East Bay Municipal Utility District
Employees' Retirement System

Actuarial Experience Study

Analysis of Actuarial Experience During the Period July 1, 2016 through June 30, 2020

Segal

Segal

180 Howard Street Suite 1100
San Francisco, CA 94105-6147
T 415.263.8200
segalco.com

November 12, 2020

Ms. Sophia Skoda
Director of Finance
East Bay Municipal Utility District
375 Eleventh Street
Oakland, CA 94607-4240

RE: Review of Actuarial Assumptions for the June 30, 2020 Actuarial Valuations

Dear Sophia:

We are pleased to submit this report of our review of the actuarial experience for the East Bay Municipal Utility District Employees' Retirement System (EBMUDERS). This study utilizes the census data for the period July 1, 2016 to June 30, 2020 and provides the proposed actuarial assumptions, both economic and demographic, to be used in the June 30, 2020 valuations.

I am a member of the American Academy of Actuaries and I 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,

Andy Yeung

Andy Yeung, ASA, MAAA, FCA, EA
Vice President and Actuary

JRC/jl

Table of Contents

I. Introduction, Summary, and Recommendations 4

II. Background and Methodology 9
- Economic Assumptions 9
- Demographic Assumptions 9

III. Economic Assumptions 11
- A. Inflation 11
  - Retiree Cost-of-Living Increases 12
- B. Investment Return 14
  - Real Rate of Investment Return 14
  - System Expenses 15
  - Risk Adjustment 17
  - Recommended Investment Return Assumption 19
  - Comparison with Alternative Model used to Review Investment Return Assumption 20
  - Comparing with Other Public Retirement Systems 20
- C. Salary Increase 22
  - Active Member Payroll 25

IV. Demographic Assumptions 26
- A. Retirement Rates 26
  - 1955/1980 Plan – Eligible for an Unreduced Benefit 27
  - 1955/1980 Plan – Not Eligible for an Unreduced Benefit 28
  - 2013 Tier 29
  - Deferred Vested Members 30
  - Reciprocity 30
  - Survivor Continuance 30
  - Sick Leave Conversion 31
  - Optional Form of Benefit 32
- B. Mortality Rates - Healthy 35
- C. Mortality Rates - Disabled 42
- D. Termination Rates 46
- E. Disability Incidence Rates 50

V. Cost Impact 52

Appendix A: Current Actuarial Assumptions 55

Appendix B: Proposed Actuarial Assumptions 61

I. Introduction, Summary, and Recommendations

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

If assumptions are modified, contribution requirements are adjusted to take into account a change in the projected experience in all future years. There is a great difference in both philosophy and cost impact between recognizing the actuarial deviations as they occur annually and changing the actuarial assumptions. Taking into account one year's gains or losses without making a change in the assumptions means that year's experience is treated as temporary and that, over the long run, experience will return to what was originally assumed. For example, it is impossible to determine when and to what extent the economy will rebound after the current crisis caused by the COVID-19 pandemic.[1] Changing assumptions reflects a basic change in thinking about the future, and has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

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

This study was undertaken in order to review the economic and demographic actuarial assumptions and to compare the actual experience with that expected under the current assumptions during the four-year experience period from July 1, 2016 through June 30, 2020. 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 provide guidance for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected future experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for: merit and promotion salary increases, retirement from active employment, percent of members assumed to go on to work for a reciprocal system, reciprocal salary increases, pre-retirement mortality, healthy life post-retirement mortality, disabled life post-retirement mortality, beneficiary mortality, termination,

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

disability incidence, percent married/domestic partnership and spouse/domestic partner age difference, and sick leave conversion.

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

Pg #	Actuarial Assumption Categories	Recommendation
11	**Inflation:** Future increases in the Consumer Price Index (CPI), which drives investment returns and active member salary increase, as well as cost-of-living adjustments (COLAs) for retirees.	Maintain the inflation assumption at 2.75% per year as discussed in Section (III)(A).
12	**Cost-of-Living Adjustments:** Maximum 3% annual increases in the benefit paid to retired employees that is increased to 5% when the System's funded ratio on a Projected Benefit Obligation (PBO) basis is more than 85%.[2]	Maintain the cost-of-living assumption at 2.75% per year as discussed in Section (III)(A).
14	**Investment Return:** The estimated average future net rate of return on current and future assets of the System as of the valuation date. This rate is used to discount liabilities.	Maintain the current investment return assumption of 7.00% per year as discussed in Section (III)(B).
22	**Individual Salary Increases:** Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components: • Inflationary salary increases • Real "across the board" salary increases • Merit and promotion increases	Maintain the current inflationary salary increase assumption of 2.75% 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 remain the same at 3.25%. Increase the merit and promotion rates of salary increase as developed in Section III(C) to reflect past experience.
26	**Retirement Rates:** The probability of retirement at each age at which participants are eligible to retire. **Other Retirement Related Assumptions including:** • Percent married/domestic partnership and spouse/domestic partner age differences for members not yet retired • Retirement age for deferred vested members • Future reciprocal members and reciprocal salary increases	For active members, adjust the current sex distinct retirement rates to those developed in Section (IV)(A) on a unisex basis. For 1955/1980 Plan members, we recommend two separate sets of assumptions with the first set applied to those members eligible for an unreduced pension benefit and the second set applied to those who are not eligible for an unreduced pension benefit. The recommended active retirement assumption will anticipate slightly earlier retirements. For active and deferred vested members, increase the percent married/domestic partnership at retirement assumption from 80% to 85% for males and from 50% to 60% for females. Decrease the spouse age difference assumption that male retirees are three years older than their spouses to two years older than their spouses, and maintain the spouse age difference assumption that female retirees are three years younger than their spouses. For deferred vested members, maintain the deferred vested retirement age assumption of 59. Reduce the proportion of future deferred vested members expected to be covered by a reciprocal system from 30% to 15%. Increase the reciprocal salary increase assumption from 3.75% to 4.00% per year.

[2] Effective October 1, 2000, when the System is 85% funded on a PBO basis and the cost-of-living is less than 4%, withdrawals from the accumulated COLA bank are made to allow cost-of-living increases up to 4%.

