9.00	0.00	8.00	30.00	0.00	30.00
61	11.00	5.88	10.00	30.00	100.00	30.00
62	20.00	13.51	14.00	35.00	N/A	35.00
63	18.00	0.00	16.00	35.00	50.00	35.00
64	16.00	13.16	16.00	35.00	0.00	35.00
65	20.00	25.00	20.00	100.00	0.00	100.00
66	30.00	47.06	35.00	100.00	N/A	100.00
67	35.00	11.11	30.00	100.00	N/A	100.00
68	25.00	6.67	30.00	100.00	N/A	100.00
69	35.00	9.09	30.00	100.00	N/A	100.00
70	55.00	17.65	30.00	100.00	N/A	100.00
71	55.00	20.00	30.00	100.00	N/A	100.00
72	55.00	0.00	30.00	100.00	N/A	100.00
73	55.00	33.33	30.00	100.00	N/A	100.00
74	55.00	0.00	30.00	100.00	N/A	100.00
75 and over	100.00	0.00	100.00	100.00	N/A	100.00

Chart 28 compares the actual retirement experience with the current and proposed assumptions for PEPRA General members.

Chart 29 compares the actual retirement experience with the current and proposed assumptions for PEPRA Safety members.

Deferred vested members

In the last experience study, separate deferred vested retirement ages were introduced for reciprocal and non-reciprocal members. General members were assumed to retirement at age 60 for both reciprocal and non-reciprocal members, while reciprocal Safety members were assumed to retire at age 55 and non-reciprocal Safety members were assumed to retire at 52.

The following table shows the observed deferred vested retirement age for General members based on the actual experience over the past six years, separately for those who went on to work at a reciprocal retirement system and those that did not. Also shown are the current assumed retirement ages and the retirement ages we propose.

General Members' Deferred Vested Retirement Age

	Reciprocal Members	Non-Reciprocal Members
Current assumption	60.0	60.0
Actual average age	60.4	60.5
Proposed assumption	**60.0**	**60.0**

Based on this experience, we recommend maintaining the deferred vested retirement age assumption for General members at age 60 regardless of reciprocity status.

The following table shows the observed deferred vested retirement age for Safety members based on the actual experience over the past six years, separately for those who went on to work at a reciprocal retirement system and those that did not. Also shown are the current assumed retirement ages and the retirement ages we propose.

Safety Members' Deferred Vested Retirement Age

	Reciprocal Members	Non-Reciprocal Members
Current assumption	55.0	52.0
Actual average age	54.6	52.8
Proposed assumption	**55.0**	**53.0**

Based on this experience, we recommend increasing the deferred vested retirement age assumption for Safety non-reciprocal members from age 52 to 53 while maintaining the deferred vested retirement age assumption for Safety reciprocal members at age 55.

Chart 20: Actual Number of Retirements Compared to Expected
Non-PEPRA General Members

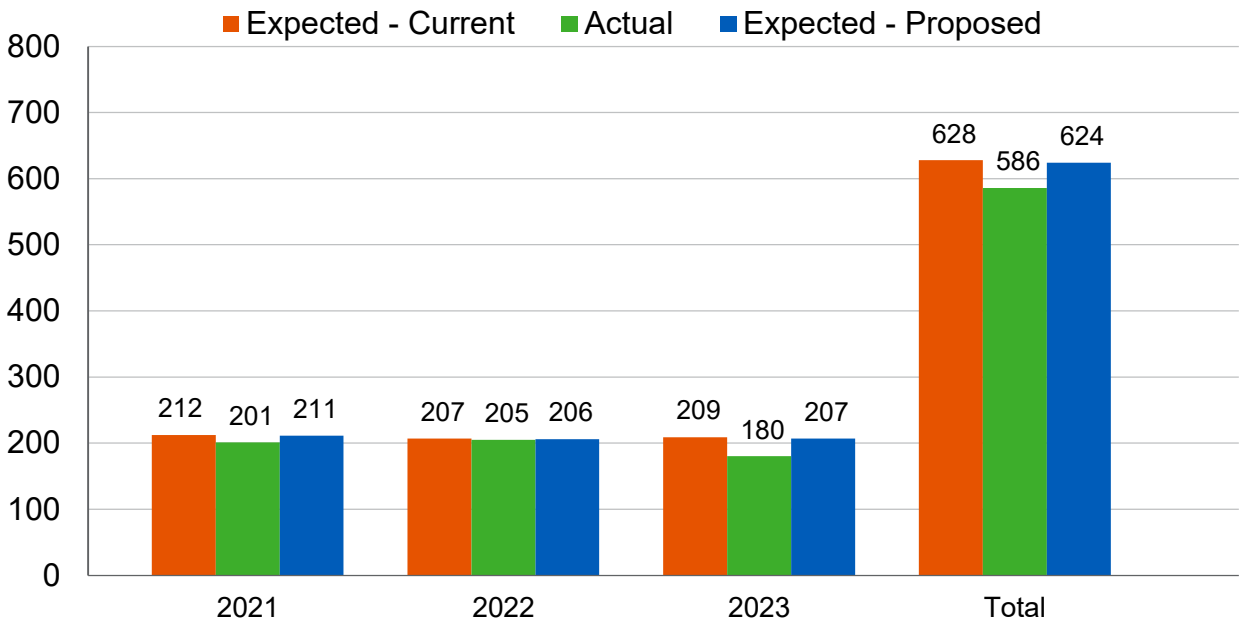


Chart 21: Actual Number of Retirements Compared to Expected
Non-PEPRA Safety Members

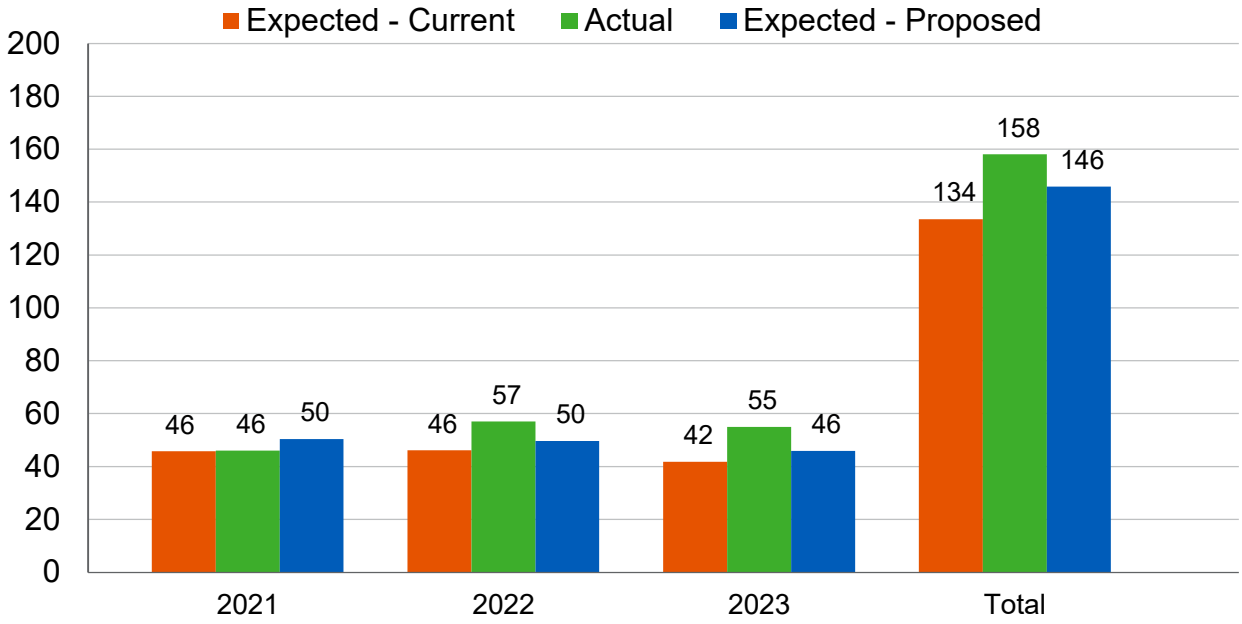


Chart 22: Actual Number of Retirements Compared to Expected
PEPRA General Members

