



Kern County Employees' Retirement Association

ACTUARIAL EXPERIENCE STUDY

Analysis of Actuarial Experience
During the Period
July 1, 2013 through June 30, 2016



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June 21, 2017

Board of Retirement
Kern County Employees' Retirement Association
11125 River Run Boulevard
Bakersfield, CA 93301

Re: Review of Actuarial Assumptions for the June 30, 2017 Actuarial Valuation

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience of the Kern County Employees' Retirement Association. This study utilizes the census data for the period July 1, 2013 to June 30, 2016 and provides the proposed actuarial assumptions, both economic and demographic, to be used in the June 30, 2017 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,

A handwritten signature in black ink, appearing to read "Paul Angelo".

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

A handwritten signature in black ink, appearing to read "John Monroe".

John W. Monroe, ASA, MAAA, EA
Vice President and Actuary

JAC/hy

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Actuarial Experience Study

Analysis of Actuarial Experience

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I. Introduction, Summary, and Recommendations

To project the cost and liabilities of the pension plan, assumptions are made about 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. Changing assumptions reflects a basic change in thinking about the future, and it 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, 2013 through June 30, 2016. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27 "Selection of Economic Assumptions for Measuring Pension Obligations" and ASOP No. 35 "Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations." These Standards of Practice put forth guidelines 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.

Please note that the investment return assumption recommended in this report has been developed without taking into consideration the impact of the 50/50 allocation of future "excess earnings" between the retirement and Supplemental Retiree Benefit Reserve (SRBR) asset pools.

We are recommending changes in the assumptions for: inflation, investment return, promotional and merit salary increases, retirement from active employment, percent married, spouse age difference, pre-retirement mortality, post-retirement healthy and disabled life mortality, termination (refunds and deferred vested retirements), disability incidence (non-duty and duty), percent of members assumed to go on to work for a reciprocal system and reciprocal salary increases.

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

Pg #	Actuarial Assumption Categories	Recommendation
7	<p>Inflation: Future increases in the Consumer Price Index (CPI) which drives investment returns and active member salary increases, as well as cost-of-living adjustments (COLAs) for retirees.</p>	<p>Reduce the inflation assumption from 3.25% to 3.00% per annum as discussed in Section (III)(A).</p>
8	<p>Investment Return: The estimated average net rate of return on current and future assets of the Association as of the valuation date. This rate is used to discount liabilities.</p>	<p>Reduce the investment return assumption from 7.50% to 7.25% per annum as discussed in Section (III)(B).</p>
11	<p>Administrative Expenses: Fees for administration, legal, accounting and other functions carried out by the Association.</p>	<p>Maintain the explicit administrative expense load at 0.90% of projected payroll as discussed in Section (III)(B).</p>
16	<p>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:</p> <ul style="list-style-type: none"> • Inflationary salary increases • Real “across the board” salary increases • Promotional and merit increases 	<p>Reduce the current inflationary salary increase assumption from 3.25% to 3.00% and maintain the current real “across the board” salary increase assumption at 0.50%. This means that the combined inflationary and real “across the board” salary increases will decrease from 3.75% to 3.50%.</p> <p>Change the promotional and merit increases to those developed in Section III(C). Future promotional and merit salary increases are slightly higher under the proposed assumption.</p> <p>The recommended salary increase assumptions anticipate lower salary increases overall.</p>
22	<p>Retirement Rates: The probability of retirement at each age at which participants are eligible to retire.</p> <p>Other Retirement Related Assumptions including:</p> <ul style="list-style-type: none"> • Percent married and spousal age differences for members not yet retired • Retirement age for inactive vested members • Future reciprocal members and reciprocal salary increases 	<p>For active members, adjust the current retirement rates to those developed in Section (IV)(A). The recommended assumptions will anticipate slightly later retirements overall for active members in all tiers.</p> <p>For active and inactive vested members, maintain the percent married at retirement assumption for males at 75% and increase the assumption to 60% for females. Reduce the spouse age difference assumption from three years to two years for female members (female members are assumed to be two years younger than their male spouse beneficiaries). For inactive vested members, maintain the assumed retirement age at 57 for General members and 53 for Safety members.</p> <p>Decrease the current proportion of future terminated members expected to be covered by a reciprocal system to 50% for General members and 55% for Safety members. In addition, reduce the current reciprocal salary increase assumptions from 4.25% to 4.00% for General and Safety members.</p>

Pg #	Actuarial Assumption Categories	Recommendation
31 37	<p>Mortality Rates: The probability of dying at each age. Mortality rates are used to project life expectancies.</p>	<p>For healthy General pensioners and all beneficiaries, change from the current RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set forward one year for males and females to the Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set forward one year for males and set forward two years for females, projected generationally with the two-dimensional mortality improvement scale MP-2016.</p> <p>For healthy Safety pensioners, change from the current RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 with ages set back one year for males and females to the Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table with ages set back one year for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2016.</p> <p>For disabled General pensioners, change from the current RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 with ages set forward eight years for males and females to the Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set forward seven years for males and set forward eight years for females, projected generationally with the two-dimensional mortality improvement scale MP-2016.</p> <p>For disabled Safety pensioners, change from the current RP-2000 Combined Table projected with Scale BB to 2023 with ages set forward four years for males and females to the Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set forward three years for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2016.</p> <p>For pre-retirement mortality, change from the current post-retirement mortality tables to the Headcount-Weighted RP-2014 Employee Mortality Table times 80%, projected generationally with the two-dimensional scale MP-2016.</p> <p>For determining member contribution rates, change the mortality rates to those developed in Section (IV)(B).</p> <p>The recommended mortality assumptions will anticipate longer life expectancy both pre- and post-retirement.</p>
40	<p>Termination Rates: The probability of leaving employment at each age and receiving either a refund of contributions or a deferred vested retirement benefit.</p>	<p>Adjust the current termination rates to those developed in Section (IV)(D). The recommended assumptions will anticipate more terminations for General and Safety members.</p>
49	<p>Disability Incidence Rates: The probability of becoming disabled at each age.</p>	<p>Adjust the current disability rates to those developed in Section (IV)(E). The recommended assumptions will anticipate fewer disability retirements for General members and Safety members.</p>

We have estimated the impact of proposed assumption changes as if they were applied to the June 30, 2016 actuarial valuation. In particular, if all of the proposed economic assumptions changes (as recommended in Section III of this report) were implemented, the average employer

rate would have increased by 2.71% of payroll and the average member rate would have been increased by 0.16% of payroll. Of the various economic assumption changes, the most significant cost impact is from the investment return assumption change.

Furthermore, if all of the proposed demographic assumption changes (as recommended in Section IV of this report) were implemented, the average employer rate would have increased by 0.99% of payroll. The average member rate would have decreased by 0.01% of payroll. Of the various demographic assumption changes, the most significant cost impact is from the mortality assumption change.

Therefore, the estimated cost impact of all proposed assumption changes (both economic and demographic) is 3.70% of payroll for the average employer rate, where the Normal Cost rate increased by 0.70%, the UAAL amortization rate increased by 2.99% and the explicit administrative expense load increased by 0.01%. The average member rate would have increased by 0.15% of payroll, including a decrease in explicit administrative load of 0.01%. The cost associated with the administrative expense load has continued to be allocated to both the employer and the member based on the components of the total contribution rate (before expenses) for the employer and the member.

Section II 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 III for the economic assumptions and Section IV for the demographic assumptions. The cost impact of the proposed changes is detailed in Section V.

II. 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 percentage of members with an eligible spouse or domestic partner, spousal age difference, percent of members assumed to go on to work for a reciprocal system and reciprocal salary increases.

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.
- **Investment Return:** Expected long-term rate of return on the Association’s investments after investment 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 “across the board” real 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 promotional and merit increases. Payments to amortize any Unfunded Actuarial Accrued Liability (UAAL) are assumed to increase each year by the price inflation rate plus any “across the board” real pay increases that are assumed.

The setting of these economic assumptions is described in Section III.

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 terminate during the year, we would say the probability of termination in that age group is $50 \div 500$ 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, say, 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.

III. 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 it is set using primarily historical information. Following is an analysis of 15 and 30-year moving averages of historical inflation rates:

HISTORICAL CONSUMER PRICE INDEX – 1930 TO 2016 (U.S. City Average - All Urban Consumers)

	25 th Percentile	Median	75 th Percentile
15-year moving averages	2.5%	3.4%	4.5%
30-year moving averages	3.1%	3.9%	4.8%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary period over the past two decades. Also, the later of the 15-year averages during the period are lower as they do not include the high inflation years of the mid-1970s and early 1980s.

Based on information found in the Public Plans Data website, which is produced in partnership with the National Association of State Retirement Administrators (NASRA), the median inflation assumption used by 142 large public retirement funds in their 2015 fiscal year valuations was 3.00%. In California, CalPERS, CalSTRS, Contra Costa County, Los Angeles County, and two other 1937 Act CERL systems use an inflation assumption of 2.75% while OCERS and eleven other 1937 Act CERL systems use an inflation assumption of 3.00%.

KCERA’s investment consultant, Verus, anticipates an annual inflation rate of 2.10%, while the average inflation assumption provided by Verus and seven other investment advisory firms retained by Segal’s California public sector clients was 2.30%. 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.

To find a forecast of inflation based on a longer time horizon, we referred to the 2016 report on the financial status of the Social Security program. 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 2.60%. We also compared the yields on the thirty-year inflation indexed U.S. Treasury bonds to comparable traditional U.S. Treasury bonds. As of March 2017, the difference in yields is about 2.09%, which provides a measure of market expectations of inflation.

Based on all of the above information, we recommend that the current 3.25% annual inflation assumption be reduced to 3.00% for the June 30, 2017 actuarial valuation.

Retiree Cost of Living Increases

We also recommend maintaining the current assumptions to value the post-retirement COLA benefit at 2.50% per year. The current and proposed COLA assumptions are shown below:

Maximum COLA for all Tiers	Current Assumption	Proposed Assumption
2.50%	2.50%	2.50%

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.
- Using a lower long-term COLA assumption based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption of 3.00% 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 assumptions based on the long-term annual inflation assumption, as we have 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 investment expenses and risk.

Real Rate of Investment Return

This component represents the portfolio's incremental investment market returns over inflation. Theory has it that as an investor takes a greater investment risk, the return on the investment is expected to also be greater, at least in the long run. This additional 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 association's portfolio will vary with the Board's asset allocation among asset classes.

The following is KCERA's current target asset allocation and the assumed real rate of return assumptions by asset class. The first column of real rate of return assumptions are determined by reducing Verus' total or "nominal" 2017 return assumptions by their assumed 2.10% inflation rate. The second column of returns (except for Value Added Real Estate, Hedge Funds, Private Equity and Private Credit) represents the average of a sample of real rate of return assumptions, where each firm's nominal returns have been reduced by that firm's assumed inflation rate. The

sample includes the expected annual real rate of return provided to us by Verus and seven other investment advisory firms retained by Segal’s public sector clients. We believe these averages are a reasonable forecast of long term future market returns in excess of inflation.¹

KCERA’S TARGET ASSET ALLOCATION AND ASSUMED ARITHMETIC REAL RATE OF RETURN ASSUMPTIONS BY ASSET CLASS AND FOR THE PORTFOLIO

Asset Class	Percentage of Portfolio	Verus’ Assumed Real Rate of Return²	Average Assumed Real Rate of Return from a Sample of Consultants to Segal’s California Public Sector Clients³
Large Cap U.S. Equity	15%	3.80%	5.61%
Small Cap U.S. Equity	4%	4.90%	6.37%
Global Equity	6%	6.30%	6.50%
Developed International Equity	8%	9.20%	6.96%
Emerging Market Equity	4%	9.70%	9.28%
U.S. Core Fixed Income	19%	1.40%	1.06%
High Yield/Specialty	6%	3.10%	3.65%
Emerging Market Debt	4%	4.50%	3.85%
Core Real Estate	5%	3.00%	4.37%
Value Added Real Estate	5%	6.00%	6.00% ⁴
Commodities	4%	3.40%	3.76%
Hedge Funds	10%	4.70%	4.70% ⁴
Private Equity	5%	8.70%	8.70% ⁴
Private Credit	5%	5.10%	5.10% ⁴
Total	100%	4.65%	4.82%

The above are representative of “indexed” returns and do not include any additional returns (“alpha”) from active management. This is consistent with the Actuarial Standard of Practice No. 27, Section 3.6.3.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 believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the measurement period.”

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.

² Derived by reducing Verus’ nominal rate of return assumptions by their assumed 2.10% inflation rate.

³ These are based on the projected arithmetic returns provided by Verus and seven other investment advisory firms serving the county retirement systems of Kern and 16 other city and county retirement systems in California. These return assumptions are gross of any applicable investment expenses.

⁴ For these asset classes, Verus’ 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 Verus’ assumption should more closely reflect the underlying investments made specifically for KCERA.

The following are some observations about the returns provided above:

1. The investment consultants to our California public sector clients have each provided us with their expected real rates of return for each asset class, over various future time periods. However, in general, the returns available from investment consultants are projected over time periods shorter than the durations of a retirement plan's liabilities.
2. Using a sample average of expected real rate of returns allows the KCERA'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.
3. Therefore, we recommend that the 4.82% portfolio real rate of return be used to determine KCERA's investment return assumption. This is 0.11% higher than the return that was used three years ago in the review to prepare the recommended investment return assumption for the June 30, 2014 valuation. The difference is due to changes in KCERA's target asset allocation (-0.02%), changes in the real rate of return assumptions provided to us by the investment advisory firms (+0.10%) and the interaction effect of these two changes (+0.03%).

Investment 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. KCERA has previously adopted an explicit administrative expenses assumption and used that in the development of employer and member contributions starting with the June 30, 2014 valuation. The payment of those expenses would not result in a reduction in the net income available from investment return.

The current investment expense assumption is 0.23% of the market value of assets. The following table provides the investment expenses in relation to the market value of assets for the five years ending June 30, 2016.

INVESTMENT EXPENSES AS A PERCENTAGE OF MARKET VALUE OF ASSETS (Dollars in 000's)

Year Ending June 30	Market Value of Assets ⁵	Investment Expenses ⁶	Investment %
2012	\$2,800,024	\$9,045	0.32
2013	3,104,770	8,615	0.28
2014	3,576,112	8,473	0.24
2015	3,625,093	13,608	0.38
2016	3,571,588	13,175	0.37
Five-Year Average			0.32
Recommendation			0.35

⁵ As of end of plan year.

⁶ Excludes 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.

The average investment expenses percentage over this five-year period is 0.32% of the market value of assets. They exclude investment expenses associated with private equity/credit and hedge funds. This is because the capital market assumptions provided by Verus for those categories are already net of investment expenses. Note that while the investment expenses can fluctuate depending on the actual return for the year, we believe that it is reasonable to set this assumption based on the experience over the most recent five-year period. Based on this experience, we believe that an increase in the future expense assumption from 0.23% to 0.35% is reasonable.

Note related to investment expenses paid to active managers – As cited above, under Section 3.6.3.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.” For KCERA, nearly all of the investment expenses were paid for expenses associated with active managers.

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. If necessary, we will work with the KCERA’s staff to determine whether future studies might potentially exclude the level of investment expenses for active managers that are expected to be offset by investment returns. For now, 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. For example, 0.25% of alpha would increase the confidence level by 3% (see discussions that follow on definitions of risk adjustment and confidence level).

Administrative Expenses

The current administrative expense assumption is 0.90% of payroll. The following table provides the administrative expenses (i.e., non-investment related expenses) in relation to the projected payroll for each of the five years ending June 30, 2016.

ADMINISTRATIVE EXPENSES AS A PERCENTAGE OF PAYROLL (Dollars in 000's)

Year Ending June 30	Payroll	Administrative Expenses	Administrative Expenses as a Percent of Payroll %
2012	\$526,079	\$3,469	0.66
2013	516,465	3,848	0.75
2014	533,851	4,860	0.91
2015	531,598	4,887	0.92
2016	537,540	5,224	0.97
Five-Year Average			0.84
Recommendation			0.90

The average administrative expenses percentage over this five-year period is 0.84% of payroll, with the most recent values higher than this average. Based on this experience, we recommend maintaining the current administrative expense assumption at 0.90% of projected payroll. This expense will continue to be allocated to both the employer and member based on the total average contribution rates in the upcoming June 30, 2017 actuarial valuation, as determined before including the administrative expenses.

Risk Adjustment

The real rate of return assumption for the portfolio is adjusted to reflect the potential risk of shortfalls in the return assumptions. KCERA'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.⁷ The 4.82% expected real rate of return developed earlier in this report was based on expected mean or average arithmetic returns. This means there is a 50% chance of the actual return in each year being at least as great as the average (assuming a symmetrical distribution of future returns). The risk adjustment is intended to increase that probability somewhat above the 50% level. This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not. Note that, based on the investment return assumptions recently adopted by systems that have been analyzed under this model, we observe a confidence level generally in the range of 50% to 60%.

Three years ago, the Board adopted an investment return assumption of 7.50%. That return implied a risk adjustment of 0.23%, reflecting a confidence level of 53% that the actual average return over 15 years would not fall below the assumed return, assuming that the distribution of returns over that period follows the normal statistical distribution.⁸

In our model, the confidence level associated with a particular risk adjustment represents the likelihood that the actual average return would equal or exceed the assumed value over a 15-year period. For example, if we set our real rate of return assumption using a risk adjustment that produces a confidence level of 60%, then there would be a 60% chance (6 out of 10) that the average return over 15 years will be equal to or greater than the assumed value. 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.

If we use the same 53% confidence level from our last study to set this year's risk adjustment, based on the current long-term portfolio standard deviation of 11.70% provided by Verus, the corresponding risk adjustment would be 0.26%. Together with the other investment return

⁷ This type of risk adjustment is sometimes referred to as a "margin for adverse deviation."

⁸ Based on an annual portfolio return standard deviation of 10.40% provided by Wurts (before they became part of Verus) in 2014. Strictly speaking, future compounded long-term investment returns will tend to follow a log-normal distribution. However, we believe the Normal distribution assumption is reasonable for purposes of setting this type of risk adjustment.

components, this would result in an investment return assumption of 7.21%, which is lower than the current assumption of 7.50%.

Based on the general practice of using one-quarter percentage point increments for economic assumptions, we evaluated the effect on the confidence level of a net investment return assumption of 7.25%. That assumption, together with the other investment return components, would produce a risk adjustment of 0.22%, which (with rounding) corresponds to a confidence level of 53%. This is equal to the confidence level of 53% used in KCERA’s last study for the June 30, 2014 valuation. We believe this analysis supports reducing the current assumption from 7.50% to 7.25%.