Pg #	Actuarial Assumption Categories	Recommendation
35	**Mortality Rates:** The probability of dying at each age. Mortality rates are used to project life expectancies.	For pre-retirement mortality: Current base table: Headcount-Weighted RP-2014 Employee Mortality Tables set forward two years for males, and set forward one year for females. Recommended base table for the Pension Plan: Pub-2010 General Employee Amount-Weighted Above-Median Mortality Tables. Recommended base table for the Health Plan: Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Tables. For healthy retirees: Current base table: Headcount-Weighted RP-2014 Healthy Annuitant Mortality Tables set forward two years for males and set forward one year for females. Recommended base table for the Pension Plan: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Tables, with rates increased by 5% for males. Recommended base table for the Health Plan: Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Tables, with rates increased by 5% for males. For beneficiaries: Current base table: Headcount-Weighted RP-2014 Healthy Annuitant Mortality Tables, set forward two years for males and set forward one year for females. Recommended base table for the Pension Plan: Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Tables with rates increased by 5% for males and females. Recommended base table for the Health Plan: Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Tables with rates increased by 5% for males and females. For disabled retirees: Current base table: Headcount-Weighted RP-2014 Healthy Annuitant Mortality Tables set forward nine years for males and females. Recommended base table for the Pension Plan: Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Tables with rates increased by 5% for males. Recommended base table for the Health Plan: Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Tables with rates increased by 5% for males. All current tables are projected 20-years with the two-dimensional mortality improvement scale MP-2015. All recommended tables above are projected generationally with the two-dimensional mortality improvement scale MP-2020. The recommended mortality assumptions will anticipate longer life expectancies for healthy and disables retirees, and shorter life expectancies for beneficiaries.

Pg #	Actuarial Assumption Categories	Recommendation
46	**Termination Rates:** The probability of leaving employment at each age or after a certain years of service and receiving either a refund of member contributions or a deferred vested retirement benefit.	Current assumption is: i) ordinary withdrawal rates (refund of member contributions) based on service for the first five years of service and rates based on age after five years of service, and ii) vested termination rates (deferred vested retirement benefit) based on age, regardless of service. Besides switching from the current sex distinct termination rates to those developed on a unisex basis, we recommend combining the ordinary withdraw and vested termination rates, with combined termination rates based on service for the first five years of service, and rates based on age after five years of service. The termination rates are those developed in Section IV(D) and generally reflect a lower incidence of termination overall. Termination rates are set to zero when members become eligible to retire and a retirement rate is present. In addition, termination liability continues to be based on the greater actuarial value of a refund of member contributions and a deferred vested retirement benefit.
50	**Disability Incidence Rates:** The probability of becoming disabled at each age.	Adjust the current sex distinct disability rates to those developed in Section IV(E) on a unisex basis to reflect lower incidence of disability. The recommended assumption will anticipate fewer disablements.
31	**Sick Leave Conversion:** The assumption for converting unused sick leave into service credit at retirement.	Increase the sick leave conversion assumption from 0.036 years of additional service credit at retirement for each year membership to 0.038 years of additional service credit.

We have estimated the impact of all the recommended economic and demographic assumptions as if they were applied to the June 30, 2019 actuarial valuation for the Pension Plan. (We note that the recommended economic and demographic assumptions are expected to have a relatively small impact on the Health Plan.) The table below shows the changes in the employer contribution rates, the member contribution rates, the UAAL, and the funded percentage.

Cost Impact of the Recommended Assumptions Based on June 30, 2019 Pension Plan's Actuarial Valuation

Impact on Employer Contribution Rates[3]	
1955/1980 Plan	5.30%
2013 Tier	3.06%
Impact on Employee Contribution Rates	
1955/1980 Plan	0.00%
2013 Tier	0.75%
Impact on UAAL and Funded Percentage	
UAAL increase	$99.4 million
Funded percentage (valuation value of asset basis)	From 75.9% to 72.8%

Of the various changes to assumptions, the cost increase on the employer's rate is primarily from the change in the assumptions for merit and promotion salary increases (about 1/6 of the costs in aggregate) and mortality (about 3/4 of the costs in aggregate).

It should also be noted that in adopting the contribution rates in the June 30, 2019 valuations, the Board decided to carry over unchanged the higher contribution rates approved as part of the June 30, 2018 valuations. Those higher rates totaled 1.01% of payroll for the 1955/1980 Plan and 1.02% for the 2013 Tier for the Pension and Health Plans combined and may be used to offset a portion of the contribution rate increase due to assumption changes adopted by the Board and/or other unfavorable actuarial experience (e.g., investment return after smoothing less than expected by the current 7.00% assumption, etc.) in the June 30, 2020 valuations.

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.

[3] The average employer rate for both tiers combined is 4.59% of pay, based on projected payrolls of $145,611,673 for 1955/1980 Plan members and $67,126,549 for 2013 Tier members for a total of $212,738,222 for plan year 2019/2020.

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, reciprocal salary increase, and unused sick leave conversion.

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.
- **Cost-of-Living Adjustments:** Maximum 3% annual increases in the benefit paid to retired employees that is increased to 5% when the System's funded ratio measured on a PBO basis is more than 85%.[4] This assumption is tied to the inflation assumption and the System's funded ratio measured on a PBO basis.
- **Investment Return:** Expected long-term rate of return on the System's investments after investment and administrative expenses. This assumption has a significant impact on contribution rates.
- **Salary Increases:** In addition to inflationary increases, it is assumed that salaries will also grow by real "across the board" pay increases in excess of price inflation. It is also assumed that employees will receive raises above these average increases as they advance in their careers. These are commonly referred to as merit and promotion increases. Payments to amortize any Unfunded Actuarial Accrued Liability (UAAL) are assumed to increase each year by the price inflation rate plus any real "across the board" pay increases that are assumed.

The setting of these economic assumptions is described in Section 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

[4] Effective October 1, 2000, when the System is 85% funded on a PBO basis and the cost-of-living is less than 4%, withdrawals from the accumulated COLA bank are made to allow cost-of-living increases up to 4%.

“exposures”). For example, if there were 500 active employees in the 20-24 age group at the beginning of the year and 50 of them left during the year, we would say the probability of termination in that age group is 50 ÷ 500 or 10%.

The reliability of the resulting probability is highly dependent on both the number of decrements and the number of exposures. For example, if there are only a few people in a high age category at the beginning of the year (number of exposures), we would not lend as much credibility to the probability of termination developed for that age category, especially if it is out of line with the pattern shown for the other age groups. Similarly, if we are considering the death decrement, there may be a large number of exposures in, 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 our analysis begins with a review of historical information. Following is an analysis of 15 and 30 year moving averages of historical inflation rates:

Historical Consumer Price Index – 1930 to 2019[5]
(U.S. City Average - All Urban Consumers)

	25th Percentile	Median	75th Percentile
15-year moving averages	2.4%	3.3%	4.4%
30-year moving averages	2.9%	3.7%	4.8%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary environment over the past two decades. Also, the later 15-year averages during the period are lower because 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 174 large public retirement funds in their 2018 fiscal year valuations was 2.65%.[6] In California, CalSTRS, and seventeen 1937 Act CERL systems use an inflation assumption of 2.75% and three 1937 Act CERL systems use an inflation assumption of 2.50%.[7] We note that EBMUDERS was one of Segal's first California public retirement system clients to use the 2.75% inflation assumption when the Board lowered the 3.00% assumption to 2.75% at the last review of the economic actuarial assumptions in 2018. Since then, Segal has recommended lowering the inflation assumption to 2.75% to our other California public retirement system clients and that assumption was approved by those clients. (It should be noted that one of our clients decided earlier this year to further reduce their inflation assumption to 2.50%.) CalPERS has lowered their inflation assumption from 2.75% to 2.50% over a three-year period.