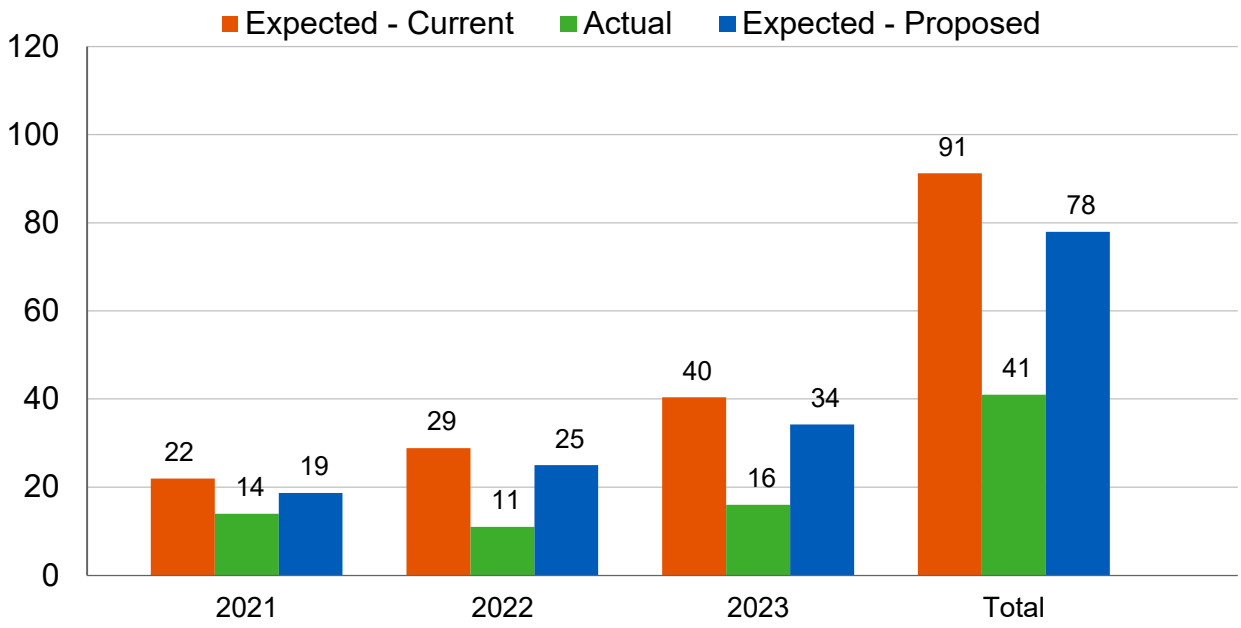


Chart 23: Actual Number of Retirements Compared to Expected
PEPRA Safety Members

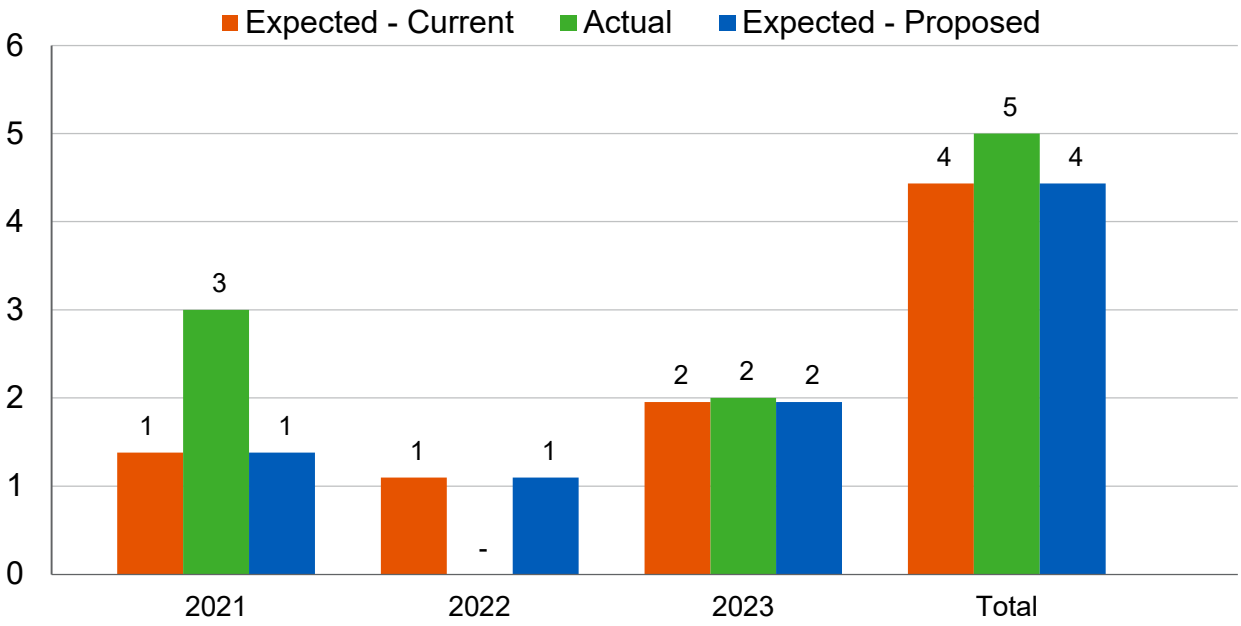


Chart 24: Retirement Rates

Non-PEPRA General Members with less than 30 Years of Service

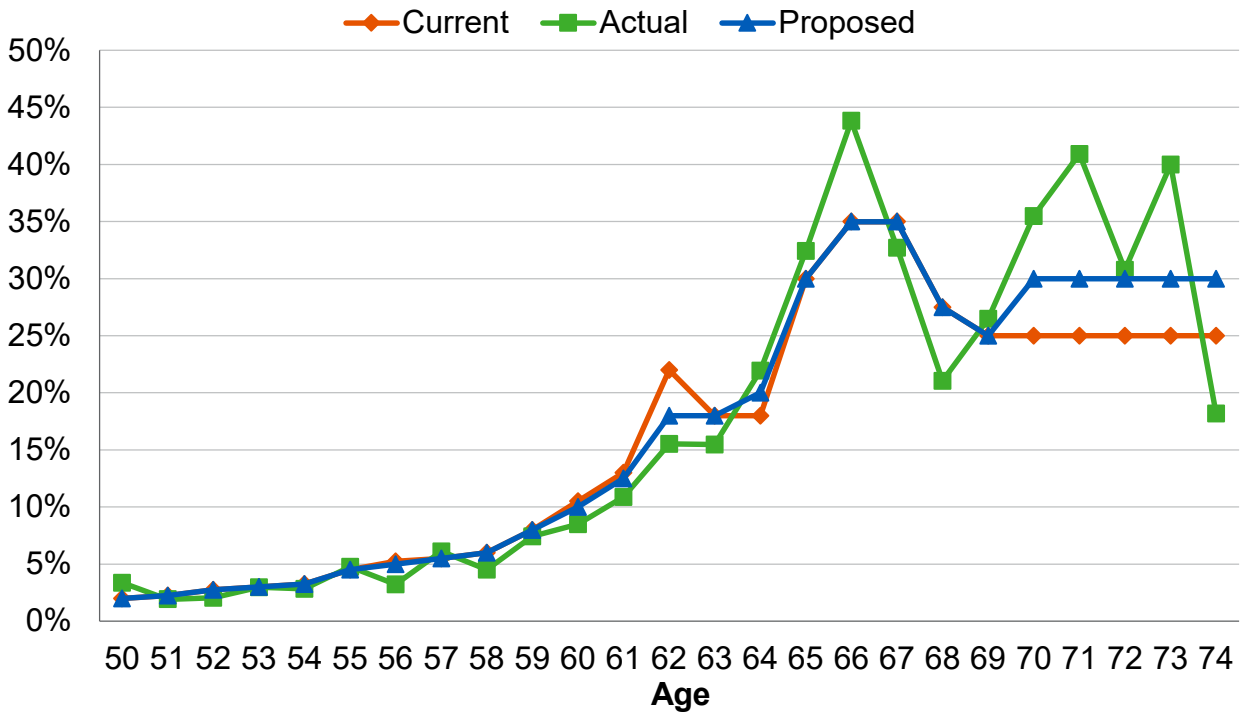


Chart 25: Retirement Rates

Non-PEPRA General Members with 30 or more Years of Service

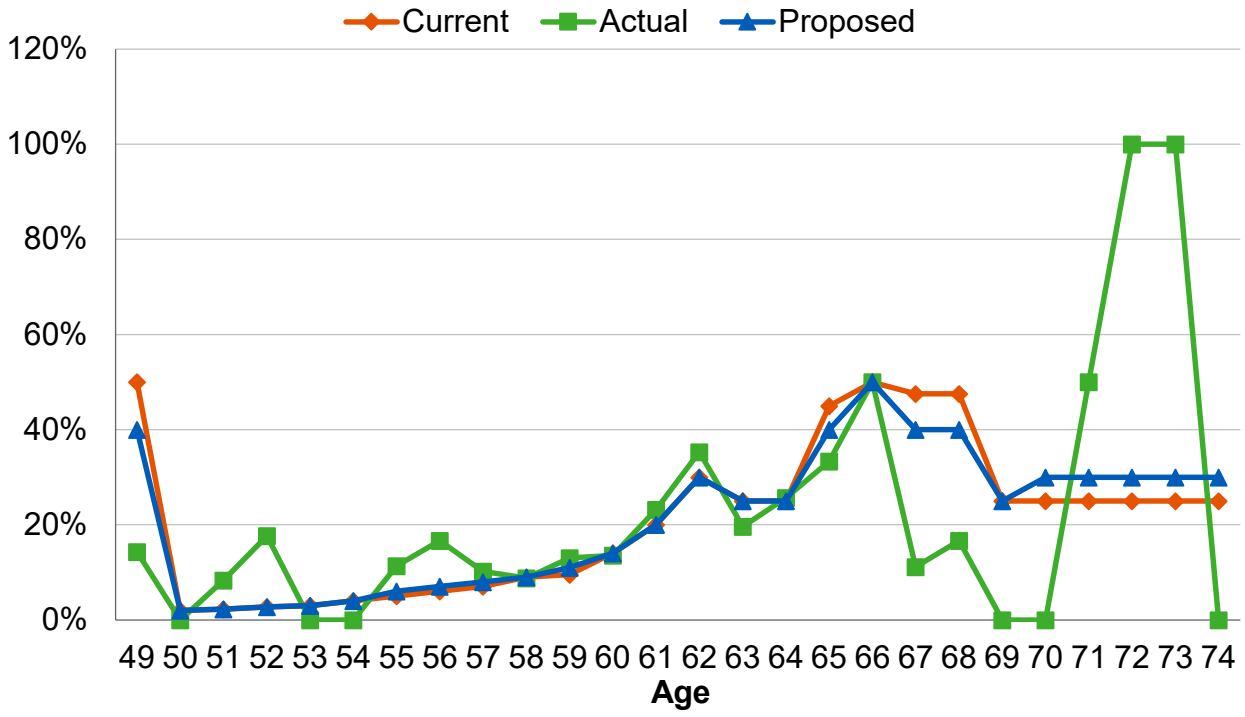


Chart 26: Retirement Rates