The table below shows KCERA’s investment return assumptions and for the years when this analysis was performed, the risk adjustments and corresponding confidence levels compared to the values for prior studies.

HISTORICAL INVESTMENT RETURN ASSUMPTIONS, RISK ADJUSTMENTS AND CONFIDENCE LEVELS BASED ON ASSUMPTIONS ADOPTED BY THE BOARD

Year Ending June 30	Investment Return	Risk Adjustment	Corresponding Confidence Level
2011 - 2013	7.75%	(0.04%)	49%
2014 - 2016	7.50%*	0.23%	53%
2017 (Recommended)	7.25%*	0.22%	53%

* These investment return assumptions are gross of administrative expenses.

As we have discussed in prior years, the risk adjustment model and associated confidence level is most useful as a means for comparing how KCERA has positioned itself relative to risk over periods of time.⁹ The use of a 53% 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.
- The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by Verus. 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.
- A confidence level of 53% is within the range of about 50% to 60% that corresponds to the risk adjustments used by most of Segal’s other California public retirement system clients. Most public retirement systems that have recently reviewed their investment return assumptions have seen decreases in their confidence level even though they adopted more conservative investment return assumptions for their valuations.

⁹ 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.”

- 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”.

Taking into account the factors above, our recommendation is to reduce the net investment return assumption from 7.50% to 7.25%. As noted above, this return implies a 0.22% risk adjustment, reflecting a confidence level of 53% that the actual average return over 15 years would not fall below the assumed return. The reduction in the return assumption is almost solely due to the lower inflation assumption.

Recommended Investment Return Assumption

The following table summarizes the components of the investment return assumption developed in the previous discussion. For comparison purposes, we have also included similar values from the last study.

CALCULATION OF INVESTMENT RETURN ASSUMPTION

Assumption Component	Recommended Value	Adopted Value
	June 30, 2017	June 30, 2014
Inflation	3.00%	3.25%
Plus Average Real Rate of Return	4.82%	4.71%
Minus Expense Adjustment	(0.35%)	(0.23%)
Minus Risk Adjustment	(0.22%)	(0.23%)
Total	7.25%	7.50%
Confidence Level	53%	53%

Based on this analysis, we recommend that the investment return assumption be decreased from 7.50% to 7.25% per annum.

Effect of Gain Sharing Provisions

The recommended investment return assumption has been developed without taking into consideration any impact of the 50/50 excess earnings allocation between the retirement and Supplemental Retiree Benefits (SRBR) Reserve asset pools. This is based on our understanding that Article 5.5 of the Statute, which authorizes the allocation of 50% allocation of excess earnings to the SRBR, does not allow for the use of a different investment return for funding than is used for interest crediting. This would appear in effect to preclude the prefunding of the SRBR through the use of an assumption lower than the market earnings assumption.

Actuarial Standard of Practice (ASOP) No. 4 (“*Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*”) was revised and adopted in December 2013. The revised ASOP states that some plan provisions, including gain sharing provisions, “may create pension obligations that are difficult to appropriately measure using traditional valuation procedures.” ASOP No. 4 now mentions that “for such plan provisions, the actuary should consider using alternative valuation procedures, such as stochastic modeling....to reflect the impact of variations in experience from year to year.”

Accordingly, we performed stochastic modeling in December 2015 to estimate the impact of the 50% allocation of future excess earnings to the SRBR. The results of our model indicated that the 50/50 allocation of future excess earnings would have about the same impact as an “outflow” (i.e., assets not available to fund the benefits included in this valuation) that would average approximately 0.3% of assets over time. This was done by comparing the future impact on the employer’s contribution rate over a 15-year period with and without the 50% allocation of excess earnings to the SRBR.

We recommend that we continue to develop our recommended investment return assumption and the resultant employee and employer contribution rates without considering the 50% allocation of excess earnings to the SRBR. In addition, we would continue to disclose the additional SRBR liability by re-measuring the pension liabilities under a reduced investment return assumption.

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 a 7.25% investment return assumption is now the most common assumption, and is used by nine County employees retirement systems. However, a 7.00% investment return assumption is becoming more common among California public sector retirement systems. In particular, six County employees retirement systems (Contra Costa, Fresno, Mendocino, Sacramento, San Mateo and Santa Barbara) use a 7.00% earnings assumption. Furthermore, the CalPERS Board has approved a reduction in the earnings assumption from 7.50% to 7.00% over the next three years. In addition, CalSTRS recently adopted a 7.25% earnings assumption for the 2016 valuation (down from 7.50%) and a 7.00% earnings assumption for the 2017 valuation.

The following table compares KCERA’s recommended net investment return assumption against those of the nationwide public retirement systems that participated in the National Association of State Retirement Administrators (NASRA) 2016 Public Fund Survey for 142 large public retirement funds in their 2015 fiscal year valuations (after excluding one low outlier):

		NASRA 2016 Public Fund Survey		
Assumption	KCERA	Low	Median	High
Net Investment Return	7.25%	5.50%	7.50%	8.50%

The detailed survey results show that more than one-half of the systems have an investment return assumption in the range of 6.75% to 7.75%, and over half of those systems have used an assumption of 7.50%. The survey also notes that several plans have reduced their investment return assumption during the last year. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

In summary, we believe that both the risk adjustment model and other considerations indicate a lower earnings assumption. The recommended assumption of 7.25% provides for a risk margin within the risk adjustment model consistent with recent KCERA practice, and it is consistent with KCERA’s current practice relative to other public systems.

C. Salary Increase

Salary increases impact plan costs in two ways: (i) by increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and (ii) by increasing total active member payroll which in turn generates lower UAAL contribution rates. 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 are recommending that the assumed rate of inflation be reduced from 3.25% to 3.00% per annum. 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 0.6% - 0.9% 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 June 2016. In that report, real "across the board" pay increases are forecast to be 1.2% per year under the intermediate assumptions.

The real pay increase assumption is generally considered a more "macroeconomic" assumption, which 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 KCERA's active members, the actual average inflation plus "across the board" increase (i.e., wage inflation) over three year period ending June 30, 2016 was 0.07%.

Considering these factors, 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 decrease from 3.75% to 3.50%.

3. **Promotional and Merit 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 KCERA, there are service-specific promotional and merit increases.

The annual promotional and merit 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. Increases are measured separately for General and Safety members. This is accomplished by:

- a. Measuring each continuing member’s actual salary increase over each year of the experience period;
- b. Excluding any members with increases of more than 50% or decreases of more than 25% during any particular year;
- c. Categorizing these increases according to member demographics;
- 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 three-year 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 promotional and merit assumptions should be used in combination with the 3.50% assumed inflation and real “across the board” increases.

The following table shows the General members’ actual average promotional and merit increases by years of service over the three-year period from July 1, 2013 through June 30, 2016 along with the actual average increases based on the current three-year periods and those shown in the prior experience study. The current and proposed assumptions are also shown. The actual increases for the most recent three-year period 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 over the current three-year experience period (-0.1% on average).

**GENERAL MEMBERS
MERIT AND PROMOTIONAL INCREASES
(Actual vs. Proposed Assumption)**

Years of Service	Rate (%)			
	Current Assumption	Actual Average Increase (Last 3 Years)	Actual Average Increase from Current and Prior Study	Proposed Assumption
Less than 1	5.50	4.40	4.29	5.50
1	4.00	7.10	3.13	4.00
2	3.50	6.49	3.07	3.50
3	3.00	5.50	3.58	3.00
4	2.25	4.67	2.97	2.50
5	2.00	3.88	2.64	2.25
6	1.75	3.06	2.02	2.00
7	1.50	2.74	1.22	1.50
8	1.25	2.35	0.06	1.25
9	1.00	2.60	0.62	1.00
10	0.90	2.76	1.72	0.90
11	0.80	2.17	0.57	0.80
12	0.70	1.85	0.88	0.70
13	0.60	1.76	0.95	0.60
14	0.50	2.12	0.74	0.50
15	0.50	2.03	0.33	0.50
16	0.50	2.20	0.72	0.50
17	0.50	1.28	0.75	0.50
18	0.50	1.55	(0.69)	0.50
19	0.50	2.04	0.10	0.50
20 & over	0.50	1.75	0.68	0.50

The following table provides the same information for Safety members. The actual average promotional and merit increases were determined by reducing the actual average total salary increases by the actual average inflation plus real “across the board” increase (i.e., wage inflation, estimated as the increase in average salaries) for each year over the three-year period (0.7% on average).

**SAFETY MEMBERS
MERIT AND PROMOTIONAL INCREASES
(Actual vs. Proposed Assumption)**

Years of Service	Rate (%)			
	Current Assumption	Actual Average Increase (Last 3 Years)	Actual Average Increase from Current and Prior Study	Proposed Assumption
Less than 1	8.00	9.83	9.61	9.00
1	6.50	7.47	5.75	6.50
2	5.50	6.07	2.64	5.50
3	4.00	5.61	4.69	4.25
4	3.50	5.65	5.10	3.75
5	3.25	4.55	4.52	3.25
6	3.00	3.56	4.07	3.00
7	2.50	1.84	1.92	2.50
8	1.75	0.80	0.67	1.75
9	1.50	1.02	0.74	1.50
10	1.25	0.55	1.45	1.25
11	1.00	0.16	1.08	1.00
12	0.90	(0.09)	0.30	0.90
13	0.85	0.21	3.02	0.85
14	0.80	0.48	1.76	0.80
15	0.75	0.36	0.87	0.75
16	0.70	0.09	1.88	0.70
17	0.65	0.34	1.90	0.65
18	0.60	(0.78)	(0.10)	0.60
19	0.55	(0.16)	0.32	0.55
20 & over	0.50	(0.11)	0.30	0.50

Charts 1 and 2 provide a graphical comparison of the actual promotional and merit increases, compared to the proposed and current assumptions. The charts also show the actual promotional and merit increases based on an average of both the current and previous three-year experience periods. This is discussed below. Chart 1 shows this information for General members and Chart 2 for Safety members.

We realize that the most recent and the prior experience study period may not be indicative of typical future long-term promotional and merit salary increases. This appears to be the case for both General and Safety members as they received virtually no “across the board” salary increases (based on the very low or negative increase in average wages). In this situation, our model may lead to higher estimated promotional and merit increases. Therefore, we also examined the promotional and merit salary experiences used in the prior study. We believe that when the experiences from the last two studies are combined into an average result, it provides a representation of potential future promotional and merit salary increases over the long term. However, in our proposed changes to the promotional and merit increases, we have given relatively less weight to the actual average increases experience during the last two studies.

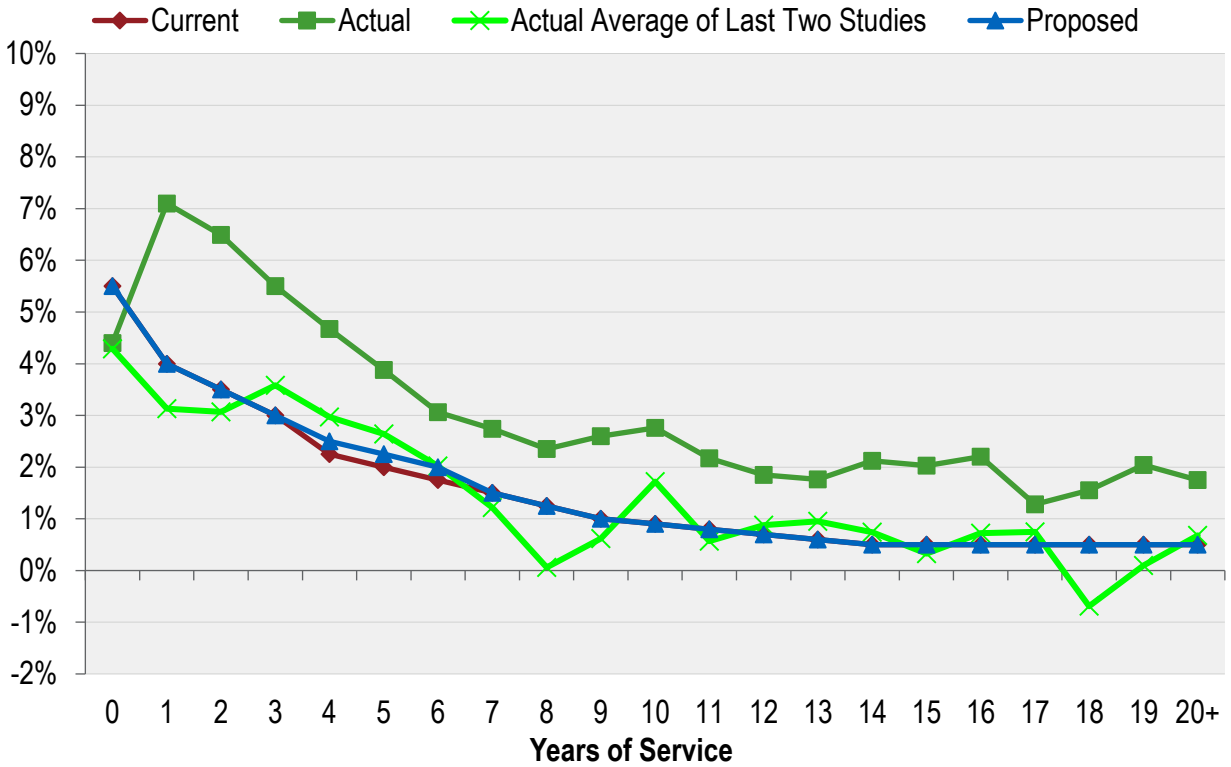
Based on this experience, we are proposing slight overall increases in the promotional and merit salary increases for both General and Safety members. Overall, salary increases are assumed to be lower for General and Safety members due to the lower price inflation assumption.

Active Member Payroll

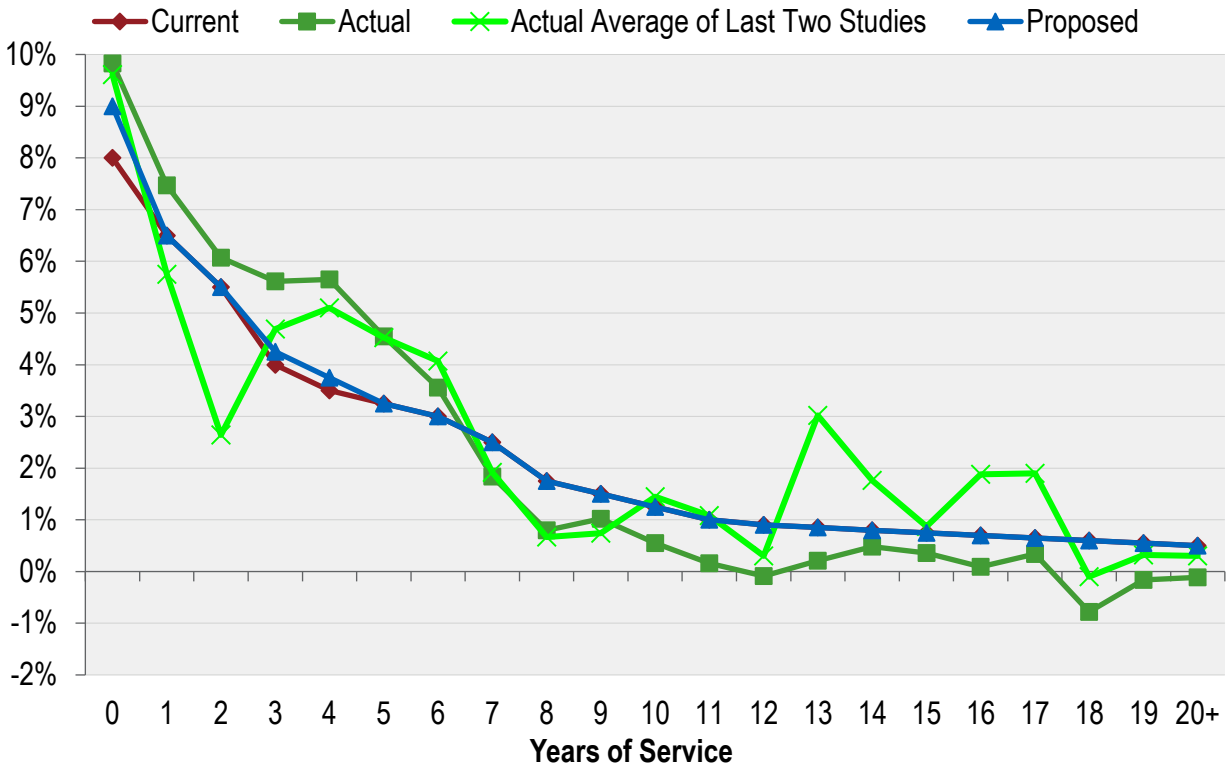
Projected active member payrolls are used to develop the UAAL contribution rate. Future values are determined as a product of the number of employees in the workforce and the average pay for all employees. The average pay for all employees increases only by inflation and real “across the board” pay increases.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

We recommend that the active member payroll increase assumption be decreased from 3.75% to 3.50% annually, consistent with the combined inflation plus real “across the board” salary increase assumptions.

**CHART 1: PROMOTIONAL AND MERIT SALARY INCREASE RATES
GENERAL MEMBERS**



**CHART 2: PROMOTIONAL AND MERIT SALARY INCREASE RATES
SAFETY MEMBERS**



IV. Demographic Assumptions

A. 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.

The table on the following page shows the observed service retirement rates for General Tier I members based on the actual experience over the past three years. The observed service retirement rates were determined by comparing those members who actually retired from service to those eligible to retire from service. This same methodology is followed throughout this report and was described in Section II. Also shown are the current rates assumed and the rates we propose:

General Tier I

Age	Rate of Retirement (%)		
	Current Rate	Actual Rate	Proposed Rate
Under 50	0.00	90.91	0.00
50	6.00	5.33	6.00
51	6.00	5.22	6.00
52	6.00	4.77	6.00
53	6.00	7.41	6.00
54	8.00	8.09	8.00
55	11.00	7.41	10.00
56	12.00	11.11	12.00
57	15.00	13.62	14.00
58	16.00	14.09	15.00
59	19.00	18.02	19.00
60	23.00	23.48	23.00
61	25.00	18.88	23.00
62	30.00	26.07	25.00
63	30.00	16.05	25.00
64	30.00	18.38	25.00
65	30.00	36.70	32.00
66	40.00	32.89	35.00
67	40.00	28.30	35.00
68	40.00	48.39	40.00
69	40.00	39.13	40.00
70 and over	100.00	22.67	100.00

As shown above, we anticipate General Tier I members will retire slightly later than under the current assumptions and are mainly recommending decreases in some of the retirement rates.