EBMUDERS' investment consultant, Meketa, anticipates an annual inflation rate of 2.60%, while the average inflation assumption provided by Meketa and five other investment advisory firms retained by Segal's California public sector clients was 2.34%. Note that, in general, investment

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

[6] Among 188 large public retirement funds, the inflation assumption was not available for 14 of the public retirement funds in the survey data.

[7] One of these 1937 Act CERL systems uses a 2.50% inflation assumption with a 2.75% COLA assumption.

consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation.[8]

To find a forecast of inflation based on a longer time horizon, we referred to the Social Security Administration's (SSA) 2020 report on the financial status of the Social Security program.[9] The projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.40%. The SSA report also includes alternative projections using lower and higher inflation assumptions of 1.80% and 3.00%, respectively.

We also compared the yields on the thirty-year inflation indexed U.S. Treasury bonds to comparable traditional U.S. Treasury bonds.[10] As of July 2020, the difference in yields is about 1.60% which provides a measure of market expectations of inflation.

Based on all of the above information, we recommend that the current 2.75% annual inflation assumption be maintained for the June 30, 2020 actuarial valuation.

As the industry is continuing to move toward using a lower inflation assumption, we would continue to monitor this assumption and to report back to the Board before the next quadrennial experience study. (We note that based on a recommendation made by Segal several years ago, the Board has been conducting additional reviews of the economic assumptions in between the quadrennial experience studies when both the economic and demographic assumptions are reviewed.)

The setting of the inflation assumption using the information outlined above is a somewhat subjective process, and Segal does not apply a specific weight to each of the metrics in determining our recommended inflation assumption.

Retiree Cost-of-Living Increases

The annual cost-of-living increase in the benefit paid to retired members and beneficiaries is dependent on inflation. Up to a 3.00% annual adjustment will be made and that adjustment is increased to 5.00% when the Retirement Board determines that the System is more than 85% funded on a Projected Benefit Obligation (PBO) basis using market value of assets. Effective October 1, 2000, when the System is 85% funded on a PBO basis and the cost-of-living is less than 4.00%, withdrawals from the accumulated COLA bank are made to allow cost-of-living increases up to 4.00%. A long-term annual average assumption of 2.75% is currently used to approximate the liabilities before and after the System is expected to exceed the 85% funded ratio.

In our last economic assumptions study report dated September 12, 2018, consistent with the 2.75% annual inflation assumption adopted by the Board, the Board reduced the assumed 3.00% retiree cost-of-living adjustment to 2.75%.

In developing the COLA assumption for this study, we considered the results of a stochastic approach that would attempt to account for the possible impact of low inflation that could occur under the current situation (i.e., when the System is less than 85% funded on a PBO basis) and

[8] The time horizon used by the six investment consultants in our review generally ranges from 10 years to 30 years, and Meketa uses a 20-year horizon.

[9] Source: Social Security Administration: The 2020 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds

[10] Source: Board of Governors of the Federal Reserve Association.

before significant COLA banks could be established for new retirees. We also considered the impact of paying a higher COLA under the hypothetical situation if the System's funded ratio is over 85%.

The results of our stochastic modeling are as follows:

- In the current situation when the System is less than 85% funded on a PBO basis, our modeling shows that the use of a COLA benefit assumption lower than the 2.75% inflation assumption would be justified. This is due to the unavailability of significant COLA banks to increase the COLA benefit above the 2.75% inflation assumption (and up to the maximum 3.00% level) in early low inflation years.

- 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 assumption.

  However, 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 2.75% is met in a year, and we question the reasonableness of this result.

- In the hypothetical situation when the System is more than 85% funded on a PBO basis (which would be anticipated eventually in the valuation, as the System's unfunded liability is continued to be paid off), our modeling shows the following:

  - Under the plan provision effective October 1, 2000 that provides COLAs up to 4.00% per year when inflation is less than 4.00% (by using withdrawals from the COLA banks), the current levels of the accumulated COLA banks overall are not sufficiently large enough to support a COLA assumption greater than the inflation assumption. With that said, the results of our stochastic modeling show that COLA benefits payable under this plan provision would generally no longer support the use of a COLA benefit assumption somewhat lower than the 2.75% inflation assumption, as was the case under the less than 85% funded scenario noted above.
  - The plan provision that would increase the COLA benefit up to a maximum of 5.00% per year does not have a measureable impact on the results of our stochastic model. That is, COLA benefits payable under this plan provision would still not support the use of a COLA benefit assumption measurably lower or higher than the 2.75% inflation assumption.

Based on this analysis, we continue to recommend setting the COLA assumption based on the long-term annual inflation assumption, as we have in prior years. **We recommend that the current retiree cost-of-living assumption of 2.75% per year be maintained for the June, 30 2020 valuation.**[11]

[11] For current retirees and beneficiaries, we would utilize the accumulated COLA banks to value annual 3.00% COLA increases as long as the COLA banks are available.

B. Investment Return

The investment return assumption is comprised of two primary components, inflation and real rate of investment return, with adjustments for investment and administrative 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 system's portfolio will vary with the Board's asset allocation among asset classes.

The System's current target asset allocation and the assumed real rate of return assumptions by asset class are shown in the following table. The first column of real rate of return assumptions are determined by reducing Meketa's total or "nominal" 2020 return assumptions (developed pre-COVID) by their assumed 2.60% inflation rate. The second column of returns (except for Covered Calls) represents the average of a sample of real rate of return assumptions. The sample includes the expected annual real rate of return provided to us by Meketa and five other investment advisory firms retained by Segal's public sector clients. We believe these averages are a reasonable consensus forecast of long-term future market returns in excess of inflation.[12]

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

Asset Class	Percentage of Portfolio	Meketa's Assumed Real Rate of Return[13]	Average Assumed Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[14]
Domestic Large Cap Equity	22.50%	5.88%	5.44%
Domestic Small Cap Equity	2.50%	7.51%	6.62%
Developed Int'l Large Cap Equity	20.00%	7.11%	6.71%
Emerging Market Equity	5.00%	9.38%	8.93%
Core Bonds	20.00%	0.48%	1.07%
High Yield Bonds	2.50%	3.21%	3.14%
Bank Loans	2.50%	2.81%	3.55%
Real Estate	5.00%	6.01%	5.09%
Covered Calls	20.00%	4.12%	4.12%[15]
Total	**100.00%**	**4.77%**	**4.64%**

[12] 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.