Non-PEPRA Safety Members with less than 30 Years of Service

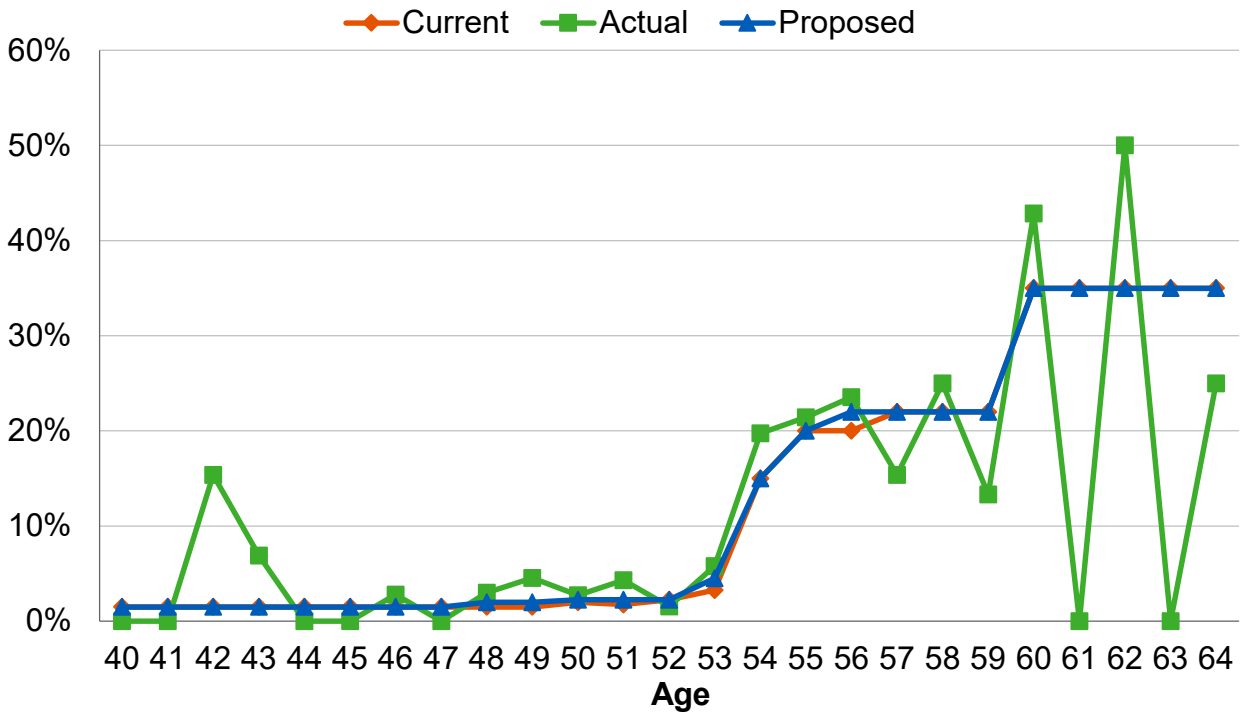


Chart 27: Retirement Rates

Non-PEPRA Safety Members with 30 or more Years of Service

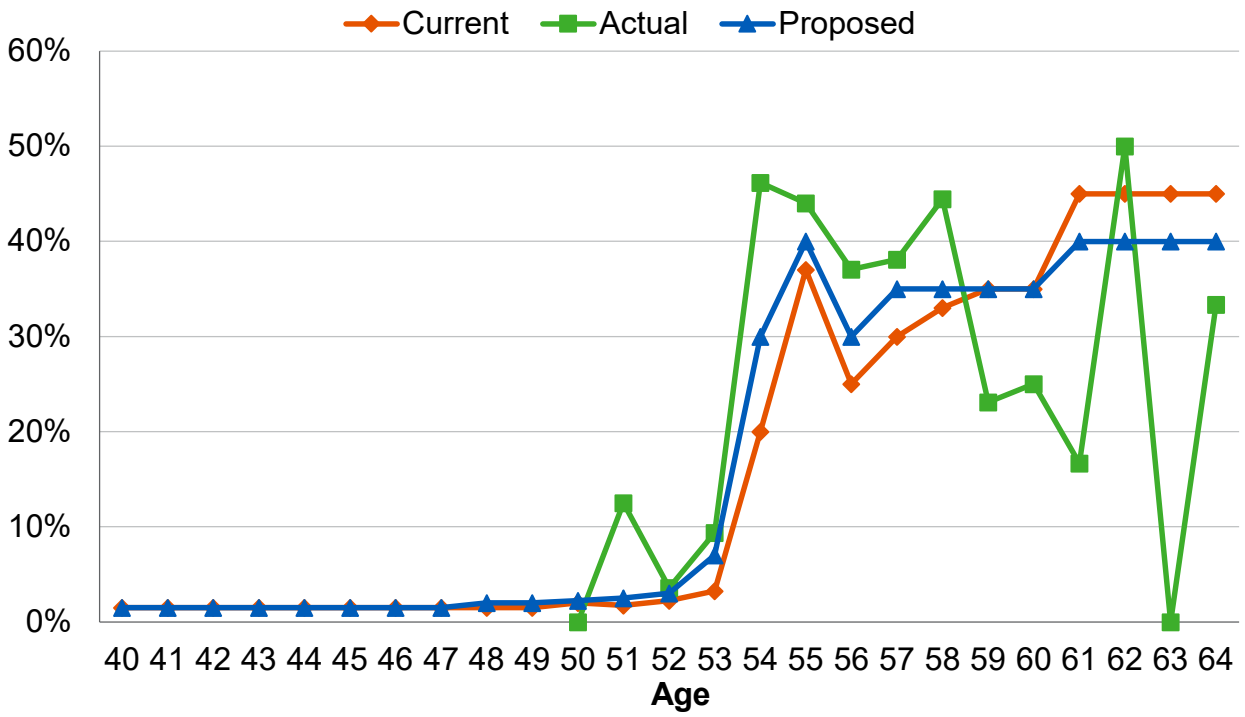


Chart 28: Retirement Rates
PEPRA General Members

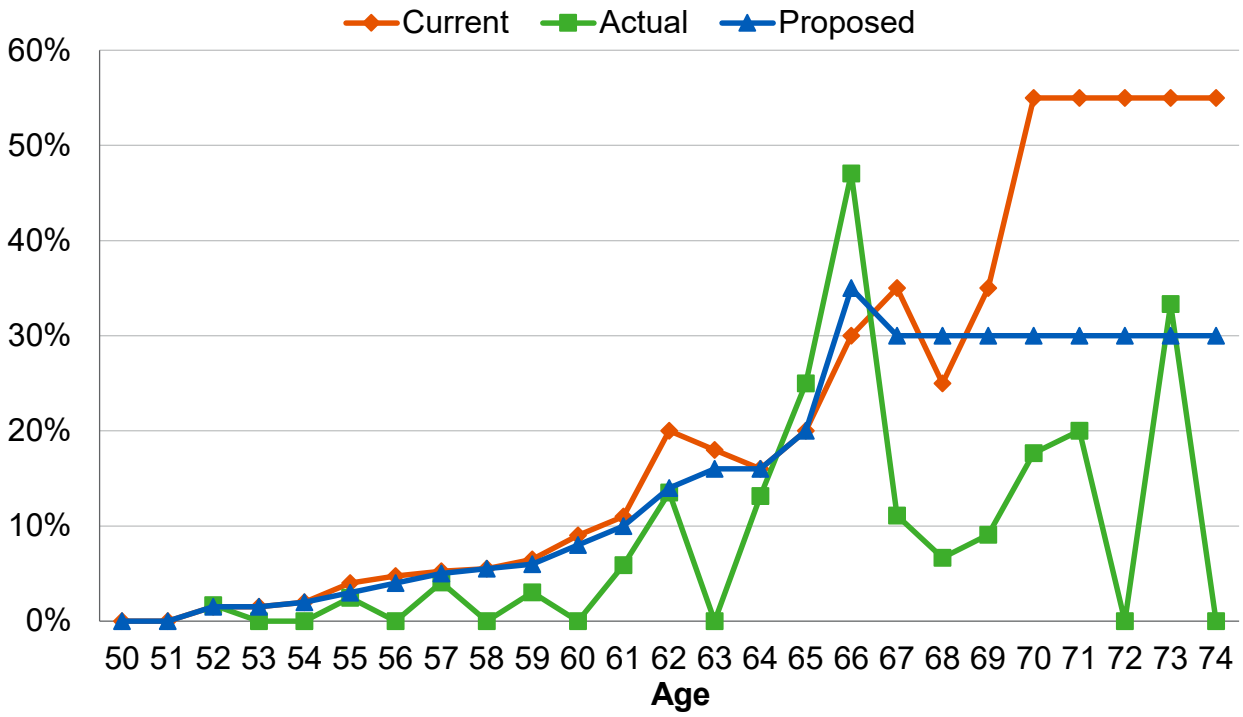
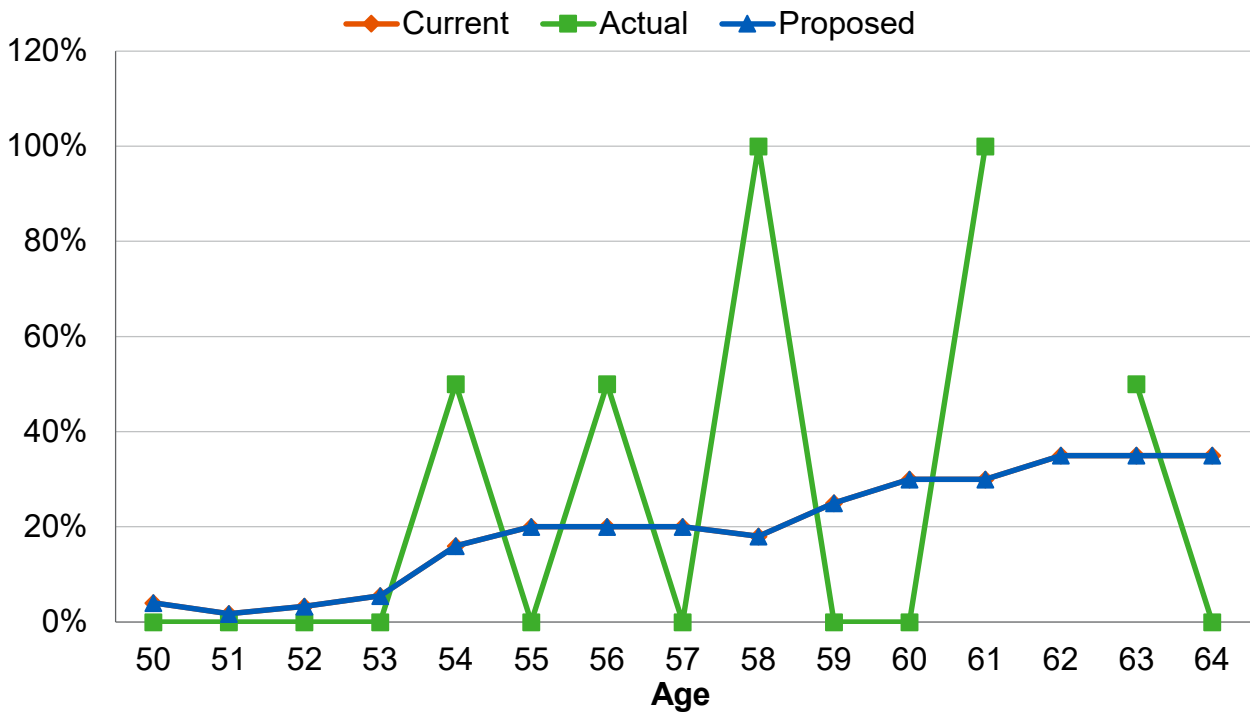


Chart 29: Retirement Rates
PEPRA Safety Members



F. In-service redemptions

In 1998, the Board of Retirement, in the course of actions related to the Ventura Settlement, determined that several additional pay elements should be included as Earnable Compensation. These additional pay elements fall into two categories:

- Ongoing Pay Elements – Those that are expected to be received relatively uniformly over a member's employment years; and
- Terminal Pay Elements – Those that are expected to increase during the member's final average earnings pay period.