Chart 3 that follows later in this section compares actual experience with the current and proposed rates of retirement for General Tier I members.

The following table shows the observed retirement rates for Safety Tier I members over the past three years. Also shown are the current rates assumed and the rates we propose:

Safety Tier I

Age	Rate of Retirement (%)		
	Current Rate	Actual Rate	Proposed Rate
Under 45	0.00	7.14	0.00
45	2.00	0.00	2.00
46	2.00	0.00	2.00
47	2.00	2.63	2.00
48	2.00	4.76	3.00
49	8.00	10.34	9.00
50	20.00	21.05	20.00
51	16.00	11.11	15.00
52	18.00	18.42	18.00
53	18.00	18.97	18.00
54	20.00	21.43	20.00
55	24.00	21.28	24.00
56	28.00	17.78	24.00
57	28.00	5.88	24.00
58	35.00	3.57	30.00
59	20.00	13.64	20.00
60	20.00	31.25	20.00
61	20.00	33.33	20.00
62	50.00	0.00	40.00
63	50.00	20.00	40.00
64	50.00	7.69	40.00
65 and over	100.00	33.33	100.00

As shown above, we anticipate Safety Tier I members will retire slightly later overall than under the current assumptions and are mainly recommending decreases in some of the retirement rates.

Chart 4 compares actual experience with the current and proposed rates for Safety Tier I members.

For General Tier II, General Tier III and Safety Tier II, we do not have credible experience from the past three years to proposed new rates based on actual retirements from members of those tiers. However, we have based our recommended rates for General Tier II, General Tier III and Safety Tier II on a combination of the current assumptions for these tiers and the lower than expected actual retirement experience that occurred for Tier I members.

The following are the current and proposed rates of retirement for General Tier II and General Tier III members:

Age	Rate of Retirement (%)			
	General Tiers IIA and IIB		General Tier III	
	Current Rate	Proposed Rate	Current Rate	Proposed Rate
Under 50	0.00	0.00	0.00	0.00
50	3.00	3.00	0.00	0.00
51	3.00	3.00	0.00	0.00
52	3.00	3.00	3.00	3.00
53	3.00	3.00	3.00	3.00
54	3.50	3.50	3.50	3.50
55	6.00	5.50	6.00	5.50
56	6.50	6.50	6.50	6.50
57	8.00	7.50	8.00	7.50
58	10.00	9.50	10.00	9.50
59	11.50	11.50	11.50	11.50
60	13.50	13.50	13.50	13.50
61	17.00	15.50	17.00	15.50
62	30.00	25.00	30.00	25.00
63	30.00	25.00	30.00	25.00
64	30.00	25.00	30.00	25.00
65	30.00	32.00	30.00	32.00
66	40.00	35.00	40.00	35.00
67	40.00	35.00	40.00	35.00
68	40.00	40.00	40.00	40.00
69	40.00	40.00	40.00	40.00
70 and over	100.00	100.00	100.00	100.00

The following are the current and proposed rates of retirement for Safety Tier II.

Age	Rate of Retirement (%)	
	Safety Tier II	
	Current Rate	Proposed Rate
Under 50	0.00	0.00
50	6.00	6.00
51	6.00	6.00
52	6.00	6.00
53	8.00	8.00
54	18.00	18.00
55	22.00	22.00
56	22.00	20.00
57	22.00	20.00
58	22.00	20.00
59	20.00	20.00
60	20.00	20.00
61	20.00	20.00
62	50.00	40.00
63	50.00	40.00
64	50.00	40.00
65	100.00	100.00
66	100.00	100.00
67	100.00	100.00
68	100.00	100.00
69	100.00	100.00
70 and over	100.00	100.00

Chart 5 compares the current rates with the proposed rates of retirement for General Tier II members.

Chart 6 compares the current rates with the proposed rates of retirement for General Tier III members.

Chart 7 compares the current rates with the proposed rates of retirement for Safety Tier II members.

Deferred Vested Members

In prior valuations, deferred vested General and Safety members were assumed to retire at age 57 and 53, respectively. The average age at retirement over the prior three years was 56.7 for

General and 52.0 for Safety. We recommend maintaining the current retirement age assumption for General and Safety deferred vested members at age 57 and age 53, respectively.

Reciprocity

It is also currently assumed that 55% of inactive General and 60% of inactive Safety deferred vested participants would be covered under a reciprocal retirement system and receive 4.25% annual salary increases from termination until their date of retirement. As of June 30, 2016, about 46% of the total General deferred vested and 54% of the total Safety deferred vested members have gone on to be covered by a reciprocal retirement system. Therefore, we recommend decreasing the reciprocal assumption to 50% for General members and decreasing the assumption to 55% for Safety members. This recommendation takes into account the experience of all deferred vested members as of June 30, 2016 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 it is known if they have reciprocity with a reciprocal retirement system.

In addition, we recommend a 4.00% annual salary increase assumption for General and Safety members be utilized to anticipate salary increases from the date of termination from KCERA to the expected date of retirement for deferred vested members covered by a reciprocal retirement system. This assumption is based on the ultimate 0.50% promotional and merit salary increase assumption for General and Safety members together with the 3.00% inflation and 0.50% real “across the board” salary increase assumptions that are recommended earlier in Section III of this report.

Form of Payment and Survivor Continuance under the Unmodified Option

In prior valuations, it was assumed that all members would select the unmodified option at retirement. Actual experience for recent new retirees shows that around 90% select the unmodified option. Therefore, we recommend maintaining the assumption that all members will elect the unmodified option at retirement.

It was also assumed that 75% of all active male members and 55% of all active female members who selected the unmodified option would be married or have an eligible domestic partner when they retired. We reviewed experience for new retirees during the three-year period and determined the actual percentage of these new retirees that had an eligible spouse or eligible domestic partner and selected the unmodified option at the time of retirement. The results of that analysis are shown below.

New Retirees – Actual percent with Eligible Spouse of Domestic Partner		
Year Ending June 30	Male	Female
2014	77%	79%
2015	76%	75%
2016	62%	51%
Total	72%	68%

According to experience of members who retired during the last three years, about 72% of all male members and 68% of all female members who selected the unmodified option were married or had a domestic partner at retirement. We recommend maintaining the assumption at 75% for male members and increasing the assumption to 60% for female members.

Since the value of the survivor’s 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 during the three-year period and studies done for other retirement systems, we recommend the following:

1. Since most the survivors are actually the opposite sex, even with the inclusion of domestic partners, we will continue to assume that the survivor’s sex is the opposite of the member.
2. The current and proposed assumption for the age of the survivor are shown below. These assumptions will continue to be monitored in future experience studies.

Survivor Ages – Current Assumptions			
Beneficiary Sex	Survivor’s Age as Compared to Member’s Age		
	Current Assumption	Actual Experience	Recommended Assumption
Male	3 years older	2.0 years older	2 years older
Female	3 years younger	4.4 years younger	3 years younger