[13] Derived by reducing Meketa's nominal rate of return assumptions by their assumed 2.60% inflation rate.

[14] These are based on the projected arithmetic returns provided by Meketa and five other investment advisory firms serving EBMUDERS and 16 other city and county retirement systems in California. These return assumptions are gross of any applicable investment expenses.

[15] For this asset class, Meketa's assumption is applied in lieu of the average because there is a larger disparity in returns for this asset class among the firms surveyed and using Meketa's assumption should more closely reflect the underlying investments made specifically for EBMUDERS.

The above are representative of “indexed” returns and do not include any additional returns (“alpha”) from active management. This is consistent with the ASOP 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 has reason to believe, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the long term.”

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 periods of time. However, in general, the returns available from investment consultants are projected over time periods that are much shorter than the durations of a retirement plan’s liabilities.
2. Using a sample average of expected real rate of returns allows the System’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 4.64% portfolio real rate of return be used to determine the System’s investment return assumption. This is 0.11% higher than the return that was used two years ago in the review to prepare the recommended investment return assumption for the June 30, 2018 valuation. The difference is entirely due to changes in the real rate of return assumptions provided to us by the investment advisory firms as the target asset allocation has remained unchanged since the prior review of economic actuarial assumptions which was completed in September of 2018. (We note that the increase in the portfolio real rate of return calculated using only the asset class returns provided by the System’s investment consultant was 0.51% during the last two years.)

System Expenses

For funding purposes, the real rate of return assumption for the portfolio needs to be adjusted for administrative and investment expenses expected to be paid from investment income. The following table provides the administrative and investment expenses in relation to the average market value of assets for the five years ending June 30, 2020.

Administrative and Investment Expenses as a Percentage of Average Market Value of Assets (Dollars in 000's)

Year Ending June 30	Market Value of Assets Weighted by Cash Flow	Administrative Expenses	Investment Expenses[16]	Administrative %	Investment %	Total %
2016	$1,406,222	$1,311	$4,293	0.09%	0.31%	0.40%
2017	1,415,260	1,429	4,607	0.10	0.33	0.43
2018	1,608,543	1,551	4,037	0.10	0.25	0.35
2019	1,747,231	1,510	4,993	0.09	0.29	0.38
2020	1,825,599	1,487	4,864	0.08	0.27	0.35
Five-Year Average				**0.09%**	**0.29%**	**0.38%**
Three-Year Average				**0.09%**	**0.27%**	**0.36%**
Current Assumption				**0.10%**	**0.06%**	**0.16%**
Proposed Assumption				**0.09%**	**0.25%**	**0.34%**

In our prior review of economic actuarial assumptions for the June 30, 2018 actuarial valuations, Segal understood at that time that the Board had adopted a more passively managed portfolio. As such, our recommendation then was to reduce the assumed investment expenses by the estimated fees associated with active management, which, at that time, was about 80% of the total investment expenses over the five years ending June 30, 2017 (or 0.28% of the Market Value of Assets Weighted by Cash Flow over the same period).

However, based on actual investment expenses as shown in the above table, those reductions in aggregate investment fees did not materialize to the extent Segal had anticipated. We have also considered the impact of the Board's decision to terminate their agreement with Franklin Templeton and understand fees associated with this termination are expected to be reduced from 53 basis points to 4 basis point for assets previously held with Franklin Templeton (or by 2.8 basis points for the entire portfolio). We further understand that the Board does not have any plans to move additional assets from active to passive management at this time. **Based on this experience, we recommend that the Association's future expense assumption be increased from 0.16% to 0.34%.**

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" when determining whether "the actuary has reason to believe, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the long term." For EBMUDERS, about 2/3 of the investment expenses were paid for expenses associated with active managers, during the year ended June 30, 2019, based on information on active management investments as provided by Meketa.

[16] Net of securities lending expenses. Because we do not assume any additional net return for this program, we effectively assume that any securities lending expenses will be offset by related income.

We have not performed a detailed analysis to measure how much of the investment expenses paid to active managers might have been offset by additional returns ("alpha") earned by that active management. For 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).

Risk Adjustment

The real rate of return assumption for the portfolio is adjusted to reflect the potential risk of shortfalls in the return assumptions. The System'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.[17] This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not.

The 4.64% expected real rate of return developed earlier in this report was based on expected mean or average arithmetic returns. In our model, the confidence level associated with a particular risk adjustment represents the relative likelihood that future investment earnings would equal or exceed the assumed earnings over a 15-year period on an expected value basis.[18] 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. 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 55%.

Two years ago, the Board adopted an investment return assumption of 7.00%. That return implied a risk adjustment of 0.12%, reflecting a confidence level of 51% 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.[19]

When we evaluated the current assumption of 7.00% with the updated long-term portfolio standard deviation of 10.02% provided by Meketa, together with the other investment return components, we calculated a risk adjustment of 0.05% which implies a confidence level of 51%.

[17] This type of risk adjustment is referred to in the Actuarial Standards of Practice as a "margin for adverse deviation."

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

[19] Based on an annual portfolio return standard deviation of 12.93% provided by the System's investment consultant in 2018. 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.

The table below shows EBMUDERS' historical investment return assumptions, risk adjustments and corresponding confidence levels for the current and prior studies, for the years when this analysis was performed.

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
2010	8.00%	0.46%	55%
2012	7.75%	0.10%	51%
2014	7.50%	0.09%	51%
2016	7.25%	0.44%	55%
2018	7.00%	0.12%	51%
2020	7.00%	0.05%	51%

As we have discussed in prior experience studies, the risk adjustment model and associated confidence level is most useful as a means for comparing how the System has positioned itself relative to risk over periods of time.[20] The use of a 51% confidence level under Segal's model 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 Meketa. 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 risk margin of 0.05% (associated with a 7.00% investment return assumption) has a confidence level of 51% which is within the general range of about 50% to 55% that corresponds to the risk adjustments used by most of Segal's other California public retirement system clients. In particular, in the past several reviews the Board adopted investment return assumptions with a confidence level of 51% on several occasions.
- We have not taken into account any additional returns ("alpha") that might be earned on active management. This means that if active management generates enough alpha to cover its related expenses, this would increase returns. This aspect of Segal's model is further evaluated below.
- As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the later section on "Comparison with Other Public Retirement Systems."