The first category is recognized in the actuarial calculations by virtue of being included in the current pay of active members. Any year-to-year fluctuation in the amount of in-service redemptions would be incorporated in the salary scale assumptions discussed in the prior section of this report. The second category requires a separate actuarial assumption to anticipate its impact on a member's retirement benefit.

In this study, we have collected data for the last three years to estimate in-service redemptions for non-PEPRA active members as a percentage of final average pay. The results are summarized in the following table.

Actual Average In-Service Redemptions for Non-PEPRA Members

Year Ending June 30	General Tier 1	General Tier 2	Safety
2021	6.79%	7.68%	8.16%
2022	8.08%	4.62%	9.37%
2023	0.00%	4.31%	7.47%
Average	**5.84%**	**5.49%**	**8.35%**
Current assumption	8.00%	3.50%	6.50%
Proposed assumption	**8.00%**	**4.00%**	**7.00%**

For determining the cost of the basic benefit (i.e., non-COLA component), the cost of this pay element is currently recognized in the valuation as an employer only cost and does not affect member contribution rates.

Based on this experience, we recommend increasing the assumption for General Tier 2 and Safety members, while maintaining the assumption for General Tier 1 members as there are very few Tier 1 members as of the most recent valuation date.

G. Miscellaneous assumptions

Reciprocity

Under the current assumptions, a percentage of future deferred vested members are assumed to go on to work under a reciprocal retirement system. The following table shows the observed reciprocity percent based on the actual experience as of June 30, 2023. Also shown are the current and proposed assumptions.

Percent of Deferred Vested Members Covered under Reciprocal System

	General	Safety
Current assumption	45%	60%
Actual percent	38%	58%
Proposed assumption	**40%**	**60%**

We recommend decreasing the reciprocal assumption to 40% for General members while maintaining the assumption at 60% for Safety members. This recommendation takes into account the experience of all deferred vested members as of June 30, 2023 instead of just new deferred vested members during the three-year period. This is because there is a lag between a member's date of termination and the time that it is known if they have reciprocity with a reciprocal retirement system.

In addition, we recommend 4.00% and 4.25% annual salary increase assumptions for General and Safety members, respectively, be utilized to anticipate salary increases from the date of termination from VCERA to the expected date of retirement for deferred vested members covered by a reciprocal retirement system. These assumptions are based on the ultimate 1.00% and 1.25% merit and promotion salary increase assumptions for General and Safety members, respectively, together with the 2.50% inflation and 0.50% real "across the board" salary increase assumptions that are recommended earlier in *Section 3* of this report.

Future benefit accruals

Benefits are based on the years of service and compensation earned by the member. In order to project benefits and determine the liabilities, an assumption about the amount of service earned by members each year is necessary.

Over the past three years, the average service earned by continuing active members from one valuation date to the next was 0.96 years.

We recommend maintaining the current assumption that all members earn full-time service (or 1.00 year of service) per year in the future.

Unknown data for members

When various elements of valuation data are not available, an assumption must be made in order to project benefits and determine liabilities.

The following table shows the gender of active members based on actual experience over the past three years. Also shown are the current and proposed assumptions for members with unknown gender. This information is shown separately for active General and Safety members.

General Active Member's Gender

	Male Member	Female Member
Current assumption	100%	0%
Actual percent	32%	68%
Proposed assumption	**0%**	**100%**

Safety Active Member's Gender

	Male Member	Female Member
Current assumption	100%	0%
Actual percent	81%	19%
Proposed assumption	**100%**	**0%**

We note that this assumption rarely applies as we generally receive gender information for all member records from VCERA. Out of the 9,384 active members included in the June 30, 2023 valuation, none were reported with unknown gender information.

Based on this experience, we recommend updating the assumption for unknown gender to assume General members with unknown gender are female and Safety members with unknown gender are male. These assumptions will continue to be monitored in future experience studies.

Form of payment

Under the plan provisions, an eligible survivor of a deceased member who has elected the unmodified option is eligible to receive a benefit continuance upon the member's death.

In prior valuations, it was assumed that all active and inactive members would select the unmodified option at retirement. Actual experience for recent new retirees shows that more than 93% select the unmodified option. **Therefore, we recommend maintaining the assumption that all members will elect the unmodified option at retirement.**

Percent with eligible survivor

The value of a member's retirement, disability, or death benefit depends on the percentage of members who are assumed to have an eligible spouse or domestic partner.

The following table shows the observed percentage of new retirees who were reported with an eligible spouse or domestic partner at the time of retirement based on the actual experience over the past three years. Also shown are the current and proposed assumptions. This information is shown separately by the member's gender.

New Retirees with Eligible Spouse or Domestic Partner and Selected Unmodified Option

	Male Member	Female Member
Current assumption	70%	55%
Actual percent	66%	52%
Proposed assumption	**70%**	**55%**

Based on this experience, we recommend maintaining the assumption for both male and female members.

Eligible survivor age and gender

Since the present value of the survivor's automatic continuance benefit is dependent on the survivor's age and sex, we must also have assumptions for the age and sex of the survivor. Based on the experience for members who retired during the current three-year period (results shown in the table below) and studies done for other retirement systems, **we recommend the following:**

1. Since most of the survivors are actually of the opposite sex, even with the inclusion of domestic partners, **we recommend continuing to assume that the survivor's sex is the opposite of the member.**
2. **We recommend maintaining the spouse age difference assumption that male retirees are three years older than their spouses and female retirees are two years younger than their spouses.** These assumptions will continue to be monitored in future experience studies.

Member's Age as Compared to Spouse's Age

	Male Retiree	Female Retiree
Current assumption	3 years older	2 years younger
Actual percent	2.4 years older	2.3 years younger
Proposed assumption	**3 years older**	**2 years younger**

Average entry age (for non-PEPRA member contributions)

The assumption for average entry age of non-PEPRA active members is used in determining the rate at which members who were hired after November 1974 contribute. In addition, this only applies to non-PEPRA active members that are not contributing fifty percent of the Normal Cost. The following table shows the observed average entry ages for all active members as of June 30, 2023. Also shown are the current and proposed assumptions.

Average Entry Age for Non-PEPRA Active Members

	General Member	Safety Member
Current assumption	35.0	27.0
Actual average age	35.0	27.2
Proposed assumption	**35.0**	**27.0**

Based on this experience, we recommend maintaining the average entry age for General members used for determining member contribution rates at age 35. For Safety members, we recommend maintaining the average entry age used for determining member contribution rates at age 27.

Section 5: Cost Impact

We have estimated the impact of all the recommended demographic and economic assumptions as if they were applied to the June 30, 2023 actuarial valuation. The table below shows the changes in the employer and member contribution rates due to the proposed assumption changes separately for the recommended economic assumption changes (as recommended in *Section 3* of this report which include the recommended merit and promotion salary increases) and the recommended demographic assumption changes (as recommended in *Section 4* of this report).