CHART 3: RETIREMENT RATES – GENERAL TIER I MEMBERS

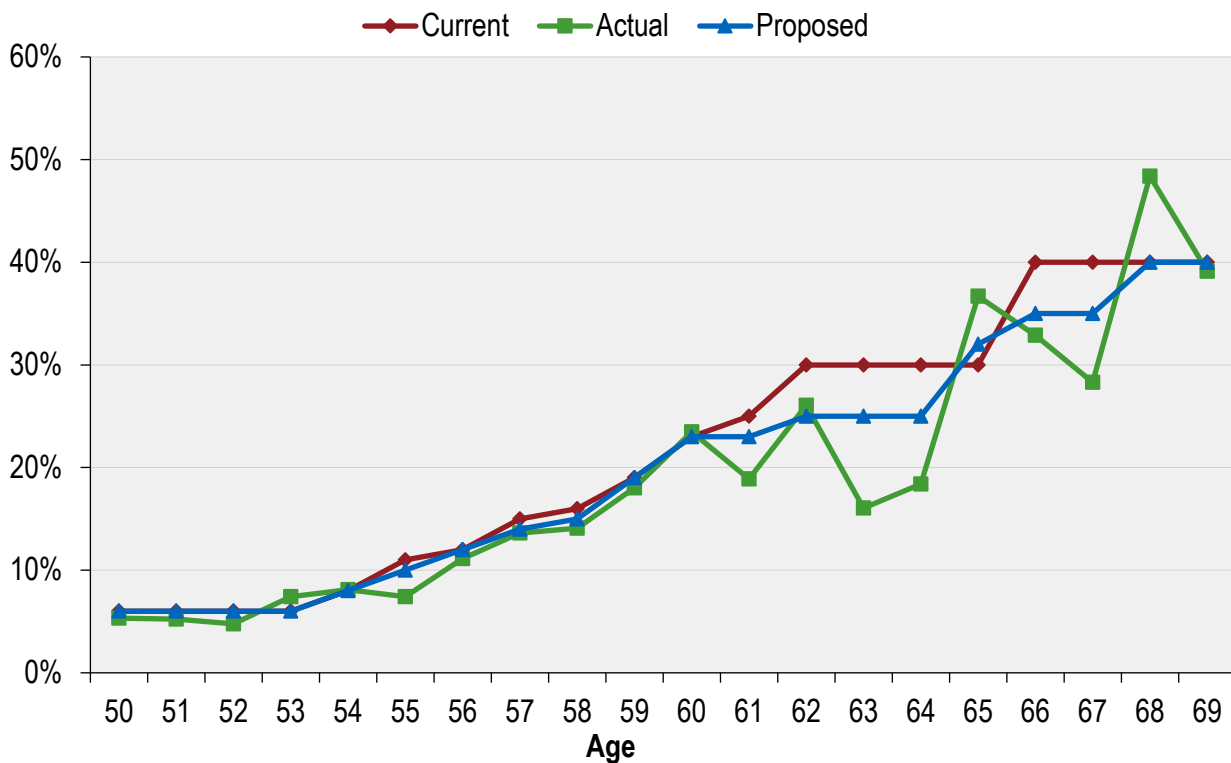


CHART 4: RETIREMENT RATES – SAFETY TIER I MEMBERS

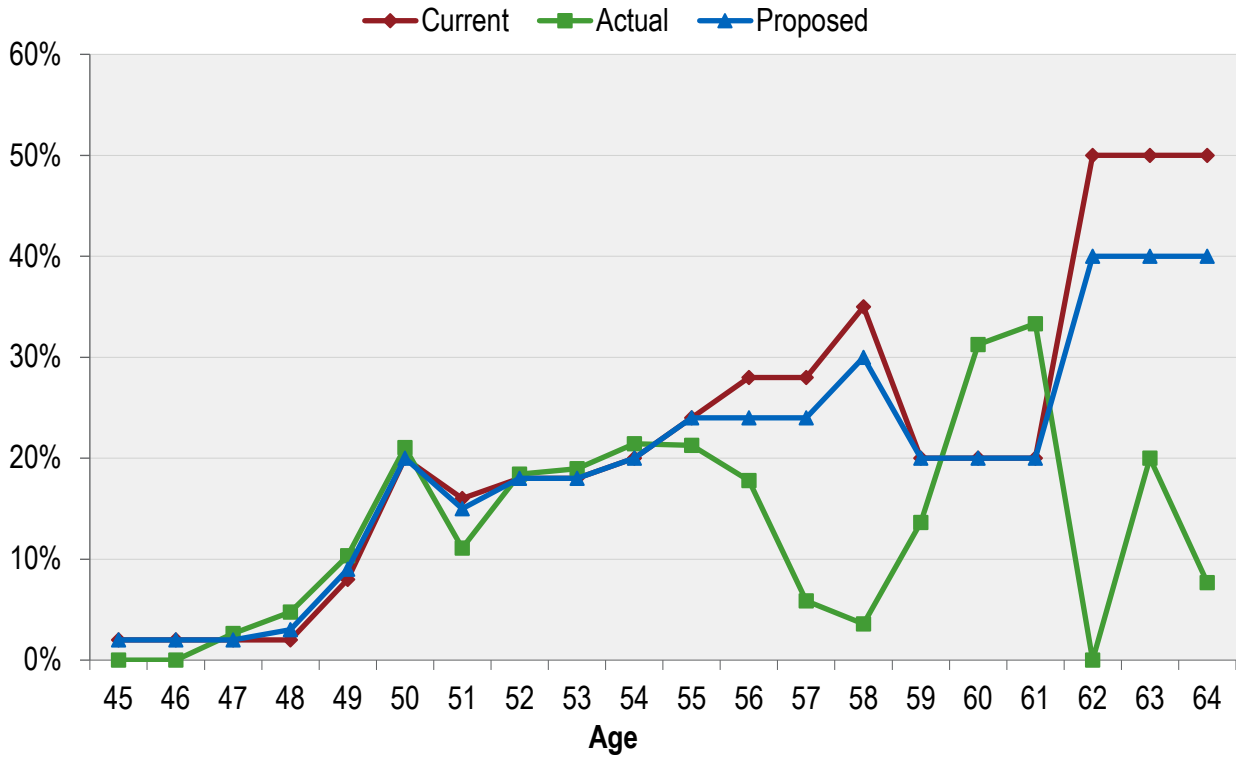


CHART 5: RETIREMENT RATES – GENERAL TIER II MEMBERS

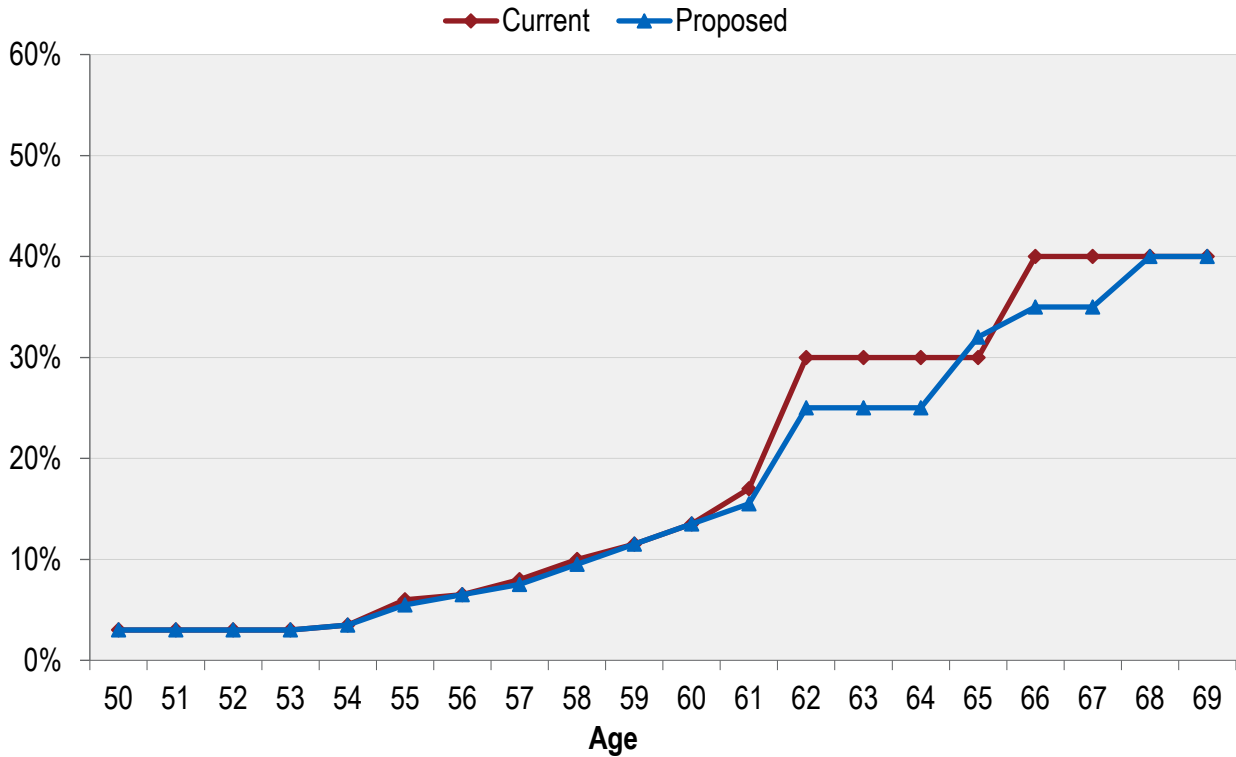


CHART 6: RETIREMENT RATES – GENERAL TIER III MEMBERS

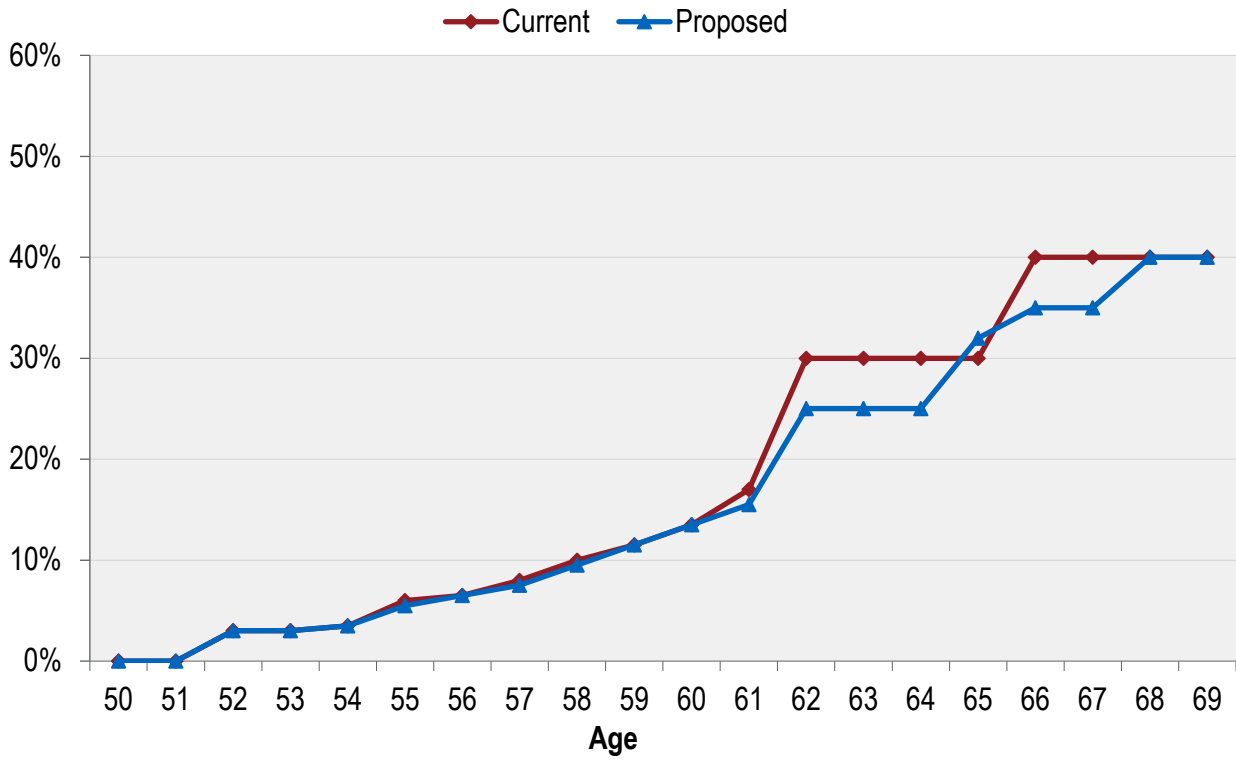
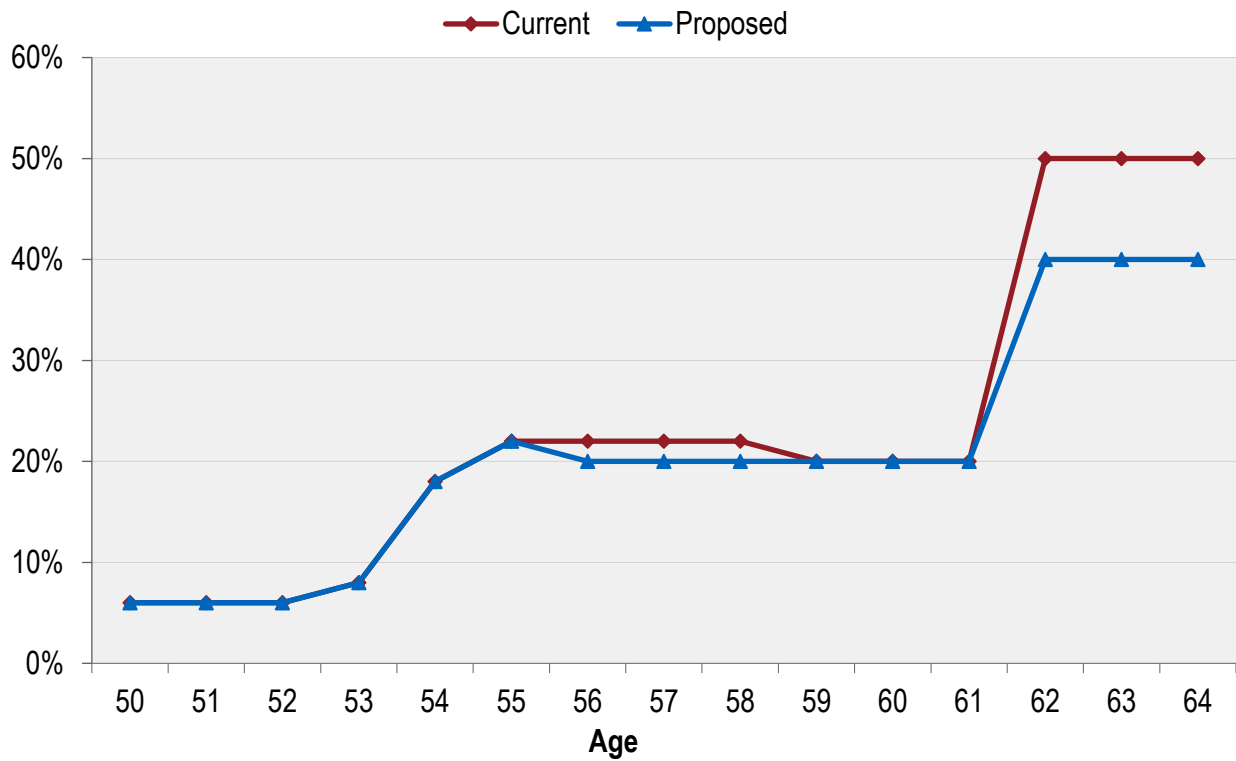


CHART 7: RETIREMENT RATES – SAFETY TIER II MEMBERS



B. 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 mortality rates project what proportion of members will die before retirement. For General members, the table currently being used for post-service retirement mortality rates is the RP-2000 Combined Healthy Mortality Table (separate tables for males and females) projected with Scale BB to 2023 set forward one year for males and females. For Safety members, the table currently being used for post-service retirement mortality rates is the RP-2000 Combined Healthy Mortality Table (separate tables for males and females) projected with Scale BB to 2023 with ages set back one year for males and females. Beneficiaries are assumed to have the same mortality of a General member of the opposite sex who has taken a service (non-disabled) retirement.

The Society of Actuaries (SOA) has published the RP-2014 family of mortality tables and associated mortality improvement scales. Within that family of mortality tables, there are mortality rates developed for annuitants on a “headcount” weighted basis that weight all retirees at the same age the same way without regard to the level of benefits those annuitants are receiving from a retirement plan. Mortality rates are also developed for annuitants on a “benefit” weighted basis, with higher credibility assigned to experience from annuitants receiving larger benefits. The headcount-weighted basis is the more common practice currently and is the approach used by Segal in the past for its California public system clients (including KCERA) and by other public sector actuaries in California.

As for the mortality improvement scales, they can be applied in one of two ways. Historically, the more common application is to use a “static” approach to anticipate a fixed level of mortality improvement for all annuitants receiving benefits from a retirement plan. This is in contrast to a “generational” approach where each future year has its own mortality table that reflects the forecasted improvements, using the published improvement scales. While the static approach is still used by some of Segal’s California public system clients, the “generational” approach is the emerging practice within the actuarial profession.

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. This is in contrast to updating a static mortality assumption with each experience study as we have proposed in prior experience studies.

The SOA is in the process of collecting data from public sector plans so that they can develop mortality tables based on public sector experience comparable to the RP-2014 mortality tables developed using data collected from private and multi-employer plans. Furthermore, after publishing the two-dimensional MP-2014 life expectancy improvement scale, the SOA replaced it with the two-dimensional MP-2015 life expectancy improvement scales to remove some of the conservatism built into the MP-2014 scale and to better reflect the most recent data of mortality improvement from the Social Security Administration. We understand that the Retirement Plans Experience Committee of the Society of Actuaries (RPEC) intends to publish annual updates to their mortality improvement scales. Improvement scale MP-2016 is the latest improvement scale available.

We recommend that given the trend in the retirement industry to move towards generational mortality, it would be reasonable for the Board to adopt the Headcount-Weighted RP-2014 mortality table (adjusted for KCERA experience), and project the mortality improvement generationally using the two-dimensional MP-2016 mortality improvement scale. Once the SOA has included data from public sector plans in developing the new tables, we will also include a discussion with the Board on whether to consider the benefit weighted mortality rates in a future experience study.

Note that in order to use more actual KCERA experience in our analysis, we have used experience for a six-year period from both the current and the prior experience study periods to study this assumption.

In the table below, we have provided the approximate increase in the total employer and member contribution rates based on the different approaches to build in margin for future mortality improvements.

	Employer and Member Contribution Rate Impact Combined
Headcount Weighted RP-2014 Family of Tables – Static Approach with Increased Margin	1.1% of payroll
Benefit Weighted RP-2014 Family of Tables – Static Approach with Increased Margin	2.3% of payroll
Headcount Weighted RP-2014 Family of Tables – Generational Approach	1.3% of payroll
Benefit Weighted RP-2014 Family of Tables – Generational Approach	2.6% of payroll

Pre-Retirement Mortality

In prior experience studies, the pre-retirement mortality rates for active members were set equal to the post-retirement mortality rates for retirees since the actual number of deaths among active members was not large enough to provide a statistically creditable analysis. However, this approach is not compatible with our current proposal because the post-retirement RP-2014 Healthy Annuitant table does not include rates for ages below 50.

From the RP-2014 family of tables, we recommend that pre-retirement mortality follow the Headcount-Weighted RP-2014 Employee Mortality Table (separate tables for males and females) times 80%, projected generationally with the two-dimensional scale MP-2016, all to account for the lower incidences of observed pre-retirement death on the combined General and Safety workforce. All pre-retirement deaths are assumed to be ordinary (non-service connected).

Post-Service Retirement Mortality

Our analysis starts with a table that shows, among all retired members, the actual deaths compared to the expected deaths under the current assumptions for the last six years. We also show the deaths under proposed assumptions. In prior years we have generally set the mortality assumption using a static mortality projection so that actual deaths will be at least 10% greater than those assumed. As noted above, we are recommending the use of a generational mortality table rather than static mortality. A generational mortality table 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. That is why the current actual to expected ratio shown in the table below for General and Safety is 100% and 98%, respectively. In future years these ratios would remain around 100%, as long as actual mortality improved at the same rates as anticipated in the generational mortality tables. The actual deaths compared to the expected deaths under the current and proposed assumptions for the last six years are as follows:

	General – Healthy			Safety – Healthy		
	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths
Male	234	244	260	73	90	89
Female	330	416	397	5	3	6
Total	564	660	657	78	93	95
Actual / Expected	117%		100%	119%		98%

For General members, the ratio of actual to expected deaths was 117%. We recommend updating the current table to the RP-2014 Headcount-Weighted Healthy Annuitant Mortality Table (separate tables for males and females) set forward one year for males and set forward two years for females. This table is then projected generationally with the two-dimensional mortality improvement scale MP-2016. This will bring the current actual to expected ratio to 100%.

For Safety members, the ratio of actual to expected deaths was 119%. We recommend updating the current table to the RP-2014 Headcount-Weighted Healthy Annuitant Mortality Table (separate tables for males and females) with ages set back one year for males and females. This table is then projected generationally with the two-dimensional mortality improvement scale MP-2016. This will bring the current actual to expected ratio to 98%.

All of this is consistent with ASOP 35 as we anticipate expected future improvement in life expectancy using the generational approach.

Chart 8 compares actual to expected deaths for General members under the current and proposed assumptions over the past six years. Experience shows that there were more deaths than predicted by the current table.

Chart 9 has the same comparison for Safety members. Experience shows that there were more deaths than predicted by the current table.

Chart 10 shows the life expectancies (i.e., expected future lifetime) under the current and the proposed tables for General members.

Chart 11 shows the same information for Safety members.

The expected deaths (Charts 8 and 9) and life expectancies (Charts 10 and 11) under the proposed generational mortality table are based on mortality rates from 2014 which is the base

year of the table. In practice, life expectancies will be increased after applying the mortality improvement scale.

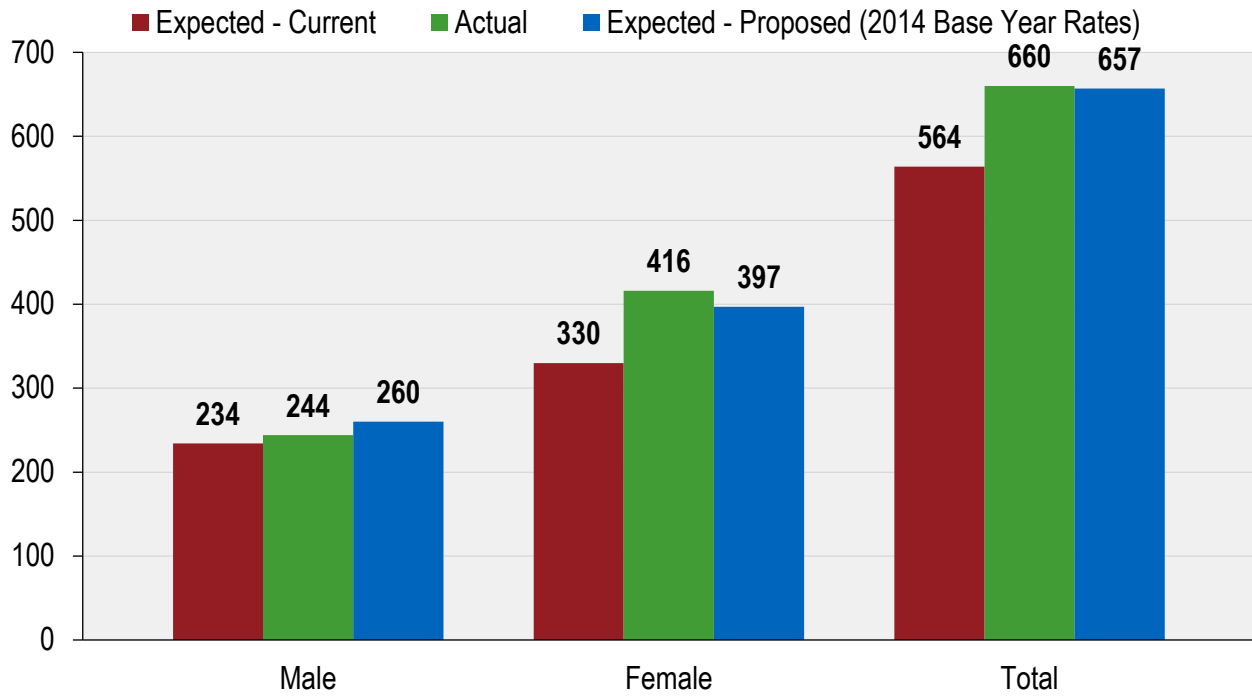
Mortality Table for Member Contributions, Optional Forms of Payment and Reserves

There are administrative reasons why a generational mortality table is more difficult to implement for determining member contributions for legacy tiers (i.e., General Tier I, General Tier IIA, Safety Tier I and Safety Tier IIA), optional forms of payment and reserves. 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 over a period that is close to the duration of the benefit payments for active members. We would recommend the use of this approximation.

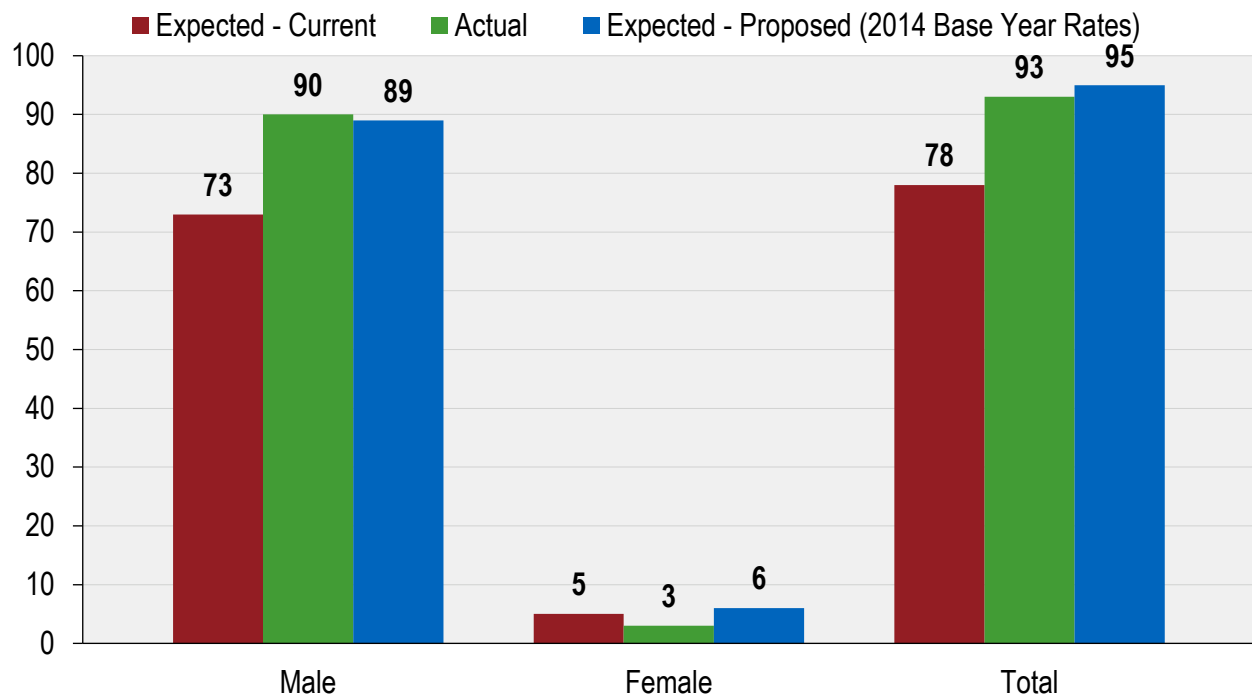
We recommend that the mortality table used for determining contributions for General members be updated from the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set forward one year for males and females weighted 30% male and 70% female to the RP-2014 Headcount-Weighted Healthy Annuitant Mortality Table projected to 2034 with the two-dimensional mortality improvement scale MP-2016 set forward one year for males and two years for females, weighted 30% male and 70% female. This is based on the proposed valuation mortality table for General members and the actual sex distribution of General members.

For Safety members, we recommend the mortality table be changed from the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set back one year for males and females weighted 80% male and 20% female to the RP-2014 Headcount-Weighted Healthy Annuitant Mortality Table projected to 2034 with the two-dimensional mortality improvement scale MP-2016 set back one year for males and females, weighted 80% male and 20% female. This is based on the proposed valuation mortality table for Safety members and the actual sex distribution of Safety members.