Taking into account the factors above, our recommendation is to maintain the net investment return assumption of 7.00% per year. As noted above, this return implies a 0.05% risk adjustment and reflects a confidence level of 51%.

[20] 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."

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	June 30, 2020 Recommended Value	June 30, 2018 Adopted Value	June 30, 2016 Adopted Value
Inflation	2.75%	2.75%	3.00%
Plus Portfolio Real Rate of Return	4.64%	4.53%	5.14%
Minus Expense Adjustment	(0.34)%	(0.16)%	(0.45)%
Minus Risk Adjustment	(0.05)%	(0.12)%	(0.44)%
Total	**7.00%**	**7.00%**	**7.25%**
Confidence Level	**51%**	**51%**	**55%**

Assumption Component	June 30, 2014 Adopted Value	June 30, 2012 Adopted Value	June 30, 2010 Adopted Value
Inflation	3.00%	3.25%	3.50%
Plus Portfolio Real Rate of Return	5.07%	5.05%	5.40%
Minus Expense Adjustment	(0.48)%	(0.45)%	(0.44)%
Minus Risk Adjustment	(0.09)%	(0.10)%	(0.46)%
Total	**7.50%**	**7.75%**	**8.00%**
Confidence Level	**51%**	**51%**	**55%**

Based on this analysis, we recommend that the investment return assumption be maintained at 7.00% per year.

As noted earlier, there is a trend in the industry toward using a lower inflation assumption. We would continue to monitor the impact of applying a lower inflation assumption in the calculation of the investment return assumption and to report back to the Board before the next quadrennial experience study.

Comparison with Alternative Model used to Review Investment Return Assumption

Since our appointment as actuary for EBMUDERS in 2007, we have consistently reviewed investment return assumptions based on our model that incorporates expected arithmetic real returns for the different asset classes and for the entire portfolio as one component of that model.[21] The use of "forward looking expected arithmetic returns" is one of the approaches discussed for use in the Selection of Economic Assumptions for measuring Pension Obligations under ASOP No. 27.

Besides using forward looking expected arithmetic returns, ASOP No. 27 also discussed setting investment return assumptions using an alternative "forward looking expected geometric returns" approach.[22] Even though expected geometric returns are lower than expected arithmetic returns, those California public retirement systems that have set investment return assumptions using this alternative approach have in practice adopted investment return assumptions that are comparable to those adopted by the Board for EBMUDERS. This is because under the model used by those retirement systems, their investment return assumptions are not reduced to anticipate future investment expenses.[23]

For comparison, we evaluated the recommended 7.00% assumption based on the expected geometric return for the entire portfolio, and gross of the investment expenses. Under that model, over a 15-year period, there is a 53% likelihood that future average geometric returns will meet or exceed 7.00%.[24]

Comparing with Other Public Retirement Systems

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

We note that an investment return of 7.00% or lower is becoming more common among California public sector retirement systems. In particular, of the twenty 1937 Act CERL systems, fourteen use a 7.00% investment return assumption, two use 6.75% and one uses 6.50%. The remaining three 1937 Act CERL systems currently use a 7.25% earnings assumption. Furthermore, both CalPERS and CalSTRS currently use a 7.00% earnings assumption, while the San Jose and San Diego City retirement systems use investment return assumptions of 6.75% and 6.50%, respectively.

The following table compares EBMUDERS' recommended net investment return assumption against those of the 188 large public retirement funds in their 2018 fiscal year valuations based

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

[22] If a retirement system uses the expected geometric average return as the discount rate in the funding valuation, that retirement system is expected to have an asset value that generally converges to the median accumulated value as the time horizon lengthens assuming all actuarial assumptions are met in the future.

[23] This means that if the model were to be applied to EBMUDERS, the expected geometric return would not be adjusted for the assumed 0.25% investment expenses paid by EBMUDERS.

[24] We performed this stochastic simulation using the capital market assumptions included in the 2020 survey prepared by Horizon Actuarial Services. That simulation was performed using 10,000 trial outcomes of future market returns, using assumptions from 20-year arithmetic returns, standard deviations and correlation matrix that were found in the 2020 survey that included responses from 34 investment advisors.

on information found in the Public Plans Data website, which is produced in partnership with NASRA:[25]

		Public Plans Data[26]		
Assumption	**EBMUDERS**	**Low**	**Median**	**High**
Net Investment Return	7.00%	4.50%	7.25%	8.00%

The detailed survey results show that more than 80% of the systems have an investment return assumption in the range of 6.75% to 7.50%. Also, about one-third of the systems have reduced their investment return assumption during the 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 the recommended assumption of 7.00% provides for a risk margin within the risk adjustment model and is consistent with EBMUDERS' current practice relative to other public systems.

[25] Among 188 large public retirement funds, the investment return assumption was not available for 6 of the public retirement funds in the survey data.

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

C. Salary Increase

Salary increases impact plan costs in two ways: (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 as a percent of payroll. These two impacts are discussed separately as follows:

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 maintained at 2.75% per year. 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 0.4% – 0.7% 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 April 2020. In that report, real "across the board" pay increases are forecast to be 1.1% per year under the intermediate assumptions.

   The real pay increase assumption is generally considered a more "macroeconomic" assumption that is not necessarily based on individual plan experience. However, recent salary experience with public systems in California as well as anecdotal discussions with plans and plan sponsors indicate lower future real wage growth expectations for public sector employees. We note that for EBMUDERS' active members, the actual average inflation plus "across the board" increase (i.e., wage inflation) over the four-year period ending June 30, 2020 was 3.84%, which is more than the change in CPI of 3.06% during that same period by 0.78%.

Valuation Date	Actual Average Increase[27]	Actual Change in CPI[28]
June 30, 2017	-0.20%[29]	3.48%
June 30, 2018	8.90%	3.91%
June 30, 2019	3.94%	3.22%
June 30, 2020	2.73%	1.62%
Four-Year Average[30]	**3.84%**	**3.06%**

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 would remain unchanged at 3.25%.

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

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

   a. Measuring each continuing member's actual salary increase over each year of the experience period on a salary-weighted basis, with higher weights assigned to experience from members with larger salaries;
   b. Excluding any members with a decrease 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 experience period; and
   f. Modifying current assumptions to reflect some portion of these measured increases reflective of their "credibility."

   To be consistent with the other economic assumptions, these merit and promotion assumptions should be used in combination with the 3.25% assumed inflation and real "across the board" increases recommended in this study.