Cost Impact of the Recommended Assumptions Based on June 30, 2023 Actuarial Valuation

Assumption	Impact on Average Employer Contribution Rates
Increase due to changes in economic assumptions	3.20%
Increase due to changes in demographic assumptions	0.68%
Total increase in average employer rate	**3.88%**
Total estimated increase in annual dollar amount ($ in '000s)[1]	**$36,589**

Assumption	Impact on Average Member Contribution Rates
Increase due to changes in economic assumptions	0.91%
Increase due to changes in demographic assumptions	0.04%
Total increase in average member rate	**0.95%**
Total estimated increase in annual dollar amount ($ in '000s)[1]	**$8,962**

Assumption	Impact on UAAL ($ in '000s)
Increase due to changes in economic assumptions	$278,449
Increase due to changes in demographic assumptions	85,969
Total increase in UAAL	**$364,418**

	Impact on Funded Percentage on VVA Basis
Change in Funded Percentage	97.08% to 92.78%

[1] Based on June 20, 2023 projected compensation as determined under each set of assumptions.

We have also analyzed in the tables below the average employer and member contribution rate impacts for each cost group due to the recommended assumption changes as if they were applied to the June 30, 2023 actuarial valuation.

Employer Contribution Rate Increases/(Decreases)
(% of Payroll)

Tier	Normal Cost	UAAL	Total	Annual Amount[1] ($ in '000s)
General Tier 1	1.33%	1.92%	3.25%	$44
General Tier 2	0.76%	1.48%	2.24%	3,727
General PEPRA Tier 2	0.64%	1.48%	2.12%	2,368
General Tier 2 w/ COLA	1.17%	1.92%	3.09%	6,338
General PEPRA w/ COLA	0.92%	1.92%	2.84%	7,056
General combined	**0.92%**	**1.76%**	**2.68%**	**$19,563**
Safety	2.29%	6.19%	8.48%	$11,805
Safety PEPRA	1.54%	6.19%	7.73%	5,221
Safety combined	**2.05%**	**6.19%**	**8.24%**	**$17,026**
All categories combined	**1.16%**	**2.72%**	**3.88%**	**$36,589**

Average Member Contribution Rate Increases/(Decreases)
(% of Payroll)

Tier	Total	Annual Amount[1] ($ in '000s)
General Tier 1	1.03%	$14
General Tier 2	0.76%	1,275
General PEPRA Tier 2	0.64%	715
General Tier 2 w/COLA	0.76%	1,558
General PEPRA Tier 2 w/COLA	0.64%	1,590
Safety	1.99%	2,770
Safety PEPRA	1.54%	1,040
All categories combined	**0.95%**	**$8,962**

[1] Based on June 30, 2023 projected annual payroll as determined under each set of assumptions.

Of the various assumption changes, the most significant rate increase is due to the change in the investment return assumption, followed by the mortality assumptions and merit and promotion salary increase assumptions.

Assumption	Impact on Average Employer Contribution Rates	Impact on Average Member Contribution Rates	Impact on UAAL ($ millions)
Increase due to increases in merit and salary promotion	0.62%	0.28%	$32,076
Increase due to decrease in investment return assumption (discount rate)	2.58%	0.63%	246,373
Increase due to changes in economic assumptions	**3.20%**	**0.91%**	**$278,449**
Increase due to changes in mortality	0.60%	0.04%	$69,625
Change due to changes in all other demographic assumptions	0.08%	0.00%	16,344
Increase due to changes in demographic assumptions	**0.68%**	**0.04%**	**$85,969**
Total increase due to all assumption changes	**3.88%**	**0.95%**	**$364,418**

Appendix A: Current Actuarial Assumptions

Economic Assumptions

Net Investment Return

7.00%, net of investment and administrative expenses.

Member Contribution Crediting Rate

2.50% (actual increase is based on projected long term ten-year Treasury rate).

Inflation

Increase of 2.50% per year.

Cost-of-Living Adjustments (COLA)

Retiree COLA increases of 2.75% are subject to a 3.00% maximum change per year for both PEPRA and non-PEPRA General Tier 1 and both PEPRA and non-PEPRA Safety. For both PEPRA and non-PEPRA General Tier 2, SEIU members receive a fixed 2% cost-of-living adjustment, not subject to changes in the CPI, that applies to future service after March 2003 (members represented by CNA receive a fixed 2% COLA that applies to future service after July 2023).

Payroll Growth

Inflation of 2.50% per year plus “across the board” real salary increases of 0.50% per year.

Increases in Internal Revenue Code Section 401(a)(17) Compensation Limit

Increase of 2.50% per year from the valuation date.

Increase in Section 7522.10 Compensation Limit

Increase of 2.50% per year from the valuation date.

Salary Increases

The annual rate of compensation increase includes:

- Inflation at 2.50%, plus
- "Across the board" salary increases of 0.50% per year, plus
- The following merit and promotion increase rates:

Merit and Promotion Increase Rates (%)

Years of Service	General	Safety
Less than 1	7.00	9.00
1 – 2	5.25	6.25
2 – 3	4.00	4.75
3 – 4	3.50	4.50
4 – 5	3.00	4.25
5 – 6	2.75	4.00
6 – 7	2.50	2.75
7 – 8	2.25	1.75
8 – 9	2.00	1.50
9 – 10	1.75	1.25
10 – 11	1.50	1.20
11 – 12	1.40	1.15
12 – 13	1.30	1.10
13 – 14	1.20	1.05
14 – 15	1.10	1.00
15 – 16	1.00	1.00
16 – 17	0.95	1.00
17 – 18	0.90	1.00
18 – 19	0.85	1.00
19 – 20	0.80	1.00
20 and over	0.75	1.00

Demographic Assumptions

Post-Retirement Mortality Rates

Healthy

- General Members: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP 2020
- Safety Members: Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020

Disabled

- General Members: Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two dimensional mortality improvement scale MP-2020
- Safety Members: Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020

Beneficiary

- All Beneficiaries: Pub-2010 General Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2020

Pre-Retirement Mortality Rates

- General Members: Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020
- Safety Members: Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020

Pre-Retirement Mortality Rates (%)

Age	General Male	General Female	Safety Male	Safety Female
20	0.04	0.01	0.04	0.02
25	0.02	0.01	0.03	0.02
30	0.03	0.01	0.04	0.02
35	0.04	0.02	0.04	0.03
40	0.06	0.03	0.05	0.04
45	0.09	0.05	0.07	0.06
50	0.13	0.08	0.10	0.08
55	0.19	0.11	0.15	0.11
60	0.28	0.17	0.23	0.14
65	0.41	0.27	0.35	0.20
70	0.61	0.44	0.66	0.39

All pre-retirement deaths are assumed to be non-service connected related.

Note that generational projections beyond the base year (2010) are not reflected in the above mortality rates.

Mortality Rates for Member Contributions

- General Members: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected 30 years (from 2010) with the two-dimensional mortality improvement scale MP 2020, weighted one-third male and two-thirds female
- Safety Members: Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected 30 years (from 2010) with the two-dimensional mortality improvement scale MP-2020, weighted 80% male and 20% female

Disability incidence rates

Disability Incidence Rates (%)

Age	General[1]	Safety[2]
20	0.01	0.03
25	0.01	0.06
30	0.02	0.24
35	0.04	0.38
40	0.08	0.52
45	0.12	0.84
50	0.19	1.12
55	0.24	2.52
60	0.31	5.86
65	0.41	0.00
70	0.45	0.00

[1] 30% of General disabilities are assumed to be service connected (duty) disabilities and the other 70% are assumed to be non service connected (ordinary) disabilities.

[2] 90% of Safety disabilities are assumed to be service connected (duty) disabilities and the other 10% are assumed to be non service connected (ordinary) disabilities.