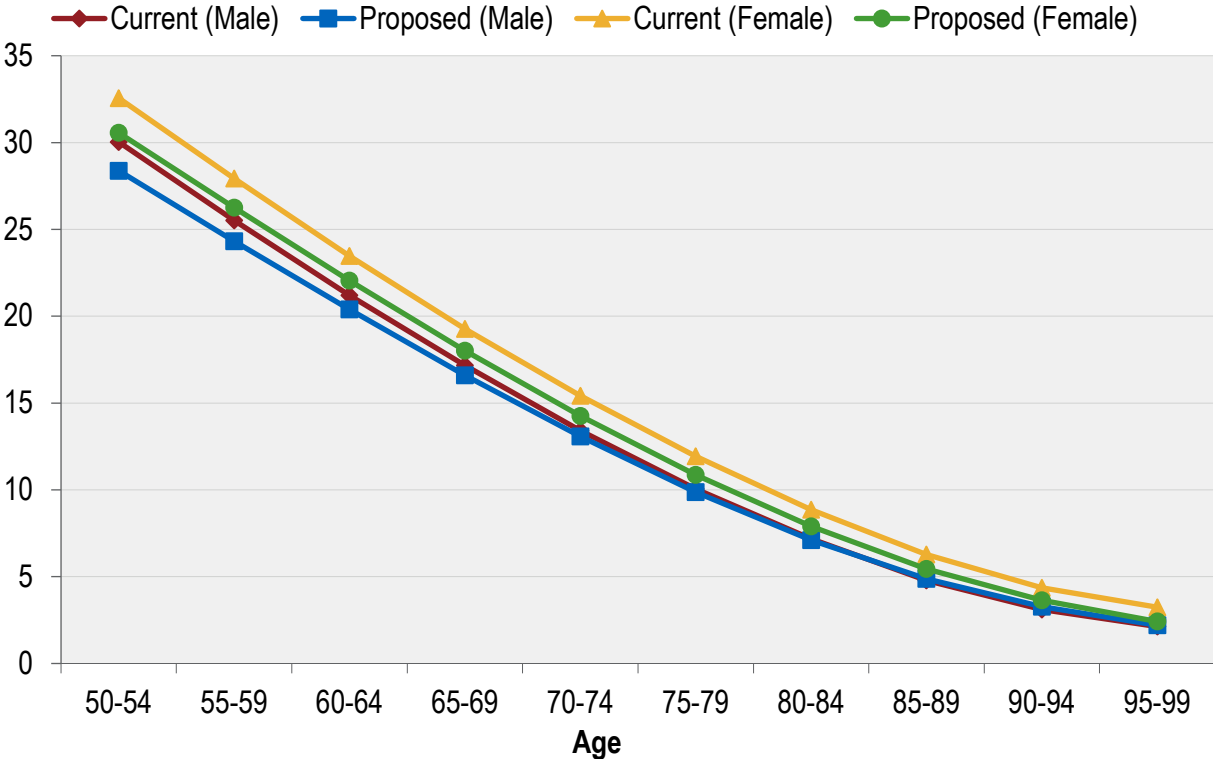
**CHART 8: POST-RETIREMENT DEATHS
NON – DISABLED GENERAL MEMBERS
(JULY 1, 2010 THROUGH JUNE 30, 2016)**



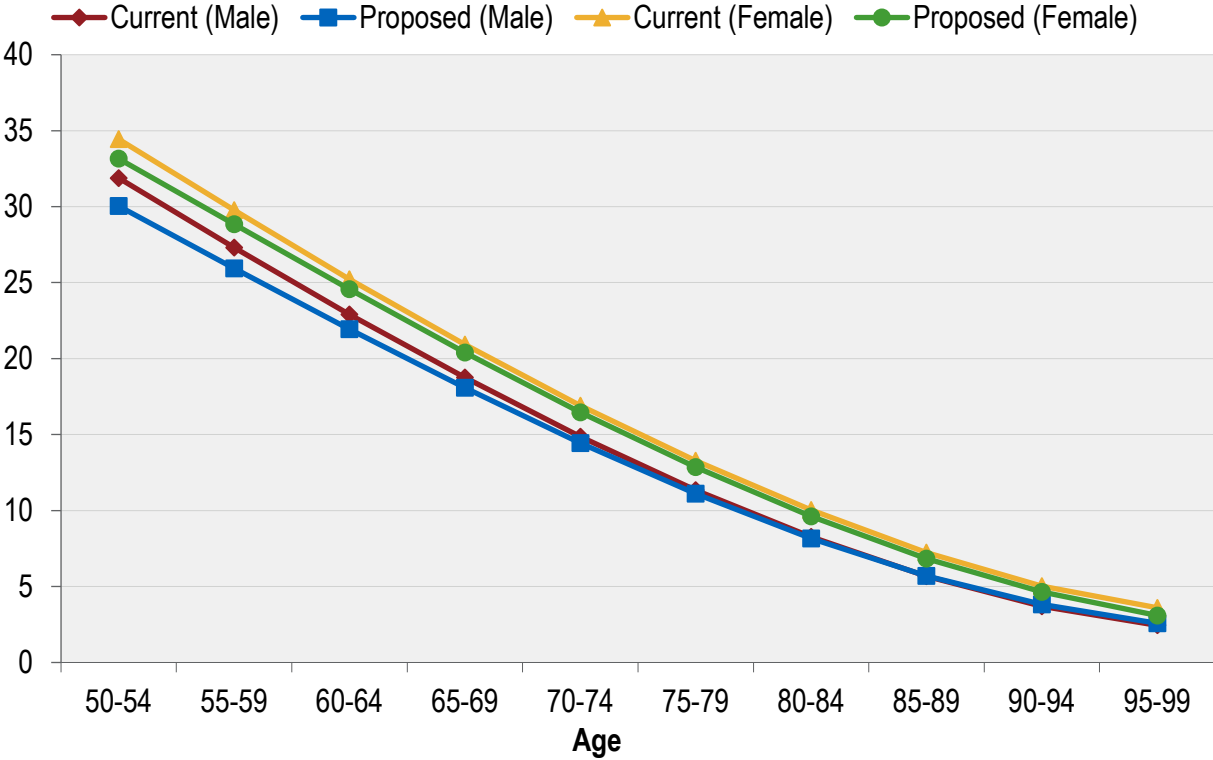
**CHART 9: POST-RETIREMENT DEATHS
NON – DISABLED SAFETY MEMBERS
(JULY 1, 2010 THROUGH JUNE 30, 2016)**



**CHART 10: LIFE EXPECTANCIES
NON – DISABLED GENERAL MEMBERS**



**CHART 11: LIFE EXPECTANCIES
NON – DISABLED SAFETY MEMBERS**



C. Mortality Rates – Disabled

Since mortality rates for disabled members can vary from those of healthy members, a different mortality assumption is often used. For General members, the table currently being used is the RP-2000 Combined Healthy Mortality Table (separate tables for males and females) projected with Scale BB to 2023 with ages set forward eight years for males and females. For Safety members, the table currently being used is the RP-2000 Combined Table (separate tables for males and females) projected with Scale BB to 2023 with ages set forward four years for males and females.

The number of actual deaths compared to the number expected under the current and proposed assumption for the last six years are as provided in the table below.

	General – Disabled			Safety – Disabled		
	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths
Male	41	40	40	47	49	49
Female	44	46	48	3	5	4
Total	85	86	88	50	54	53
Actual / Expected	101%		98%	108%		102%

Based on the actual experience, we recommend changing the mortality table for General disabled members to the RP-2014 Headcount-Weighted Healthy Annuitant Mortality Table (separate tables for males and females) set forward seven years for males and set forward eight years for females. This table is then projected generationally with the two-dimensional mortality improvement scale MP-2016. This will bring the current actual to expected ratio to 98%.

Likewise, based on the actual experience, we recommend changing the mortality table for Safety disabled members to the RP-2014 Headcount-Weighted Healthy Annuitant Mortality Table (separate tables for males and females) set forward three years for males and females. This table is then projected generationally with the two-dimensional mortality improvement scale MP-2016. This will also bring the current actual to expected ratio to 102%.

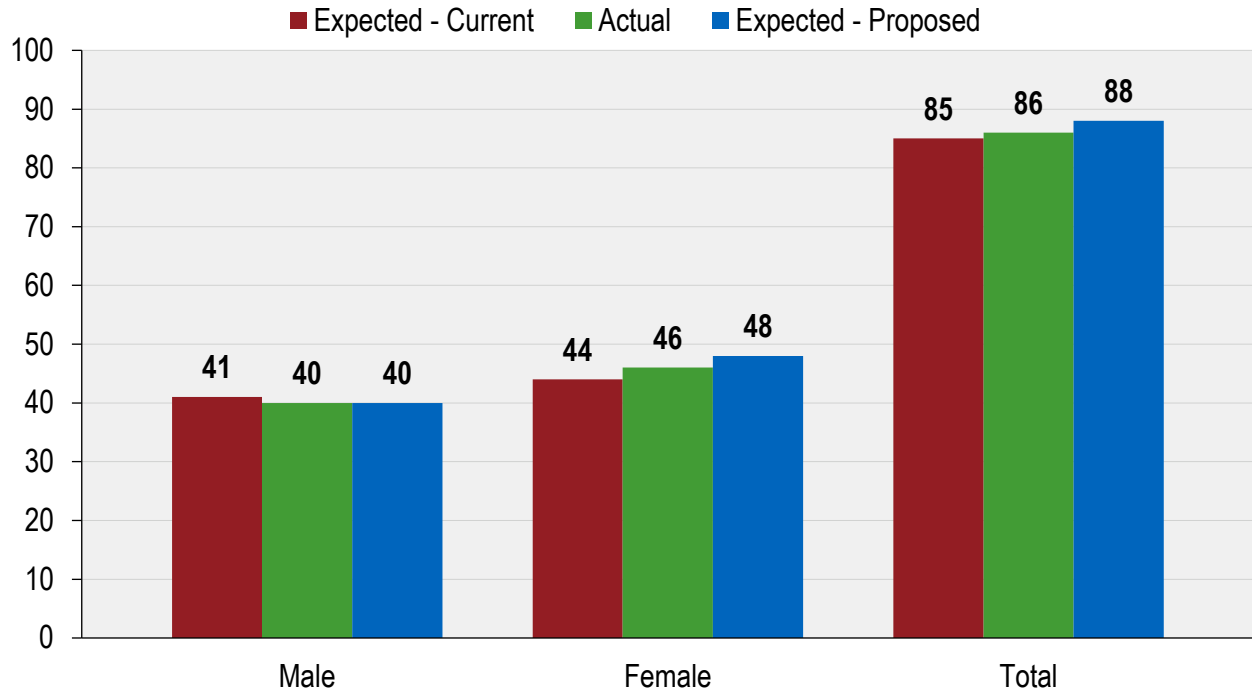
Chart 12 compares actual to expected deaths under both the current and proposed assumptions for disabled General members over the last six years. Experience shows that there were slightly more deaths than predicted by the current table.

Chart 13 has the same comparison for Safety members. Experience shows that there were more deaths than predicted by the current table.

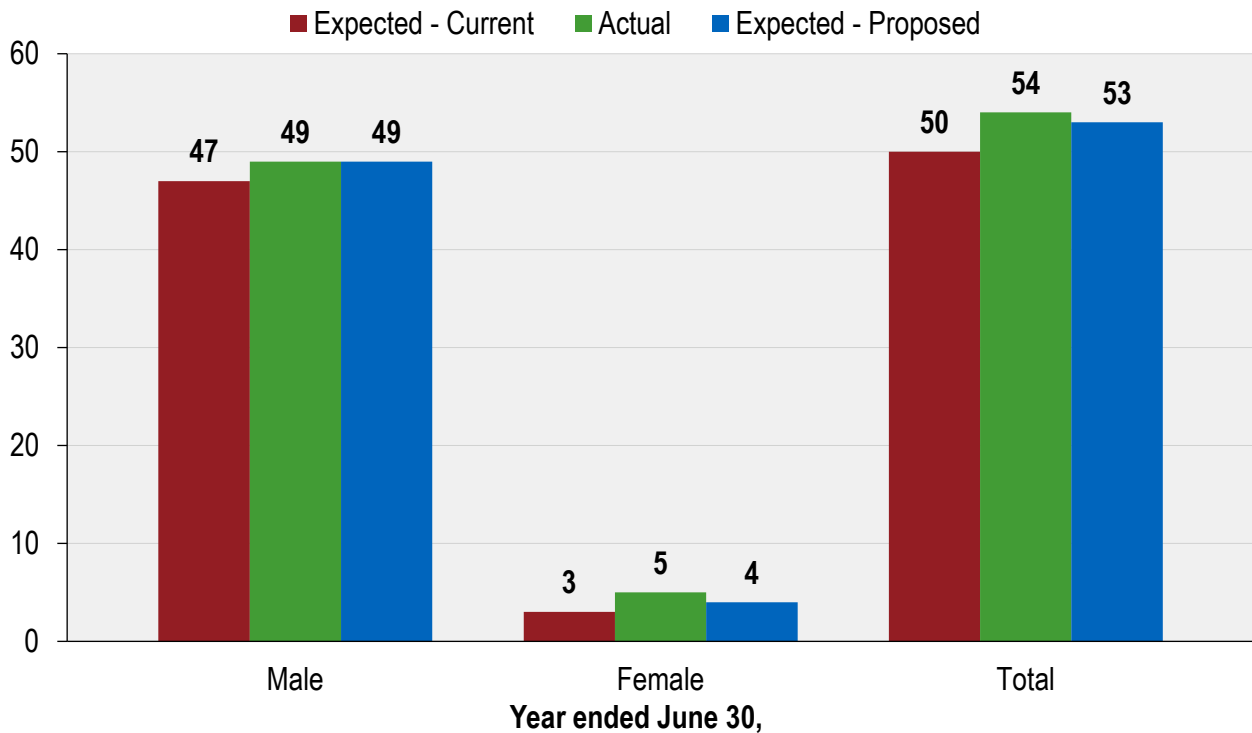
Chart 14 shows the life expectancies under both the current and proposed tables for General members.

Chart 15 shows the same information for Safety members.

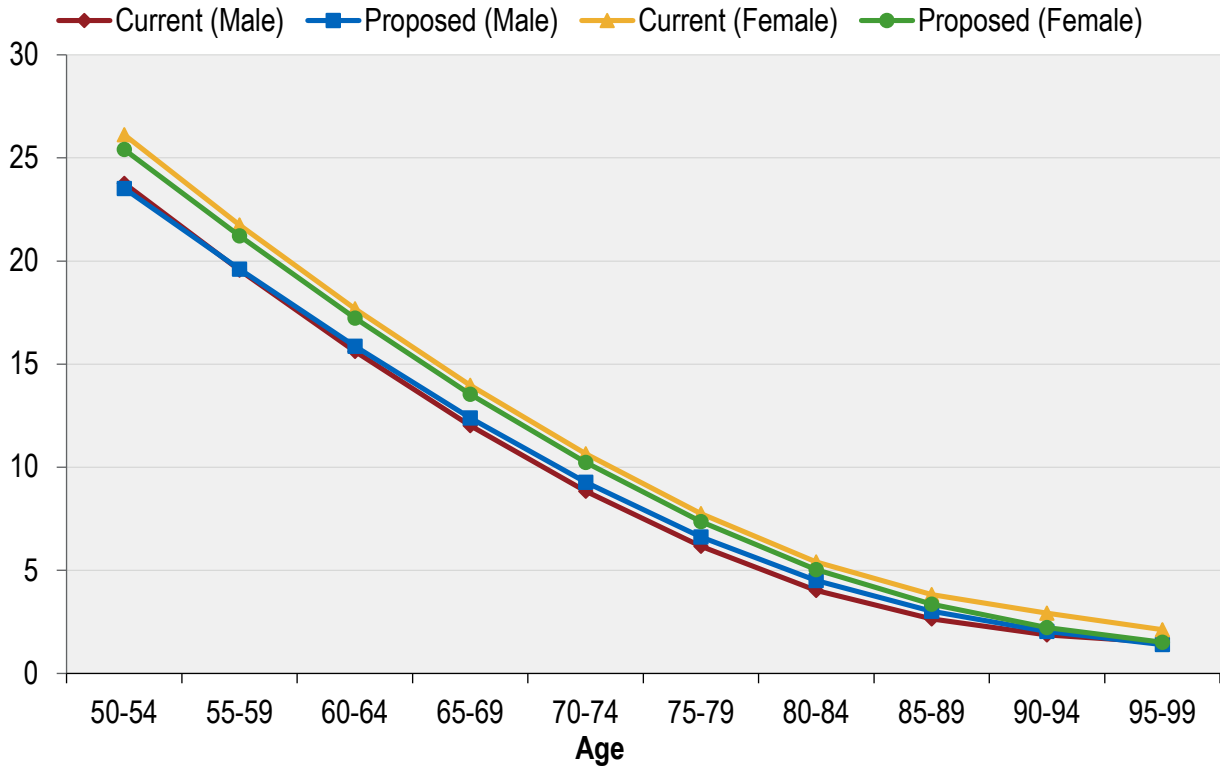
**CHART 12: POST-RETIREMENT DEATHS
DISABLED GENERAL MEMBERS
(JULY 1, 2010 THROUGH JUNE 30, 2016)**



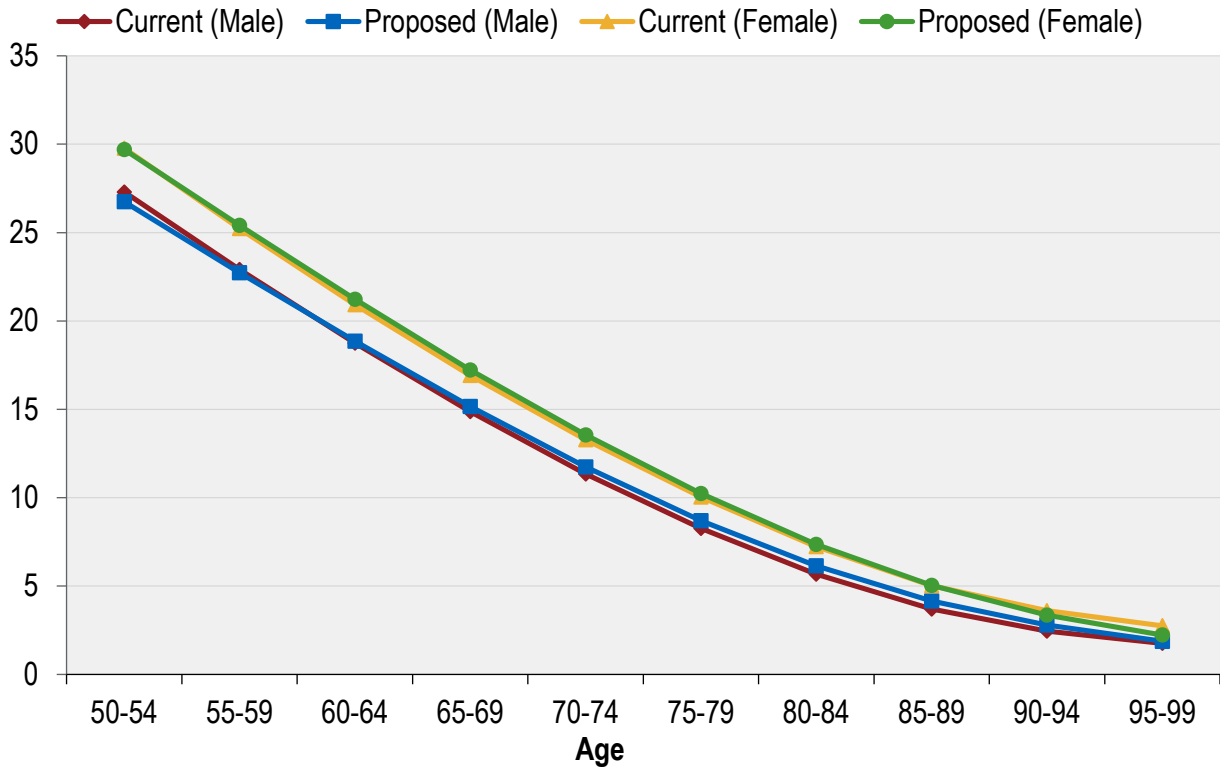
**CHART 13: POST-RETIREMENT DEATHS
DISABLED SAFETY MEMBERS
(JULY 1, 2010 THROUGH JUNE 30, 2016)**



**CHART 14: LIFE EXPECTANCIES
DISABLED GENERAL MEMBERS**



**CHART 15: LIFE EXPECTANCIES
DISABLED 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 a service-based assumption that a percentage of all terminated vested members will choose a refund of contributions. All terminated nonvested members are assumed to choose a refund of contributions. With this study, we continue to recommend that this same assumption structure be used.