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

[28] Based on the change in the June CPI for the San Francisco-Oakland-Hayward Area (formerly the San Francisco-Oakland-San Jose Area) compared to the prior year.

[29] We understand there were generally no pay increases for the year ended June 30, 2017; however, pay increase were granted during the year ended June 30, 2018 and some of those pay increases were granted retroactively. Any year 2016/2017 increases that were actually paid after the June 30, 2017 valuation data was provided to Segal would be reflected starting with the June 30, 2018 valuation.

[30] The five-year average covering the years 2013 through 2017 was 1.98% for the actual average increase in EBMUDERS salaries and 2.80% for the actual change in CPI, for a difference of 0.82%. After factoring in the large actual average salary increases for the year ending June 30, 2018, the relationship between the actual average increases and the change in CPI reversed in the four-year period used for this study.

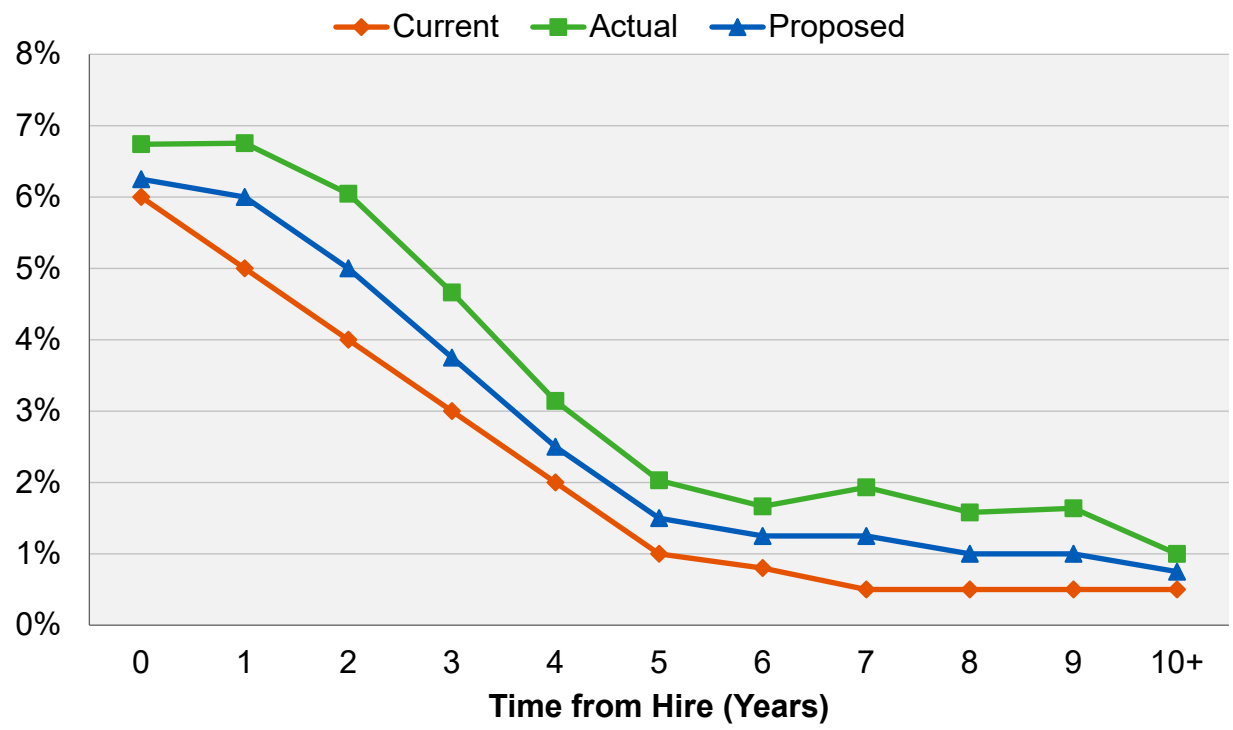
The following table shows the active members' actual average merit and promotion increases by years of service over the four-year period from July 1, 2016 through June 30, 2020. The current and proposed assumptions are also shown. The actual increases were reduced by the actual average inflation plus "across the board" increase (i.e., wage inflation, estimated as the increase in average salaries) for each year during the experience period (3.84% on average for the four-year period).

	Rate (%)		
Time from Hire (Years)	**Current Assumptions**	**Actual Average Increase**	**Proposed Assumption**
Less than 1	6.00	6.74	6.25
1 – 2	5.00	6.75	6.00
2 – 3	4.00	6.05	5.00
3 – 4	3.00	4.66	3.75
4 – 5	2.00	3.14	2.50
5 – 6	1.00	2.03	1.50
6 – 7	0.80	1.66	1.25
7 – 8	0.50	1.93	1.25
8 – 9	0.50	1.58	1.00
9 – 10	0.50	1.64	1.00
10 & Over	0.50	1.00	0.75

Chart 1 that follows later in the section compares actual experience with the current and proposed rates of actual merit and promotion increases for active members.

Based on this experience, we are proposing changes in the merit and promotion salary increases for active members, with increases in all service categories.

Chart 1: Merit and Promotion Salary Increase Rates



Active Member Payroll

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

Under the Board's current practice, the UAAL contribution rate is developed by assuming that the total payroll for all active members will increase annually over the amortization periods at the same assumed rates of inflation plus real "across the board" salary increase assumptions as are used to project the member's future benefits.

We recommend that the active member payroll increase assumption be maintained at 3.25% per year, consistent with the combined inflation plus real "across the board" salary increase assumptions.

IV. Demographic Assumptions

A. Retirement Rates

The age at which a member retires from service (i.e., not 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.

Currently, the assumed retirement rates are a function of the member's membership (that is, the 1955/1980 Plan or the 2013 Tier), age, and sex. In this year's experience study, we have developed the retirement assumptions on a unisex basis. Furthermore, for the 1955/1980 Plan members, we have analyzed recent years' retirement experience as a function of age and years of service, based on age and service combinations that qualify members for an unreduced benefit.[31] When we look at the experience of these members with age and service combinations who meet the eligibility requirements for an unreduced benefit, compared to those who do not meet the eligibility requirements for an unreduced benefit, our review concludes that retirement rates differ enough to support a separate set of higher retirement assumptions for those eligible for unreduced benefits and a separate set of lower retirement assumptions for those not eligible for unreduced benefits.

The tables on the following pages show the observed service retirement rates for the 1955/1980 Plan based on the actual experience over the past four years. Experience is separated for those members who are eligible for an unreduced benefit and for other members who are not eligible for an unreduced benefit. 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.

[31] For example, a 1955/1980 Plan member who is 54 years old with 30 or more years of service would be eligible to receive the full ("unreduced") 2.60% per year of service accrual.