Termination Rates

Termination Rates (%)

Years of Service	General	Safety
Less than 1	13.50	10.00
1 – 2	9.50	5.50
2 – 3	8.50	5.25
3 – 4	6.75	4.50
4 – 5	5.50	4.25
5 – 6	5.00	2.50
6 – 7	4.00	2.25
7 – 8	3.50	2.00
8 – 9	3.50	1.80
9 – 10	3.50	1.60
10 – 11	3.50	1.50
11 – 12	3.25	1.40
12 – 13	3.25	1.20
13 – 14	3.00	1.10
14 – 15	2.75	1.00
15 – 16	2.75	0.95
16 – 17	2.50	0.85
17 – 18	2.50	0.75
18 – 19	2.00	0.50
19 – 20	1.75	0.50
20 and over	1.75	0.50

The greater of a refund of member contributions and a deferred annuity is valued when a member withdraws.

No withdrawal is assumed after a member is first assumed to retire.

Retirement Rates

Retirement Rates (%)

Age	Non-PEPRA General Tier 1 and 2 Less than 30 Years of Service	Non-PEPRA General Tier 1 and 2 Greater than 30 Years of Service	Non-PEPRA Safety Less than 30 Years of Service	Non-PEPRA Safety Greater than 30 Years of Service	PEPRA General Tier 1 and 2	PEPRA Safety
Under 50	0.00	50.00	1.50	1.50	0.00	0.00
50	2.00	2.00	2.00	2.00	0.00	4.00
51	2.25	2.25	1.75	1.75	0.00	1.75
52	2.75	2.75	2.25	2.25	1.50	3.25
53	3.00	3.00	3.25	3.25	1.50	5.50
54	3.25	4.00	15.00	20.00	2.00	16.00
55	4.50	5.00	20.00	37.00	4.00	20.00
56	5.25	6.00	20.00	25.00	4.75	20.00
57	5.50	7.00	22.00	30.00	5.25	20.00
58	6.00	9.00	22.00	33.00	5.50	18.00
59	8.00	9.50	22.00	35.00	6.50	25.00
60	10.50	14.00	35.00	35.00	9.00	30.00
61	13.00	20.00	35.00	45.00	11.00	30.00
62	22.00	30.00	35.00	45.00	20.00	35.00
63	18.00	25.00	35.00	45.00	18.00	35.00
64	18.00	25.00	35.00	45.00	16.00	35.00
65	30.00	45.00	100.00	100.00	20.00	100.00
66	35.00	50.00	100.00	100.00	30.00	100.00
67	35.00	47.50	100.00	100.00	35.00	100.00
68	27.50	47.50	100.00	100.00	25.00	100.00
69	25.00	25.00	100.00	100.00	35.00	100.00
70	25.00	25.00	100.00	100.00	55.00	100.00
71	25.00	25.00	100.00	100.00	55.00	100.00
72	25.00	25.00	100.00	100.00	55.00	100.00
73	25.00	25.00	100.00	100.00	55.00	100.00
74	25.00	25.00	100.00	100.00	55.00	100.00
75	100.00	100.00	100.00	100.00	100.00	100.00

Retirement Age and Benefit for Deferred Vested Members

For current and future deferred vested members, retirement age assumptions are as follows:

General Retirement Age

Reciprocity Type	Retirement Age
Reciprocal members	60
Other members	60

Safety Retirement Age

Reciprocity Type	Retirement Age
Reciprocal members	55
Other members	52

Future deferred vested members who terminate with less than five years of service and are not vested are assumed to retire at age 70 for both General and Safety if they decide to leave their contributions on deposit.

45% and 60% of future General and Safety deferred vested members, respectively, are assumed to continue to work for a reciprocal employer. For reciprocals, we assume 3.75% and 4.00% compensation increases per annum for General and Safety deferred vested members, respectively.

Future Benefit Accruals

1.0 year of service per year of employment.

Unknown Data for Members

Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.

Definition of Active Member

All active members of VCERA as of the valuation date.

Form of Payment

All active and inactive members are assumed to elect the unmodified option at retirement.

Percent Married

For all active and inactive members, 70% of male members and 55% of female members are assumed to be married at pre-retirement death or retirement. There is no explicit assumption for children's benefits.

Age of Spouse

For all active and inactive members, male retirees are 3 years older than their spouses, and female retirees are 2 years younger than their spouses.

In-Service Redemptions

Non-PEPRA Formulas

The following assumptions for in-service redemptions pay as a percentage of final average compensation are used:

Tier	In-Service Redemption (% of Pay)
General Tier 1	8.00%
General Tier 2	3.50%
Safety	6.50%

For determining the cost of the basic benefit (i.e., non-COLA component), the cost of this pay element is currently recognized in the valuation as an employer only cost and does not affect member contribution rates.

PEPRA Formulas

None.

Average Entry Age for Member Contribution Rates

For non-PEPRA members hired after November 1974 who are not contributing fifty percent of Normal Cost, they will pay a contribution corresponding to a General and Safety member hired at entry age 35 and 27, respectively.

Methodology for use in Setting Entry Age for use in Actuarial Cost Method

Member's age at valuation date minus the lesser of years of employment or years of benefit service.

Appendix B: Proposed Actuarial Assumptions

Economic Assumptions

Net Investment Return

7.00%, net of investment and administrative expenses.

Member Contribution Crediting Rate

2.50% (actual increase is based on projected long term ten-year Treasury rate).

Inflation

Increase of 2.50% per year.

Cost-of-Living Adjustments (COLA)

Retiree COLA increases of 2.75% are subject to a 3.00% maximum change per year for both PEPRA and non-PEPRA General Tier 1 and both PEPRA and non-PEPRA Safety. For both PEPRA and non-PEPRA General Tier 2, SEIU members receive a fixed 2% cost-of-living adjustment, not subject to changes in the CPI, that applies to future service after March 2003 (members represented by CNA receive a fixed 2% COLA that applies to future service after July 2023).

Payroll Growth

Inflation of 2.50% per year plus “across the board” real salary increases of 0.50% per year.

Increases in Internal Revenue Code Section 401(a)(17) Compensation Limit

Increase of 2.50% per year from the valuation date.

Increase in Section 7522.10 Compensation Limit

Increase of 2.50% per year from the valuation date.

Salary Increases

The annual rate of compensation increase includes:

- Inflation at 2.50%, plus
- "Across the board" salary increases of 0.50% per year, plus
- The following merit and promotion increases:

Merit and Promotion Increase Rates (%)

Years of Service	Non-PEPRA General	PEPRA General	Non-PEPRA Safety	PEPRA Safety
Less than 1	7.00	7.00	9.00	9.00
1 – 2	5.25	5.50	6.25	6.25
2 – 3	4.00	4.50	4.75	5.00
3 – 4	3.50	4.00	4.50	4.75
4 – 5	3.00	3.50	4.25	4.50
5 – 6	2.75	3.25	4.00	4.25
6 – 7	2.50	3.00	2.75	3.00
7 – 8	2.40	2.75	2.25	2.25
8 – 9	2.30	2.50	2.00	2.00
9 – 10	2.15	2.25	1.75	1.75
10 – 11	2.00	2.00	1.70	1.70
11 – 12	1.90	1.90	1.60	1.60
12 – 13	1.80	1.80	1.50	1.50
13 – 14	1.70	1.70	1.40	1.40
14 – 15	1.60	1.60	1.30	1.30
15 – 16	1.50	1.50	1.25	1.25
16 – 17	1.40	1.40	1.25	1.25
17 – 18	1.30	1.30	1.25	1.25
18 – 19	1.20	1.20	1.25	1.25
19 – 20	1.10	1.10	1.25	1.25
20 and over	1.00	1.00	1.25	1.25

Demographic Assumptions

Post-Retirement Mortality Rates

Healthy

- General Members: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP 2021
- Safety Members: Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates decreased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021