The termination experience over the last three years for General and Safety members is shown by years of service in the following tables. Please note that we have excluded any members that were eligible for retirement. We also show the current and proposed assumptions.

Rates of Termination – General

Years of Service	Rate (%)		
	Current Rate	Actual Rate	Proposed Rate
Less than 1	18.00	15.70	17.00
1	14.00	11.89	13.00
2	10.00	11.10	10.00
3	8.00	9.60	9.00
4	6.50	9.37	7.50
5	6.00	7.39	6.50
6	5.00	6.33	5.50
7	4.50	5.47	5.00
8	4.00	6.18	4.50
9	3.50	4.57	4.00
10	3.25	3.25	3.25
11	3.00	4.75	3.00
12	2.80	4.59	2.80
13	2.60	1.62	2.60
14	2.40	1.54	2.40
15	2.30	2.84	2.30
16	2.20	2.96	2.20
17	2.10	0.74	2.10
18	1.90	0.88	1.90
19	1.70	1.69	1.70
20	1.50	2.06	1.50
21	1.30	2.33	1.30
22	1.10	2.78	1.10
23	1.00	1.52	1.00
24	1.00	2.38	1.00
25	1.00	2.70	1.00
26	1.00	5.26	1.00
27	1.00	0.00	1.00
28	1.00	0.00	1.00
29	1.00	0.00	1.00
30 & Over	0.00	0.00	0.00

Rates of Termination – Safety

Years of Service	Rate (%)		
	Current Rate	Actual Rate	Proposed Rate
Less than 1	8.00	7.98	8.00
1	5.00	7.79	6.00
2	3.50	6.13	4.50
3	3.25	5.69	4.00
4	3.00	5.17	3.50
5	2.60	3.37	3.00
6	2.30	2.76	2.50
7	2.20	2.19	2.20
8	2.10	2.05	2.10
9	2.05	0.88	2.00
10	2.00	1.49	1.90
11	1.90	1.44	1.80
12	1.70	0.00	1.60
13	1.50	1.20	1.40
14	1.30	0.88	1.20
15	1.10	0.94	1.00
16	0.90	0.57	0.90
17	0.75	0.71	0.75
18	0.75	1.09	0.75
19	0.75	0.00	0.75
20 & Over	0.00	0.00	0.00

It is important to note that, in the table above, not every service category has enough exposures and/or decrements such that the results in that category are statistically credible. 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 experience. This is also the case in the tables that follow due to the even more limited experience regarding actual terminations.

The next two tables show the refund election experience over the last three years for General and Safety members.

Rates of Electing a Refund of Contributions upon Termination – General

Years of Service*	Rate (%)		
	Current Rate	Actual Rate	Proposed Rate
5	50.00	34.29	45.00
6	47.00	35.80	42.00
7	44.00	26.39	40.00
8	41.00	20.59	36.00
9	38.00	16.67	32.00
10	35.00	25.00	30.00
11	32.00	11.11	28.00
12	30.00	20.00	26.00
13	28.00	28.57	24.00
14	26.00	16.67	22.00
15	24.00	0.00	20.00
16	22.00	0.00	18.00
17	20.00	0.00	16.00
18	18.00	0.00	14.00
19	16.00	0.00	13.00
20	14.00	0.00	12.00
21	12.00	0.00	11.00
22	10.00	0.00	10.00
23	8.00	0.00	8.00
24	6.00	0.00	6.00
25	4.00	0.00	4.00
26	2.00	0.00	2.00
27 & Over	0.00	N/A	0.00

*All members with less than 5 years of service are assumed to elect a refund of contributions.

Rates of Electing a Refund of Contributions upon Termination – Safety

Years of Service*	Rate (%)		
	Current Rate	Actual Rate	Proposed Rate
5	60.00	22.22	50.00
6	46.00	10.00	46.00
7	44.00	62.50	44.00
8	36.00	33.33	36.00
9	34.00	0.00	32.00
10	32.00	0.00	28.00
11	27.00	0.00	25.00
12	24.00	N/A	21.00
13	21.00	0.00	18.00
14	18.00	0.00	15.00
15	15.00	0.00	12.00
16	12.00	0.00	10.00
17	9.00	0.00	8.00
18	7.00	0.00	6.00
19	5.00	N/A	4.00
20 & Over	0.00	N/A	0.00

*All members with less than 5 years of service are assumed to elect a refund of contributions.

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

Chart 17 graphs the same information as Chart 16, but for Safety members.

Chart 18 shows the actual termination rates over the past three years compared to the current and proposed assumptions for General members.

Chart 19 shows the same information as Chart 18, but for Safety members.

Chart 20 shows the actual rates of electing a refund of contributions compared to the current and proposed assumptions for General members.

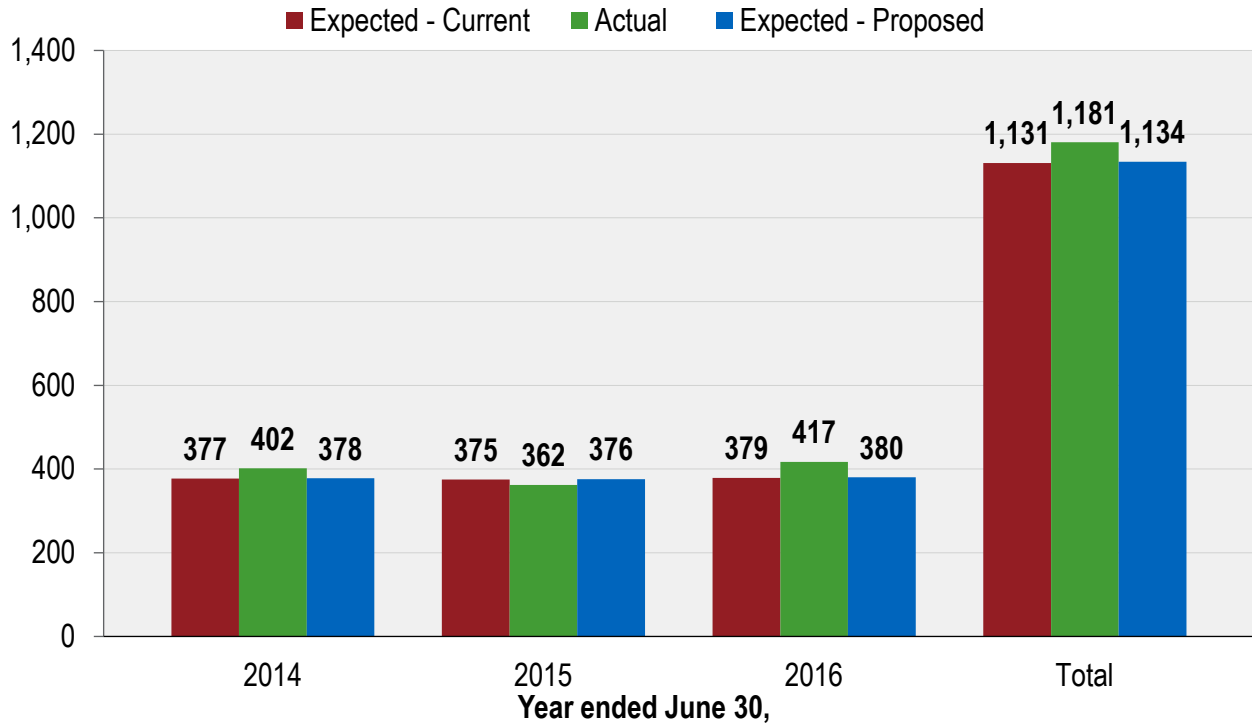
Chart 21 shows the same information as Chart 20, but for Safety members.

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

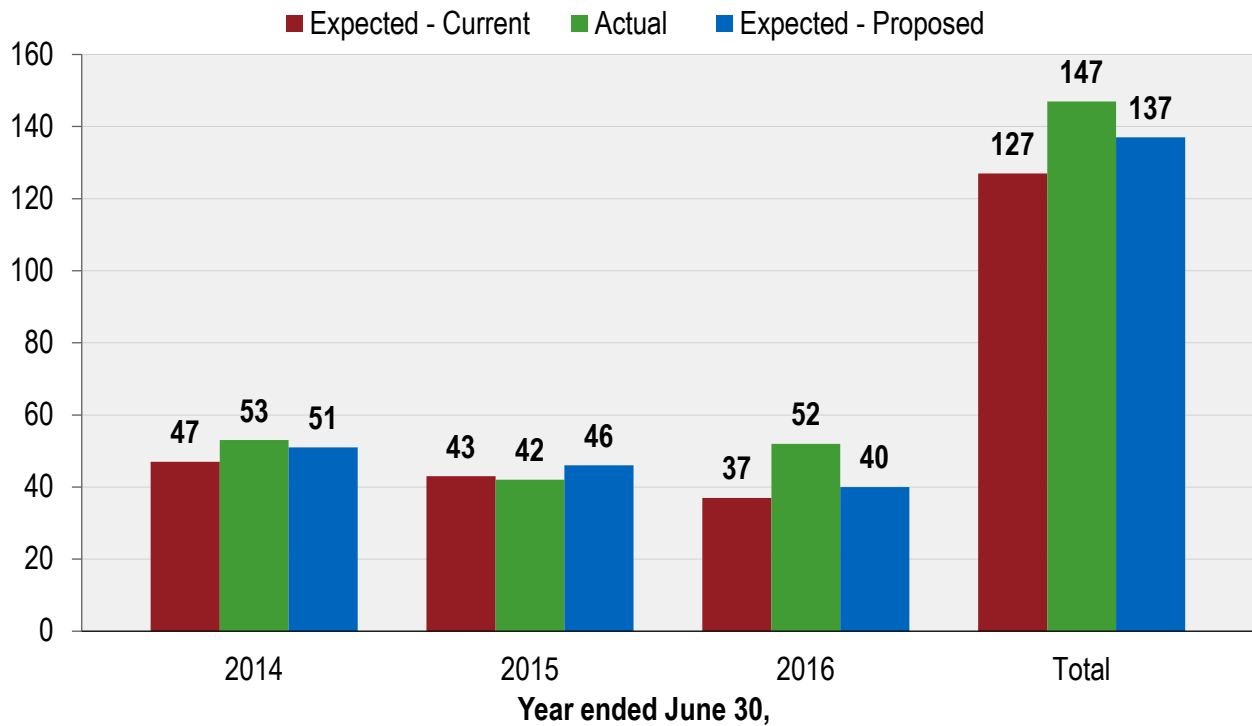
For both General and Safety members, the actual rates for electing a refund of contributions are lower than the current assumptions for the past three years. We have decreased the rates of electing a refund of contributions for General and Safety members overall.

We will also continue to assume that termination rates are zero at any age where members are assumed to retire. In other words, at those ages, members will either retire in accordance with the retirement rate assumptions or continue working, rather than terminate and defer their benefit.

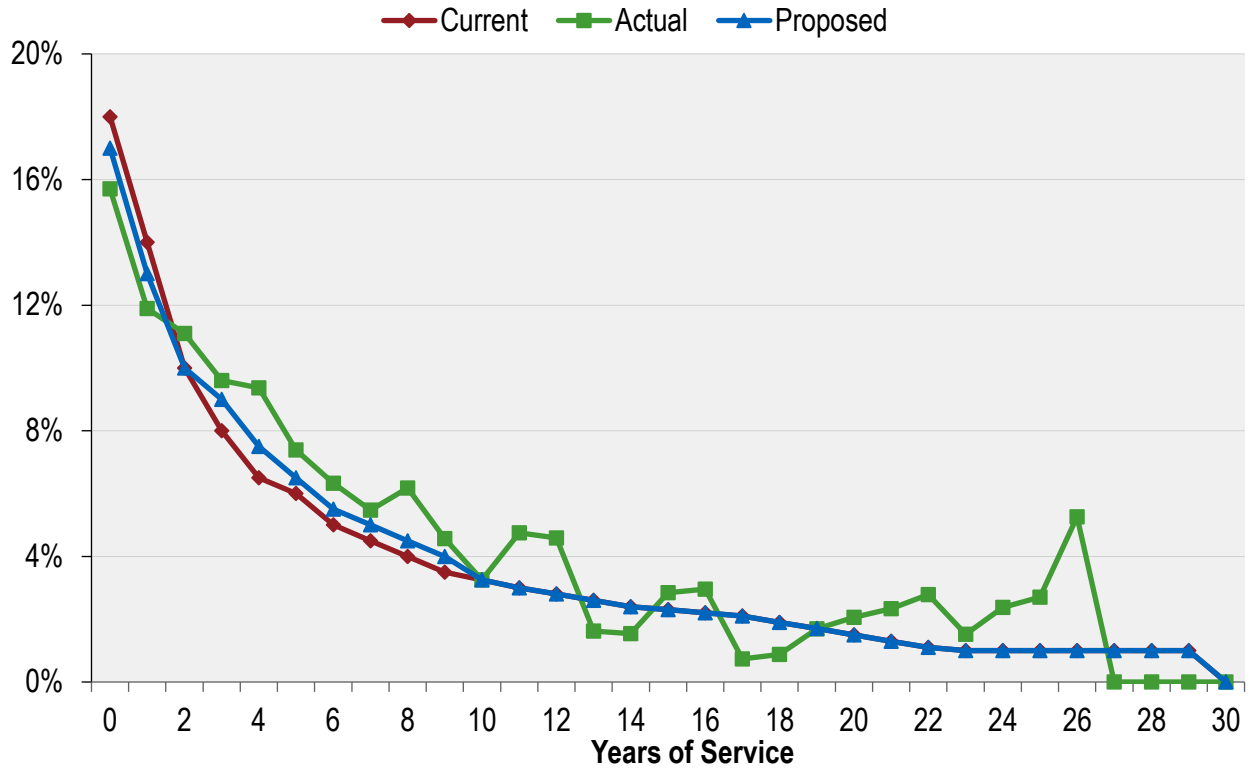
**CHART 16: ACTUAL NUMBER OF TERMINATIONS
COMPARED TO EXPECTED
GENERAL MEMBERS**



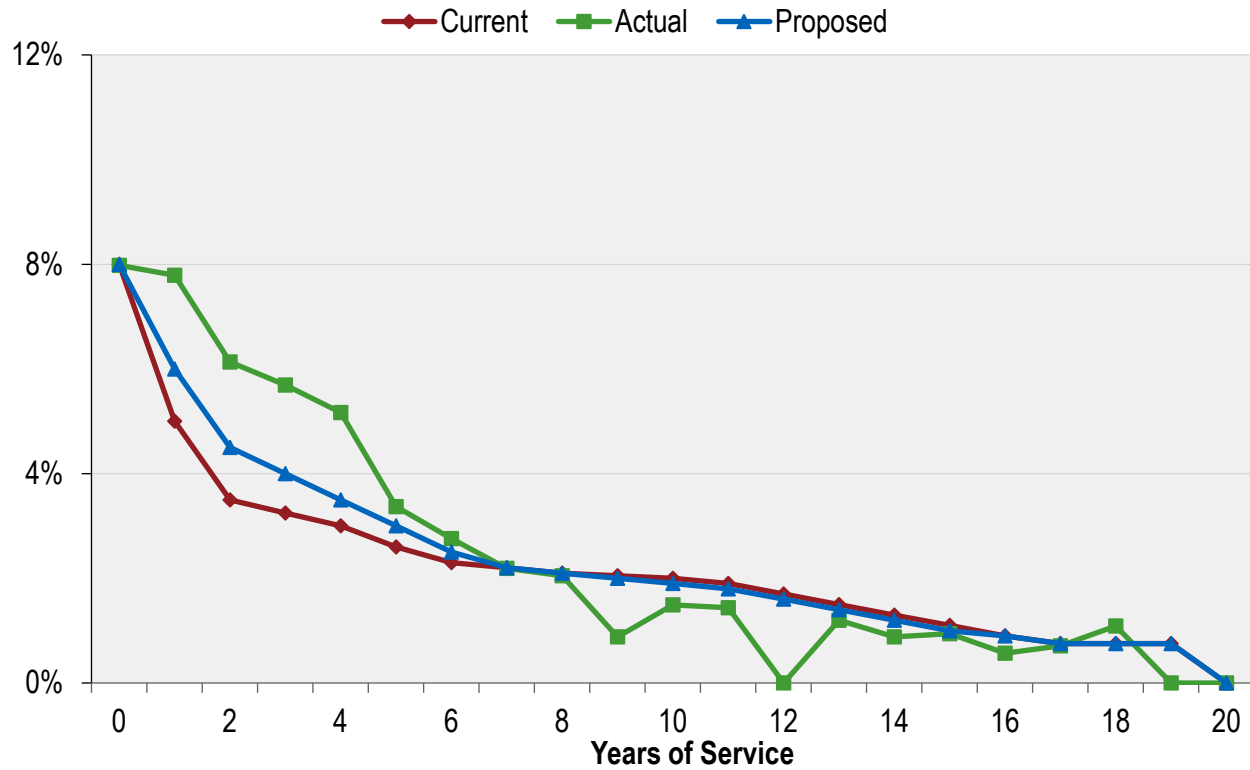
**CHART 17: ACTUAL NUMBER OF TERMINATION
COMPARED TO EXPECTED
SAFETY MEMBERS**



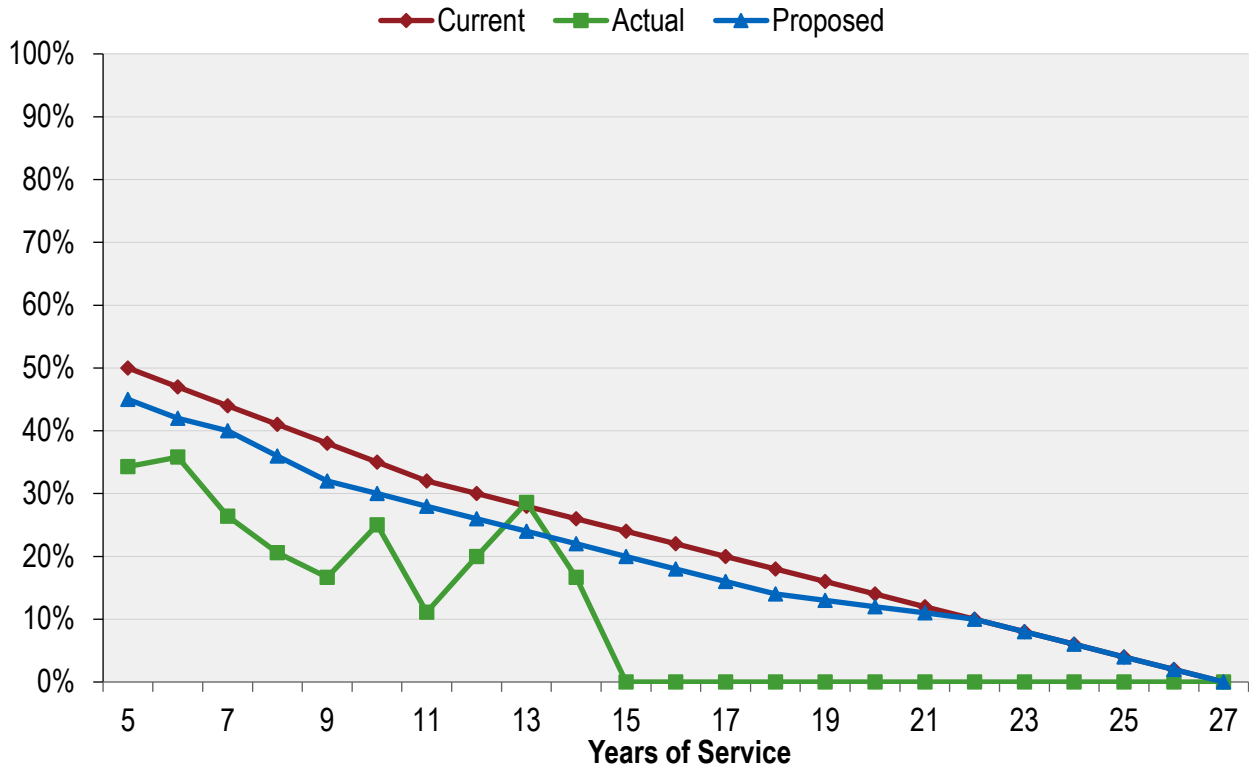
**CHART 18: TERMINATION RATES
GENERAL MEMBERS**