1955/1980 Plan – Eligible for an Unreduced Benefit

	Rate of Retirement (%)		
Age	Current Rate[1]	Actual Rate	Proposed Rate
54	50.00	58.62	55.00
55	7.00	17.14	16.00
56	7.25	15.28	16.00
57	8.74	20.73	16.00
58	9.74	13.59	16.00
59	10.60	16.98	16.00
60	13.00	19.79	16.00
61	14.47	21.28	16.00
62	23.46	13.01	16.00
63	19.32	20.31	16.00
64	15.48	17.92	16.00
65	23.00	20.24	16.00
66	26.27	39.68	27.00
67	23.08	23.08	27.00
68	26.00	13.33	27.00
69	37.31	23.08	27.00
70 & Over	100.00	17.74	100.00

[1] *This is the combined rate for males and females, weighted by exposures, based on the current assumptions.*

For 1955/1980 Plan members eligible for an unreduced benefit, we recommend increases in most of the retirement rates at the younger ages and decreases in some of the retirement rates at the older ages. The proposed rates will anticipate slightly earlier retirements.

Chart 2 that follows later in this section compares actual experience with the current and proposed rates of retirement for 1955/1980 Plan members eligible for an unreduced benefit.

1955/1980 Plan – Not Eligible for an Unreduced Benefit

	Rate of Retirement (%)		
Age	**Current Rate[1]**	**Actual Rate**	**Proposed Rate**
54	6.00	9.26	7.00
55	7.00	2.93	7.00
56	7.27	5.92	7.00
57	8.76	2.38	7.00
58	9.79	5.94	7.00
59	10.36	5.56	7.00
60	13.00	4.76	7.00
61	14.26	9.68	12.00

[1] *This is the combined rate for males and females, weighted by exposures, based on the current assumptions.*

Note: For ages 62 and over, all 1955/1980 Plan members eligible for retirement satisfy the age and service requirement for an unreduced benefit and their retirement rates are shown in the previous table.

For 1955/1980 Plan members not eligible for an unreduced benefit, we recommend decreases in most of the retirement rates. The proposed rates will anticipate slightly later retirements.

Chart 3 that follows later in this section compares actual experience with the current and proposed rates of retirement for 1955/1980 Plan members not eligible for an unreduced benefit.

2013 Tier

For 2013 Tier members, while we do not have credible experience from the past four years to propose new retirement rates, we are adjusting the structure of the rates – consistent with the retirement rates for the 1955/1980 Plan – to reflect a unisex table. As of June 30, 2020, the 2013 Tier active member male/female split was about 75%/25%. Accordingly, the proposed unisex rates are developed based on a 75%/25% male/female split of the current retirement rates. That is, we have made no changes to the actual sex based current rates; rather, we have combined them into a unisex assumption.

We will continue to monitor the retirement experience for the 2013 Tier members in future experience studies.

	Rate of Retirement (%)		
	Current Rate		
Age	Male	Female	Proposed Rate
52	2.00	1.00	1.75
53	2.00	1.00	1.75
54	3.00	2.00	2.75
55	5.00	4.00	4.75
56	6.00	5.00	5.75
57	6.00	5.00	5.75
58	6.00	5.00	5.75
59	8.00	7.00	7.75
60	8.00	7.00	7.75
61	10.00	11.00	10.25
62	19.00	15.00	18.00
63	16.00	12.00	15.00
64	8.00	12.00	9.00
65	26.00	17.00	23.75
66	25.00	20.00	23.75
67	35.00	25.00	32.50
68	35.00	35.00	35.00
69	40.00	35.00	38.75
70 & Over	100.00	100.00	100.00

Chart 4 that follows later in this section compares current and proposed rates of retirement for the 2013 Tier members.

Deferred Vested Members

In prior valuations, deferred vested members were assumed to retire at age 59. The average age at retirement over the prior four years was 59.5.

We recommend maintaining the deferred vested retirement assumption at age 59.

Please note that for 1955/1980 Plan non-reciprocal members who are currently terminated with less than five years of service and are not vested, we assume that they will retire at age 65 if they decide to leave their contributions on deposit.

Reciprocity

Under the current assumptions, it is assumed that 30% of future deferred vested members would be covered under a reciprocal retirement system. For those covered under a reciprocal retirement system (including current and future deferred vested members), members are assumed to receive 3.75% annual salary increases from termination (or from date of last reported salary, if provided for current deferred vested members) until their assumed date of retirement. During the last four valuations, on average about 12% of the deferred vested members went on to be covered by a reciprocal retirement system. The main reason for the decrease in the observed reciprocity rate compared to the expected is due to a refinement in the flagging of reciprocal members by EBMUDERS to specifically capture only outbound reciprocities (i.e., members who have left EBMUDERS to work for a reciprocal system), rather than capturing both outbound and inbound reciprocities, as was unknowingly reported in prior census files.

We recommend decreasing the reciprocity assumption from 30% to 15%. This recommendation takes into account the experience of only newly deferred vested members during the last four valuations instead of all deferred vested members during the four-year period to better capture recent reciprocity trends. We note that the refinement in the flagging of reciprocal members by EBMUDERS only pertained to the new terminations during the last four valuations, so our experience lookback was limited to those four years in this case.

In addition, we recommend that a 4.00% annual salary increase assumption be utilized to anticipate salary increases from the date of termination (or from date of last reported salary, if provided for current deferred vested members) from EBMUDERS to the expected date of retirement for deferred vested members covered by a reciprocal retirement system. This assumption is based on the ultimate 0.75% merit and promotion salary increase assumption for active members, together with the 2.75% inflation and 0.50% real "across the board" salary increase assumptions that are recommended earlier in Section III of this report.

Survivor Continuance

In prior valuations, it was assumed that 80% of all active and inactive male members and 50% of all active and inactive female members would have an eligible survivor when they retired. According to the experience of members who retired during the four-year period ending June 30, 2020, about 85% of all male members and 74% of all female members had a designated spouse or domestic partner eligible for survivorship benefits at the time of retirement. We

recommend increasing this assumption to 85% for male members and 60% for female members.

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

1. Since most of the survivors are of 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. **We recommend the current assumptions for the age of the designated spouse or domestic partner for all active and inactive members (shown below) be reduced for males by one year and maintained for females.**

	Designated Spouse or Domestic Partner's Age as Compared to Member's Age	
	Male	**Female**
Current Assumption	3 years older	3 years younger
Actual EBMUDERS' Experience	2.28 years older	2.95 years younger
Proposed Assumption	2 years older	3 years younger

Sick Leave Conversion

Active members who accrue sick leave hours may convert their accumulated unused hours[32] at retirement into service credit for use in the calculation of their retirement benefit. Currently, unused sick leave hours are reported in the membership data provided for the actuarial valuation after the hours are earned by the members, and an actuarial liability is included in the annual valuation to anticipate the conversion of these unused sick leave hours at retirement.