Disabled

- General Members: Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates decreased by 5% for males, projected generationally with the two dimensional mortality improvement scale MP-2021
- Safety Members: Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021

Beneficiary

- Beneficiaries not currently in Pay Status: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP 2021
- Beneficiaries in Pay Status: Pub-2010 General Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5%, projected generationally with the two-dimensional mortality improvement scale MP-2021

Pre-Retirement Mortality Rates

- General Members: Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021
- Safety Members: Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021

Pre-Retirement Mortality Rates (%)

Age	General Male	General Female	Safety Male	Safety Female
20	0.04	0.01	0.04	0.02
25	0.02	0.01	0.03	0.02
30	0.03	0.01	0.04	0.02
35	0.04	0.02	0.04	0.03
40	0.06	0.03	0.05	0.04
45	0.09	0.05	0.07	0.06
50	0.13	0.08	0.10	0.08
55	0.19	0.11	0.15	0.11
60	0.28	0.17	0.23	0.14
65	0.41	0.27	0.35	0.20
70	0.61	0.44	0.66	0.39

All pre-retirement deaths are assumed to be non-service connected related.

Note that generational projections beyond the base year (2010) are not reflected in the above mortality rates.

Mortality Rates for Member Contributions

- General Members: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected 30 years (from 2010) with the two-dimensional mortality improvement scale MP 2021, weighted 30% male and 70% female
- Safety Members: Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates decreased by 5% for males, projected 30 years (from 2010) with the two-dimensional mortality improvement scale MP-2021, weighted 80% male and 20% female

Disability incidence rates

Disability Incidence Rates (%)

Age	General[1]	Safety[2]
20	0.01	0.03
25	0.01	0.06
30	0.02	0.24
35	0.04	0.38
40	0.08	0.52
45	0.12	0.84
50	0.16	1.12
55	0.22	2.64
60	0.31	6.24
65	0.38	0.00
70	0.40	0.00

[1] 50% of General disabilities are assumed to be service connected (duty) disabilities and the other 50% are assumed to be non service connected (ordinary) disabilities.

[2] 95% of Safety disabilities are assumed to be service connected (duty) disabilities and the other 5% are assumed to be non service connected (ordinary) disabilities.

Termination Rates

Termination Rates (%)

Years of Service	General	Safety
Less than 1	14.00	11.00
1 – 2	10.50	6.50
2 – 3	9.00	5.50
3 – 4	7.00	4.50
4 – 5	6.00	4.25
5 – 6	5.50	2.50
6 – 7	5.00	2.25
7 – 8	4.50	2.00
8 – 9	4.00	1.90
9 – 10	4.00	1.80
10 – 11	4.00	1.70
11 – 12	3.50	1.60
12 – 13	3.50	1.50
13 – 14	3.50	1.10
14 – 15	3.25	1.00
15 – 16	3.25	0.95
16 – 17	3.00	0.85
17 – 18	3.00	0.75
18 – 19	2.50	0.50
19 – 20	2.00	0.50
20 and over	1.75	0.50

The greater of a refund of member contributions and a deferred annuity is valued when a member withdraws.

No withdrawal is assumed after a member is first assumed to retire.

Retirement Rates

Retirement Rates (%)

Age	Non-PEPRA General Tier 1 and 2 Less than 30 Years of Service	Non-PEPRA General Tier 1 and 2 Greater than 30 Years of Service	Non-PEPRA Safety Less than 30 Years of Service	Non-PEPRA Safety Greater than 30 Years of Service	PEPRA General Tier 1 and 2	PEPRA Safety
Under 45	0.00	0.00	1.50	1.50	0.00	0.00
46	0.00	0.00	1.50	1.50	0.00	0.00
47	0.00	0.00	1.50	1.50	0.00	0.00
48	0.00	0.00	2.00	2.00	0.00	0.00
49	0.00	40.00	2.00	2.00	0.00	0.00
50	2.00	2.00	2.25	2.25	0.00	4.00
51	2.25	2.25	2.25	2.50	0.00	1.75
52	2.75	2.75	2.25	3.00	1.50	3.25
53	3.00	3.00	4.50	7.00	1.50	5.50
54	3.25	4.00	15.00	30.00	2.00	16.00
55	4.50	6.00	20.00	40.00	3.00	20.00
56	5.00	7.00	22.00	30.00	4.00	20.00
57	5.50	8.00	22.00	35.00	5.00	20.00
58	6.00	9.00	22.00	35.00	5.50	18.00
59	8.00	11.00	22.00	35.00	6.00	25.00
60	10.00	14.00	35.00	35.00	8.00	30.00
61	12.50	20.00	35.00	40.00	10.00	30.00
62	18.00	30.00	35.00	40.00	14.00	35.00
63	18.00	25.00	35.00	40.00	16.00	35.00
64	20.00	25.00	35.00	40.00	16.00	35.00
65	30.00	40.00	100.00	100.00	20.00	100.00
66	35.00	50.00	100.00	100.00	35.00	100.00
67	35.00	40.00	100.00	100.00	30.00	100.00
68	27.50	40.00	100.00	100.00	30.00	100.00
69	25.00	25.00	100.00	100.00	30.00	100.00
70	30.00	30.00	100.00	100.00	30.00	100.00
71	30.00	30.00	100.00	100.00	30.00	100.00
72	30.00	30.00	100.00	100.00	30.00	100.00
73	30.00	30.00	100.00	100.00	30.00	100.00
74	30.00	30.00	100.00	100.00	30.00	100.00
75	100.00	100.00	100.00	100.00	100.00	100.00

Retirement Age and Benefit for Deferred Vested Members

For current and future deferred vested members, retirement age assumptions are as follows:

General Retirement Age

Reciprocity Type	Retirement Age
Reciprocal members	60
Other members	60

Safety Retirement Age

Reciprocity Type	Retirement Age
Reciprocal members	55
Other members	53

Future deferred vested members who terminate with less than five years of service and are not vested are assumed to retire at age 70 for both General and Safety if they decide to leave their contributions on deposit.

40% and 60% of future General and Safety deferred vested members, respectively, are assumed to continue to work for a reciprocal employer. For reciprocals, we assume 4.00% and 4.25% compensation increases per annum for General and Safety deferred vested members, respectively.

Future Benefit Accruals

1.0 year of service per year of employment.

Unknown Data for Members

Same as those exhibited by members with similar known characteristics. If not specified, General members are assumed to be female and Safety members are assumed to be male.

Definition of Active Member

All active members of VCERA as of the valuation date.

Form of Payment

All active and inactive members are assumed to elect the unmodified option at retirement.

Percent Married

For all active and inactive members, 70% of male members and 55% of female members are assumed to be married at pre-retirement death or retirement. There is no explicit assumption for children's benefits.

Age of Spouse

For all active and inactive members, male retirees are 3 years older than their spouses, and female retirees are 2 years younger than their spouses.

In-Service Redemptions

Non-PEPRA Formulas

The following assumptions for in-service redemptions pay as a percentage of final average compensation are used:

Tier	In-Service Redemption (% of Pay)
General Tier 1	8.00%
General Tier 2	4.00%
Safety	7.00%

For determining the cost of the basic benefit (i.e., non-COLA component), the cost of this pay element is currently recognized in the valuation as an employer only cost and does not affect member contribution rates.

PEPRA Formulas

None.

Average Entry Age for Member Contribution Rates

For non-PEPRA members hired after November 1974 who are not contributing fifty percent of Normal Cost, they will pay a contribution corresponding to a General and Safety member hired at entry age 35 and 27, respectively.

Methodology for use in Setting Entry Age for use in Actuarial Cost Method

Member's age at valuation date minus the lesser of years of employment or years of benefit service.

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