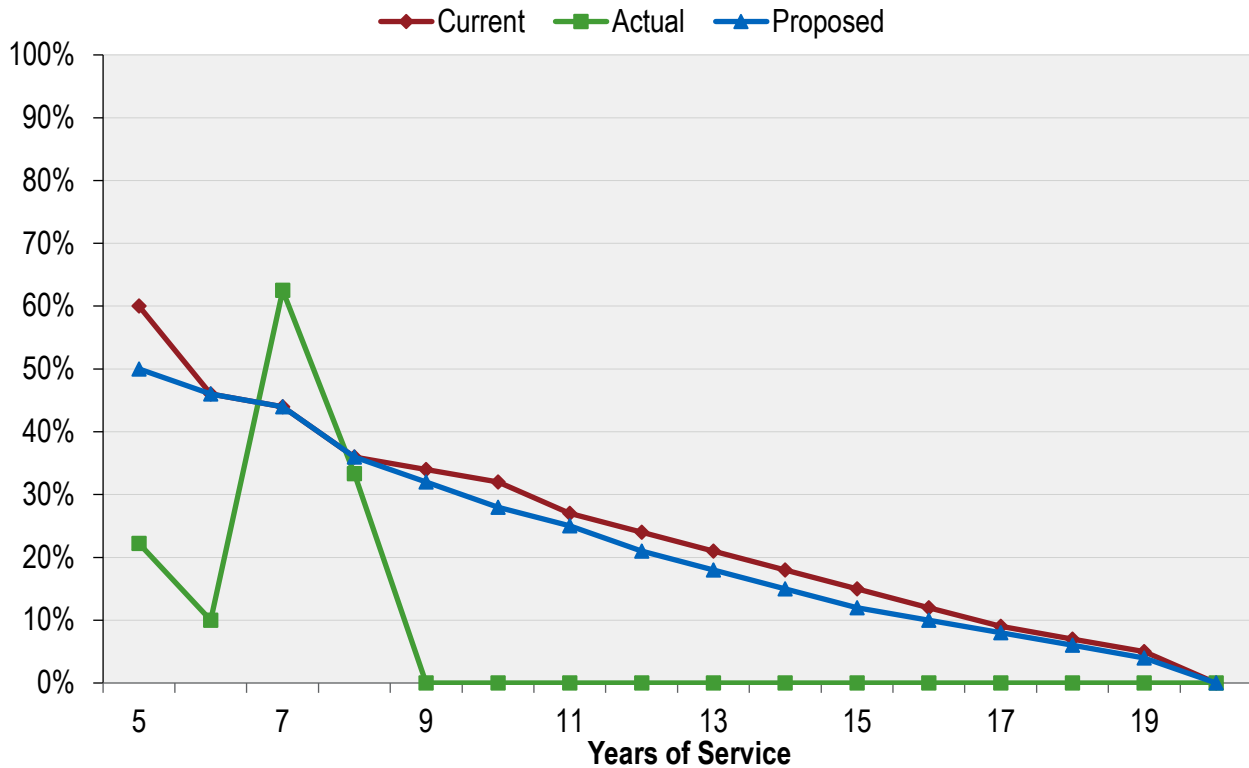
**CHART 19: TERMINATION RATES
SAFETY MEMBERS**



**CHART 20: RATES OF ELECTING A REFUND OF CONTRIBUTIONS
GENERAL MEMBERS**



**CHART 21: RATES OF ELECTING A REFUND OF CONTRIBUTIONS
SAFETY MEMBERS**



E. 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 summarizes the actual incidence of combined service and non-service connected disabilities over the past three years compared to the current and proposed assumptions for both service connected and non-service connected disability incidence:

Rates of Disability Incidence – General

Age	Rate (%)		
	Current Rate*	Actual Rate	Proposed Rate
20 – 24	0.02	0.00	0.02
25 – 29	0.04	0.00	0.03
30 – 34	0.06	0.04	0.05
35 – 39	0.12	0.00	0.10
40 – 44	0.15	0.00	0.12
45 – 49	0.25	0.00	0.20
50 – 54	0.30	0.21	0.25
55 – 59	0.35	0.04	0.30
60 – 64	0.40	0.14	0.40
65 – 69	0.40	0.73	0.40

* Total rate for service and non-service connected disabilities

Rates of Disability Incidence – Safety

Age	Rate (%)		
	Current Rate*	Actual Rate	Proposed Rate
20 – 24	0.05	0.00	0.05
25 – 29	0.10	0.00	0.08
30 – 34	0.20	0.08	0.15
35 – 39	0.35	0.00	0.30
40 – 44	0.60	0.33	0.40
45 – 49	0.75	0.34	0.50
50 – 54	1.75	0.25	1.50
55 – 59	3.00	4.43	3.25
60 – 64	4.00	4.17	4.00
65 – 69	0.00	5.88	4.00

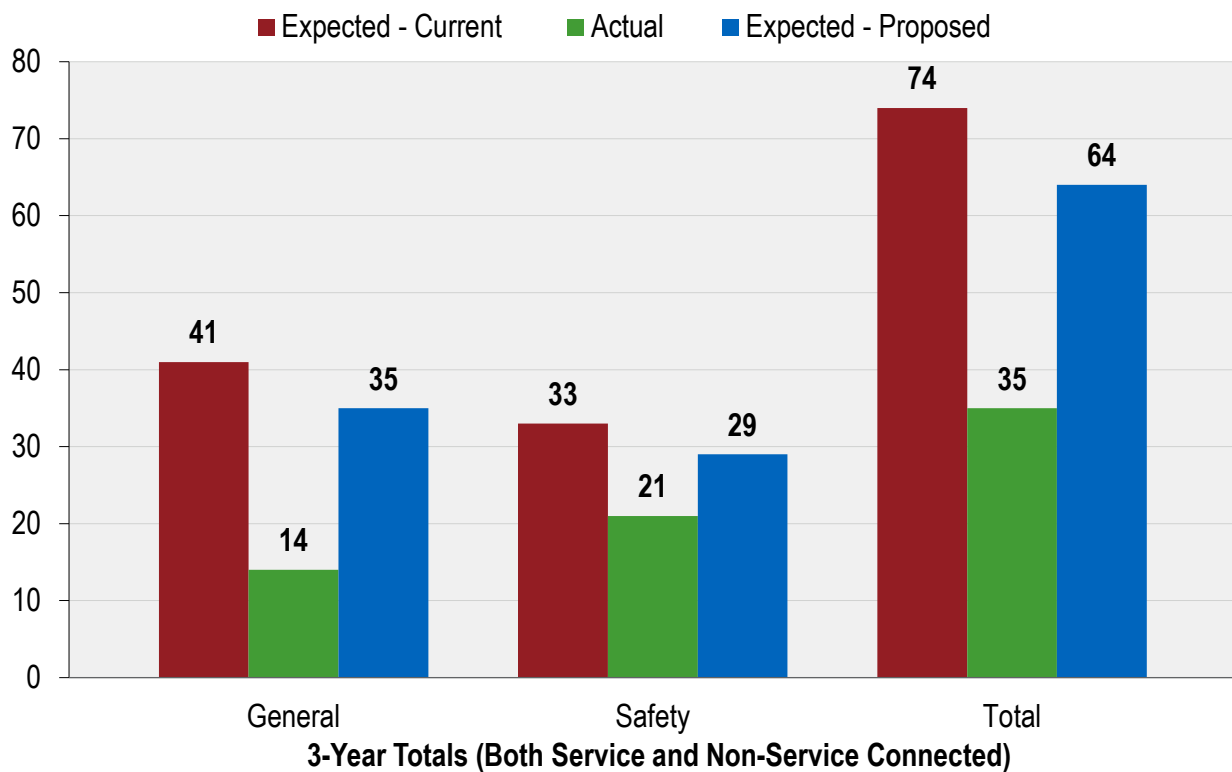
* Total rate for service and non-service connected disabilities

Chart 22 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. The proposed disability rates were adjusted to reflect the past three years' experience. There are mostly decreases in the rates proposed for both General and Safety members.

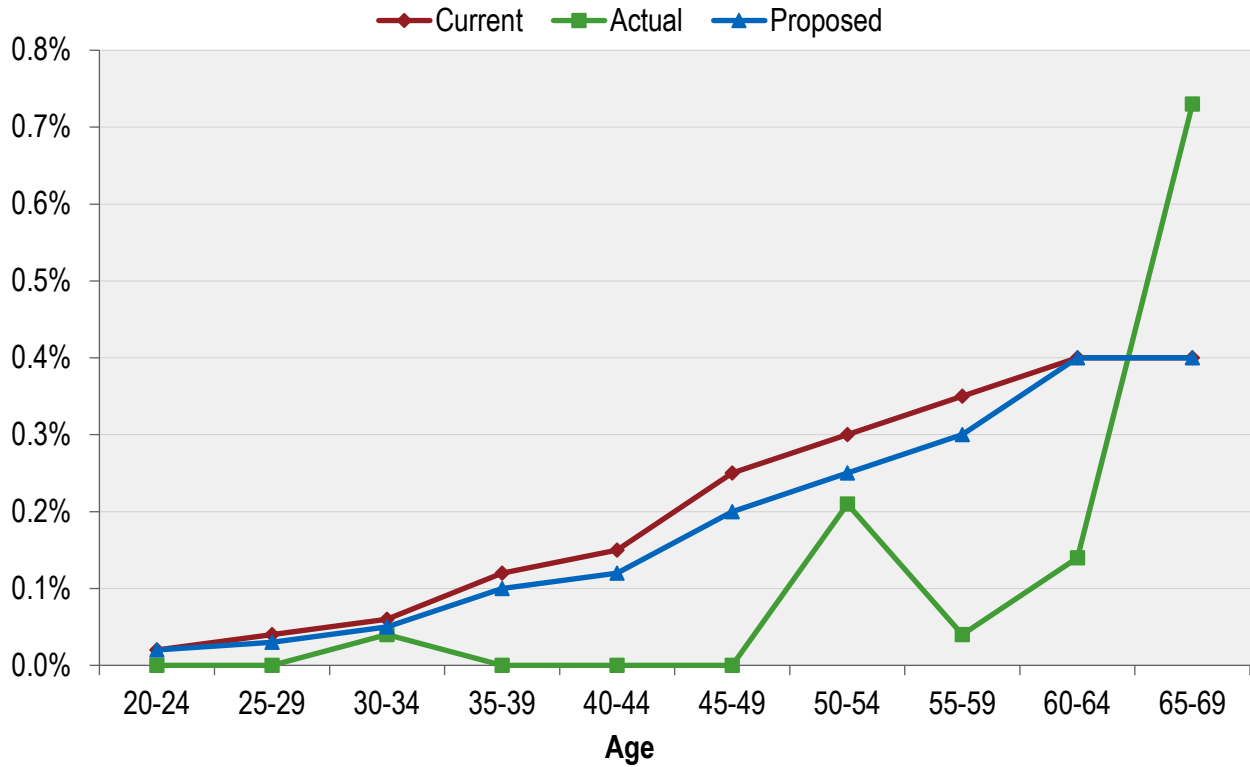
Chart 23 shows actual disability incidence rates, compared to the assumed and proposed rates for General members. Since 29% of disabled General members received a service connected disability, we recommend decreasing the current assumption that 55% of disabilities will receive a service connected disability retirement to 50%. The remaining 50% of disabled General members are assumed to receive a non-service connected disability.

Chart 24 graphs the same information as Chart 23, but for Safety members. Since 76% of disabled Safety members received a service connected disability, we recommend decreasing the current assumption that 100% of disabilities will receive a service connected disability retirement to 90%. The remaining 10% of disabled Safety members are assumed to receive a non-service connected disability.

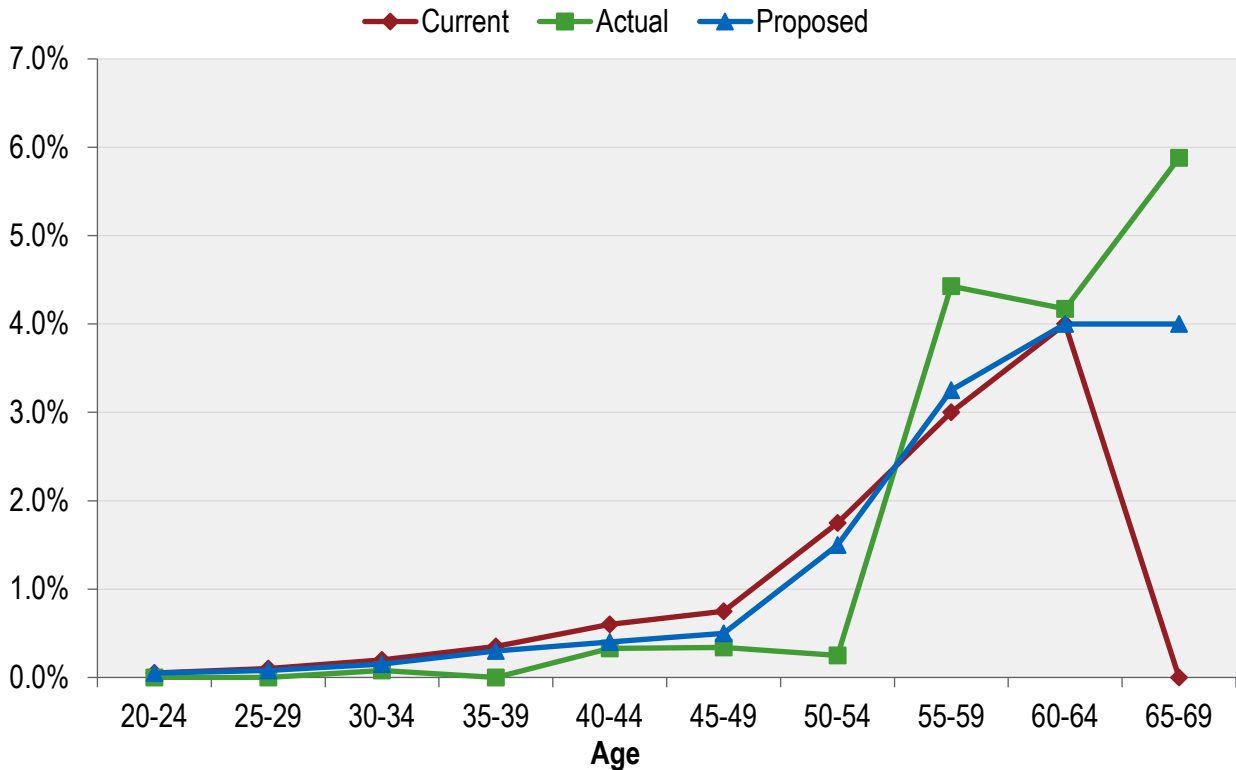
CHART 22: ACTUAL NUMBER OF DISABILITIES COMPARED TO EXPECTED



**CHART 23: DISABILITY INCIDENCE RATES
GENERAL MEMBERS**



**CHART 24: DISABILITY INCIDENCE RATES
SAFETY MEMBERS**



V. Cost Impact

The tables below show the changes in the employer and member contribution rates due to the proposed assumption changes as if they were applied to the June 30, 2016 actuarial valuation. If all of the proposed assumption changes (both economic and demographic) were implemented, the average employer rate would have increased by 3.70% of payroll. The average member rate would have increased by 0.15% of payroll. The UAAL would have increased by \$198 million. The cost associated with the administrative expense load has continued to be allocated to both the employer and the member based on the components of the total contribution rate (before expenses) for the employer and the member.

EMPLOYER CONTRIBUTION RATE IMPACT (% OF COMPENSATION)

Contributions	General County w/ Courts	General Districts	Safety	Overall Change
Normal Cost	0.61%	0.52%	0.93%	0.70%
UAAL	2.48%	2.68%	4.42%	2.99%
Administrative Expense	0.01%	0.01%	0.01%	0.01%
Total	3.10%	3.21%	5.36%	3.70%

EMPLOYER CONTRIBUTION RATE IMPACT (ESTIMATED ANNUAL DOLLAR AMOUNT IN THOUSANDS)

Contributions	General County w/ Courts	General Districts	Safety	Overall Change
Total	\$11,641	\$1,044	\$7,601	\$20,286

MEMBER CONTRIBUTION RATE IMPACT AT SAMPLE ENTRY AGES (ANNUAL DOLLAR AMOUNT IN THOUSANDS)*

Entry Age	General – Tier I (non-SJVAPCD)				General – Tier IIA (non-SJVAPCD)			
	Current	Proposed	Difference	Annual Amount**	Current	Proposed	Difference	Annual Amount**
25	7.33%	7.45%	0.12%	\$74	5.25%	5.36%	0.11%	\$68
35	8.79%	8.95%	0.16%	\$99	6.30%	6.44%	0.14%	\$87
45	10.58%	10.80%	0.22%	\$136	7.58%	7.77%	0.19%	\$118

Entry Age	General – Tier I (SJVAPCD)				General – Tier IIA (SJVAPCD)			
	Current	Proposed	Difference	Annual Amount**	Current	Proposed	Difference	Annual Amount**
25	10.51%	10.87%	0.36%	\$223	5.25%	5.48%	0.23%	\$143
35	12.61%	13.06%	0.45%	\$279	6.30%	6.59%	0.29%	\$180
45	15.19%	15.77%	0.58%	\$360	7.58%	7.95%	0.37%	\$229

Entry Age	General – Tier IIB				General – Tier III			
	Current	Proposed	Difference	Annual Amount**	Current	Proposed	Difference	Annual Amount**
All	6.00%	6.32%	0.32%	\$198	12.26%	12.25%	-0.01%	-\$6

Entry Age	Safety – Tier I (Excluding “Safety 3”)				Safety – Tier IIA (Excluding “Safety 3”)			
	Current	Proposed	Difference	Annual Amount**	Current	Proposed	Difference	Annual Amount**
25	13.10%	13.25%	0.15%	\$120	8.77%	8.87%	0.10%	\$80
35	15.93%	16.13%	0.20%	\$160	10.65%	10.79%	0.14%	\$112
45	18.39%	18.66%	0.27%	\$216	12.30%	12.47%	0.17%	\$136

Entry Age	Safety – Tier I (“Safety 3”)				Safety – Tier IIA (“Safety 3”)			
	Current	Proposed	Difference	Annual Amount**	Current	Proposed	Difference	Annual Amount**
All	13.62%	13.78%	0.16%	\$128	9.12%	9.22%	0.10%	\$80

Entry Age	Safety – Tier IIB			
	Current	Proposed	Difference	Annual Amount**
All	13.97%	14.66%	0.69%	\$552

* Sample member rates shown apply to excess of \$350 of monthly compensation for members integrated with Social Security or all compensation for those members that are not integrated with Social Security. These rates are before applying employer pickups or any maximum on the number of years over which members contribute.

** Based on annual compensation of \$62,000 for General members and \$80,000 for Safety members.

The total estimated annual dollar increase in member contributions is \$0.7 million.

Considered separately, the changes in economic assumptions accounted for about three-quarters of the overall cost impact to the plan. Of the various economic assumption changes, the most significant cost impact is from the investment return assumption change. Of the various demographic assumption changes, the most significant cost impact is from the mortality assumption change.

In particular, if all of the proposed economic assumptions changes (as recommended in Section III of this report) were implemented, the average employer rate would have increased by 2.71% of payroll and the average member rate would have been increased by 0.16% of payroll. Of the various economic assumption changes, the most significant cost impact is from the investment return assumption change.

Furthermore, if all of the proposed demographic assumption changes (as recommended in Section IV of this report) were implemented, the average employer rate would have increased by 0.99% of payroll. The average member rate would have decreased by 0.01% of payroll. Of the

various demographic assumption changes, the most significant cost impact is from the mortality assumption change.

Therefore, as noted above, the estimated cost impact of all proposed assumption changes (both economic and demographic) is 3.70% of payroll for the average employer rate, where the Normal Cost rate increased by 0.70%, the UAAL amortization rate increased by 2.99% and the explicit administrative expense load increased by 0.01%. The average member rate would have increased by 0.15% of payroll, including a decrease in explicit administrative load of 0.01%.

Appendix A: Current Actuarial Assumptions

Economic Assumptions

Net Investment Return:	7.50%, net of investment expenses
Administrative Expenses:	0.90% of payroll allocated to both the employer and member based on the components of the total contribution rate (before expenses) for the employer and member.
Employee Contribution Crediting Rate:	7.50%, compounded semi-annually
Consumer Price Index:	Increase of 3.25% per year; retiree COLA increases due to CPI are assumed to be 2.50% per year.
Payroll Growth:	Inflation of 3.25% 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 3.25% per year from valuation date.
Increase in Section 7522.10 Compensation Limit:	Increase of 3.25% per year from valuation date.

Individual Salary Increases

Annual Rate of Compensation Increase (%)		
Inflation: 3.25% per year, plus “across the board” salary increases of 0.50% per year, plus the following promotional and merit increases.		
Years of Service	General	Safety
Less than 1	5.50	8.00
1	4.00	6.50
2	3.50	5.50
3	3.00	4.00
4	2.25	3.50
5	2.00	3.25
6	1.75	3.00
7	1.50	2.50
8	1.25	1.75
9	1.00	1.50
10	0.90	1.25
11	0.80	1.00
12	0.70	0.90
13	0.60	0.85
14	0.50	0.80
15	0.50	0.75
16	0.50	0.70
17	0.50	0.65
18	0.50	0.60
19	0.50	0.55
20 & Over	0.50	0.50

Note: The promotional and merit increases are added to the sum of the inflationary and “across the board” increases.

Demographic Assumptions

Mortality – Healthy

- **General Members:** RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set forward one year for males and females
- **Safety Members:** RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set back one year for males and females

Mortality – Disabled

- **General Members:** RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set forward eight years for males and females
- **Safety Members:** RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set forward four years for males and females

Mortality Rates – Beneficiaries

- **Beneficiaries:** Beneficiaries are assumed to have the same mortality as a General Member of the opposite sex who is receiving a service (non-disability) retirement.

Member Contribution Rates

- **General Members:** RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set forward one year for males and females weighted 30% male and 70% female
- **Safety Members:** RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2023 set back one year for males and females weighted 80% male and 20% female

The RP-2000 mortality tables projected with Scale BB to 2012 and adjusted as shown above reasonably reflects the projected future mortality experience as of the measurement date. The additional projection to 2023 is a provision for future mortality improvement.

Mortality Rates Before Retirement

Age	Rate (%)			
	General		Safety	
	Male	Female	Male	Female
25	0.04	0.02	0.04	0.02
30	0.05	0.03	0.04	0.02
35	0.08	0.05	0.07	0.04
40	0.11	0.07	0.10	0.06
45	0.15	0.11	0.13	0.10
50	0.23	0.17	0.19	0.14
55	0.39	0.27	0.30	0.22
60	0.64	0.45	0.52	0.36
65	1.07	0.83	0.87	0.65

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

Disability Incidence Rates

Age	Rate (%)	
	General ¹	Safety ²
20	0.02	0.05
25	0.03	0.08
30	0.05	0.16
35	0.10	0.29
40	0.14	0.50
45	0.21	0.69
50	0.28	1.35
55	0.33	2.50
60	0.38	3.60
65	0.40	0.00
70	0.00	0.00

¹ 55% of General disabilities are assumed to be service connected (duty) disabilities and the other 45% are assumed to be non-service connected (ordinary) disabilities.

² 100% of Safety disabilities are assumed to be service connected (duty) disabilities.

Withdrawal Rates³

Years of Service	Rate (%)	
	General	Safety
Less than 1	18.00	8.00
1	14.00	5.00
2	10.00	3.50
3	8.00	3.25
4	6.50	3.00
5	6.00	2.60
6	5.00	2.30
7	4.50	2.20
8	4.00	2.10
9	3.50	2.05
10	3.25	2.00
11	3.00	1.90
12	2.80	1.70
13	2.60	1.50
14	2.40	1.30
15	2.30	1.10
16	2.20	0.90
17	2.10	0.75
18	1.90	0.75
19	1.70	0.75
20	1.50	0.00
21	1.30	0.00
22	1.10	0.00
23	1.00	0.00
24	1.00	0.00
25	1.00	0.00
26	1.00	0.00
27	1.00	0.00
28	1.00	0.00
29	1.00	0.00
30 & Over	0.00	0.00

³ No withdrawal is assumed after a member is first assumed to retire.

Electing a Refund of Contributions upon Withdrawal

Years of Service	Rate (%)	
	General	Safety
Less than 1	100	100
1	100	100
2	100	100
3	100	100
4	100	100
5	50	60
6	47	46
7	44	44
8	41	36
9	38	34
10	35	32
11	32	27
12	30	24
13	28	21
14	26	18
15	24	15
16	22	12
17	20	9
18	18	7
19	16	5
20	14	0
21	12	0
22	10	0
23	8	0
24	6	0
25	4	0
26	2	0
27 & Over	0	0

Retirement Rates

Age	Rate (%)				
	General Tier I	General Tiers IIA and IIB	General Tier III	Safety Tier I	Safety Tiers IIA and IIB
45	0.00	0.00	0.00	2.00	0.00
46	0.00	0.00	0.00	2.00	0.00
47	0.00	0.00	0.00	2.00	0.00
48	0.00	0.00	0.00	2.00	0.00
49	0.00	0.00	0.00	8.00	0.00
50	6.00	3.00	0.00	20.00	6.00
51	6.00	3.00	0.00	16.00	6.00
52	6.00	3.00	3.00	18.00	6.00
53	6.00	3.00	3.00	18.00	8.00
54	8.00	3.50	3.50	20.00	18.00
55	11.00	6.00	6.00	24.00	22.00
56	12.00	6.50	6.50	28.00	22.00
57	15.00	8.00	8.00	28.00	22.00
58	16.00	10.00	10.00	35.00	22.00
59	19.00	11.50	11.50	20.00	20.00
60	23.00	13.50	13.50	20.00	20.00
61	25.00	17.00	17.00	20.00	20.00
62	30.00	30.00	30.00	50.00	50.00
63	30.00	30.00	30.00	50.00	50.00
64	30.00	30.00	30.00	50.00	50.00
65	30.00	30.00	30.00	100.00	100.00
66	40.00	40.00	40.00	100.00	100.00
67	40.00	40.00	40.00	100.00	100.00
68	40.00	40.00	40.00	100.00	100.00
69	40.00	40.00	40.00	100.00	100.00
70	100.00	100.00	100.00	100.00	100.00

Retirement Age and Benefit for Deferred Vested Members:	<p>For current and future deferred vested members, retirement age assumptions are as follows:</p> <p style="padding-left: 40px;">General Age: 57</p> <p style="padding-left: 40px;">Safety Age: 53</p> <p>We assume that 55% of future General and 60% of future Safety deferred vested members will continue to work for a reciprocal employer. For reciprocal members, we assume 4.25% compensation increases per annum.</p>
Future Benefit Accruals:	1.0 year of service per year
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 Members:	All active members of KCERA as of the valuation date
Form of Payment:	All members are assumed to elect the unmodified option at retirement.
Percent Married:	75% 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:	Female (or male) spouses are 3 years younger (or older) than their spouses.

Appendix B: Proposed Actuarial Assumptions

Economic Assumptions

Net Investment Return:	7.25%, net of investment expenses
Administrative Expenses:	0.90% of payroll allocated to both the employer and member based on the components of the total contribution rate (before expenses) for the employer and member.
Employee Contribution Crediting Rate:	7.25%, compounded semi-annually
Consumer Price Index:	Increase of 3.00% per year; retiree COLA increases due to CPI are assumed to be 2.50% per year.
Payroll Growth:	Inflation of 3.00% 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 3.00% per year from valuation date.
Increase in Section 7522.10 Compensation Limit:	Increase of 3.00% per year from valuation date.

Individual Salary Increases

Annual Rate of Compensation Increase (%)		
Inflation: 3.00% per year, plus “across the board” salary increases of 0.50% per year, plus the following promotional and merit increases.		
Years of Service	General	Safety
Less than 1	5.50	9.00
1	4.00	6.50
2	3.50	5.50
3	3.00	4.25
4	2.50	3.75
5	2.25	3.25
6	2.00	3.00
7	1.50	2.50
8	1.25	1.75
9	1.00	1.50
10	0.90	1.25
11	0.80	1.00
12	0.70	0.90
13	0.60	0.85
14	0.50	0.80
15	0.50	0.75
16	0.50	0.70
17	0.50	0.65
18	0.50	0.60
19	0.50	0.55
20 & Over	0.50	0.50

Note: The promotional and merit increases are added to the sum of the inflationary and “across the board” increases.

Demographic Assumptions

Mortality – Post-Retirement Healthy

- **General Members:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set forward one year for males and set forward two years for females projected generationally with the two-dimensional MP-2016 projection scale

- **Safety Members:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set back one year for males and females projected generationally with the two-dimensional MP-2016 projection scale

Mortality – Disabled

- **General Members:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set forward seven years for males and set forward eight years for females projected generationally with the two-dimensional MP-2016 projection scale
- **Safety Members:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set forward three years for males and females projected generationally with the two-dimensional MP-2016 projection scale

Mortality – Beneficiaries

- **Beneficiaries:** Beneficiaries are assumed to have the same mortality as a General Member of the opposite sex who is receiving a service (non-disability) retirement.

Member Contribution Rates

- **General Members:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set forward one year for males and set forward two years for females, projected to 2034 with the two-dimensional MP-2016 projection scale, weighted 30% male and 70% female
- **Safety Members:** Headcount-Weighted RP-2014 Healthy Annuitant Mortality Table set back one year for males and females, projected to 2034 with the two-dimensional MP-2016 projection scale, weighted 80% male and 20% female

Mortality – Pre-Retirement

- **General and Safety Members:** Headcount-Weighted RP-2014 Employee Mortality Table times 80%, projected generationally with the two-dimensional MP-2016 projection scale

The RP-2014 mortality tables and adjustments as shown above reflect the mortality experience as of the measurement date. The generational projection is a provision for future mortality improvement.

Mortality Rates Before Retirement

Age	Rate (%)			
	General		Safety	
	Male	Female	Male	Female
25	0.05	0.02	0.05	0.02
30	0.05	0.02	0.05	0.02
35	0.05	0.03	0.05	0.03
40	0.06	0.04	0.06	0.04
45	0.10	0.07	0.10	0.07
50	0.17	0.11	0.17	0.11
55	0.27	0.17	0.27	0.17
60	0.45	0.24	0.45	0.24
65	0.78	0.36	0.78	0.36

All pre-retirement deaths are assumed to be non-service connected. Note that generational projections beyond the base year (2014) are not reflected in the above mortality rates.

Disability Incidence Rates

Age	Rate (%)	
	General ¹	Safety ²
20	0.02	0.05
25	0.03	0.07
30	0.04	0.12
35	0.08	0.24
40	0.11	0.36
45	0.17	0.46
50	0.23	1.10
55	0.28	2.55
60	0.36	3.70
65	0.40	4.00
70	0.00	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 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.

Withdrawal Rates³

Years of Service	Rate (%)	
	General	Safety
Less than 1	17.00	8.00
1	13.00	6.00
2	10.00	4.50
3	9.00	4.00
4	7.50	3.50
5	6.50	3.00
6	5.50	2.50
7	5.00	2.20
8	4.50	2.10
9	4.00	2.00
10	3.25	1.90
11	3.00	1.80
12	2.80	1.60
13	2.60	1.40
14	2.40	1.20
15	2.30	1.00
16	2.20	0.90
17	2.10	0.75
18	1.90	0.75
19	1.70	0.75
20	1.50	0.00
21	1.30	0.00
22	1.10	0.00
23	1.00	0.00
24	1.00	0.00
25	1.00	0.00
26	1.00	0.00
27	1.00	0.00
28	1.00	0.00
29	1.00	0.00
30 & Over	0.00	0.00

³ No withdrawal is assumed after a member is first assumed to retire.

Electing a Refund of Contributions upon Withdrawal

Years of Service	Rate (%)	
	General	Safety
Less than 1	100	100
1	100	100
2	100	100
3	100	100
4	100	100
5	45	50
6	42	46
7	40	44
8	36	36
9	32	32
10	30	28
11	28	25
12	26	21
13	24	18
14	22	15
15	20	12
16	18	10
17	16	8
18	14	6
19	13	4
20	12	0
21	11	0
22	10	0
23	8	0
24	6	0
25	4	0
26	2	0
27 & Over	0	0

Retirement Rates

Age	Rate (%)				
	General Tier I	General Tiers IIA and IIB	General Tier III	Safety Tier I	Safety Tiers IIA and IIB
45	0.00	0.00	0.00	2.00	0.00
46	0.00	0.00	0.00	2.00	0.00
47	0.00	0.00	0.00	2.00	0.00
48	0.00	0.00	0.00	3.00	0.00
49	0.00	0.00	0.00	9.00	0.00
50	6.00	3.00	0.00	20.00	6.00
51	6.00	3.00	0.00	15.00	6.00
52	6.00	3.00	3.00	18.00	6.00
53	6.00	3.00	3.00	18.00	8.00
54	8.00	3.50	3.50	20.00	18.00
55	10.00	5.50	5.50	24.00	22.00
56	12.00	6.50	6.50	24.00	20.00
57	14.00	7.50	7.50	24.00	20.00
58	15.00	9.50	9.50	30.00	20.00
59	19.00	11.50	11.50	20.00	20.00
60	23.00	13.50	13.50	20.00	20.00
61	23.00	15.50	15.50	20.00	20.00
62	25.00	25.00	25.00	40.00	40.00
63	25.00	25.00	25.00	40.00	40.00
64	25.00	25.00	25.00	40.00	40.00
65	32.00	32.00	32.00	100.00	100.00
66	35.00	35.00	35.00	100.00	100.00
67	35.00	35.00	35.00	100.00	100.00
68	40.00	40.00	40.00	100.00	100.00
69	40.00	40.00	40.00	100.00	100.00
70	100.00	100.00	100.00	100.00	100.00

Retirement Age and Benefit for Deferred Vested Members:	<p>For current and future deferred vested members, retirement age assumptions are as follows:</p> <p style="padding-left: 40px;">General Age: 57</p> <p style="padding-left: 40px;">Safety Age: 53</p> <p>We assume that 50% of future General and 55% of future Safety deferred vested members will continue to work for a reciprocal employer. For reciprocal members, we assume 4.00% compensation increases per annum.</p>
Future Benefit Accruals:	1.0 year of service per year
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 Members:	All active members of KCERA as of the valuation date
Form of Payment:	All members are assumed to elect the unmodified option at retirement.
Percent Married:	75% of male members and 60% 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:	Male retirees are 3 years older than their spouses, and female retirees are 2 years younger than their spouses.

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