In order to review the assumption for the amount of additional sick leave hours for each year of future employment that may be converted to service credit at retirement, we have observed over the four-year experience study period that the average active member with 12.2 years of service has accumulated 500 hours of unused sick leave. Based on EBMUDERS' sick leave conversion procedures, the 500 hours may be converted to about 0.48 years of service (based on 1,040 hours used for such conversion). When we divide the 0.48 years by the average active member's 12.2 years of service, sick leave is earned at the rate of about 0.039 (0.48 / 12.2) per year of service.

Based on this information, we recommend increasing the current assumption that future benefit accruals increase at 1.0 year of service per year of employment plus 0.038 years of additional service (previously 0.036) to anticipate conversion of unused sick leave for

[32] Pursuant to EBMUDERS' sick leave procedure, "when an employee's sick leave accumulation reaches the maximum of 1,040 hours, hours otherwise accrued thereafter shall be accumulated without limit in a Service Extension Credit account. For the purpose of calculating retirement benefits, an employee's period of service shall be supplemented at retirement by two hours for each hour of unused sick leave accumulated at date of retirement, PLUS two hours of each hour credited to the employee's Service Extension Credit account, with the total rounded to the nearest whole day."

each year of employment. As previously directed by EBMUDERS, this assumption applies to active members in both the 1955/1980 Plan and the 2013 Tier.

Optional Form of Benefit

Pursuant to Section 21 ("Optional Modification of Retirement Allowance") of the EBMUDERS Ordinance, a member may elect to receive an optional form of benefit at retirement that is the actuarial equivalent of his or her unmodified retirement allowance in the form of a lesser retirement allowance payable throughout life, with one of the four options stipulated in the Ordinance. It has been EBMUDERS' longstanding practice to use the current investment return and mortality assumptions in determining the actuarially equivalent optional forms of benefit.

Option 2 provides 100% continuance of the member's modified allowance under this option, payable to the designated beneficiary upon the member's death. Option 3 provides 50% continuance of the member's modified allowance under that option; and Option 4 provides 25% of the member's modified allowance under that option. Rather than a monthly benefit continuance option, Option 1 is a cash refund option that provides the balance of unused member contributions upon the member's death to his or her beneficiary or estate. However, under each option, the surviving spouse/registered domestic partner, if any, is also entitled to receive 50% of the member's unmodified allowance upon the member's death. We understand that for this reason, a higher proportion of members choose an optional form of benefit at retirement, in comparison to the election percentages we have observed at many of the 1937 CERL systems we serve which do not have this additional benefit feature.

Over the four-year period ending June 30, 2020, members who went out on a service retirement had elected the following options at retirement:

Option Elected	Observed Election Percentage
Unmodified or Option 1	52%
Option 2 (100% Continuance)	11%
Option 3 (50% Continuance)	22%
Option 4 (25% Continuance)	15%
Total	**100%**

We have observed that these election percentages have remained relatively stable for the last several years.

Based on this observation, we recommend maintaining the following optional form election percentages for use in the June 30, 2020 valuation, as noted below:

Option Elected	Recommended Election Percentage
Unmodified or Option 1	50%
Option 2 (100% continuance)	10%
Option 3 (50% continuance)	20%
Option 4 (25% continuance)	20%
Total	**100%**

Chart 2: Retirement Rates
1955/1980 Plan – Eligible for an Unreduced Benefit

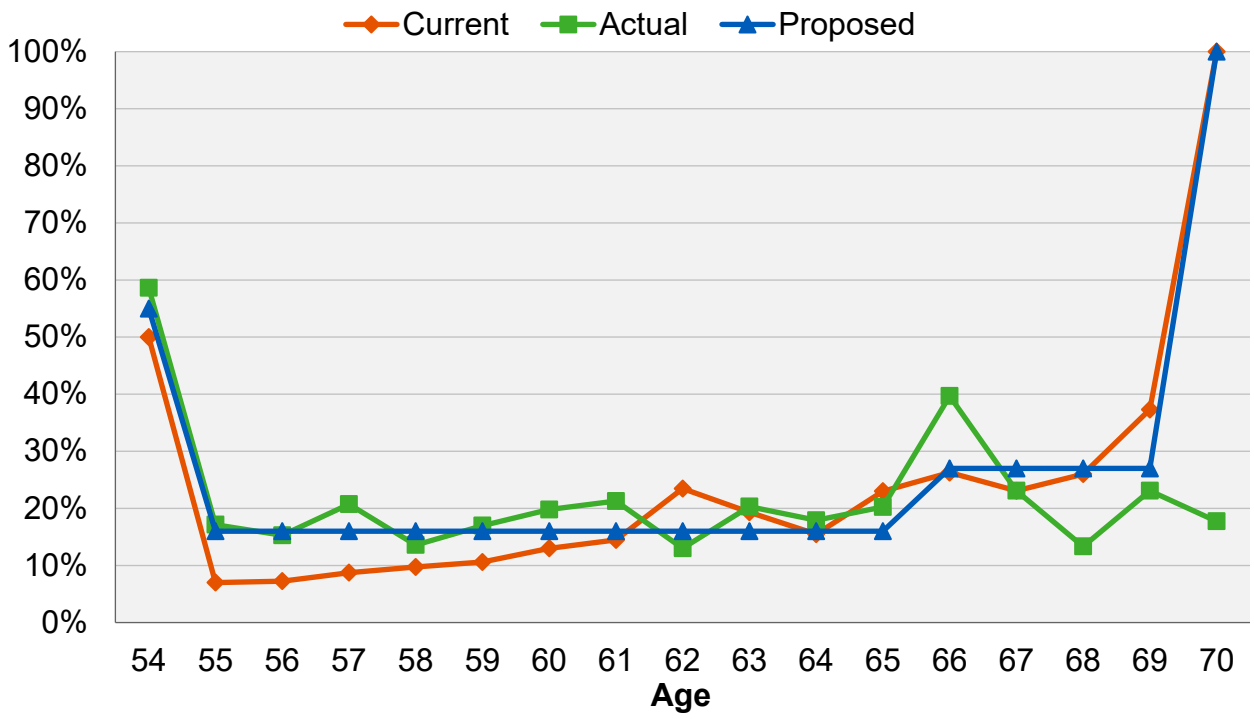
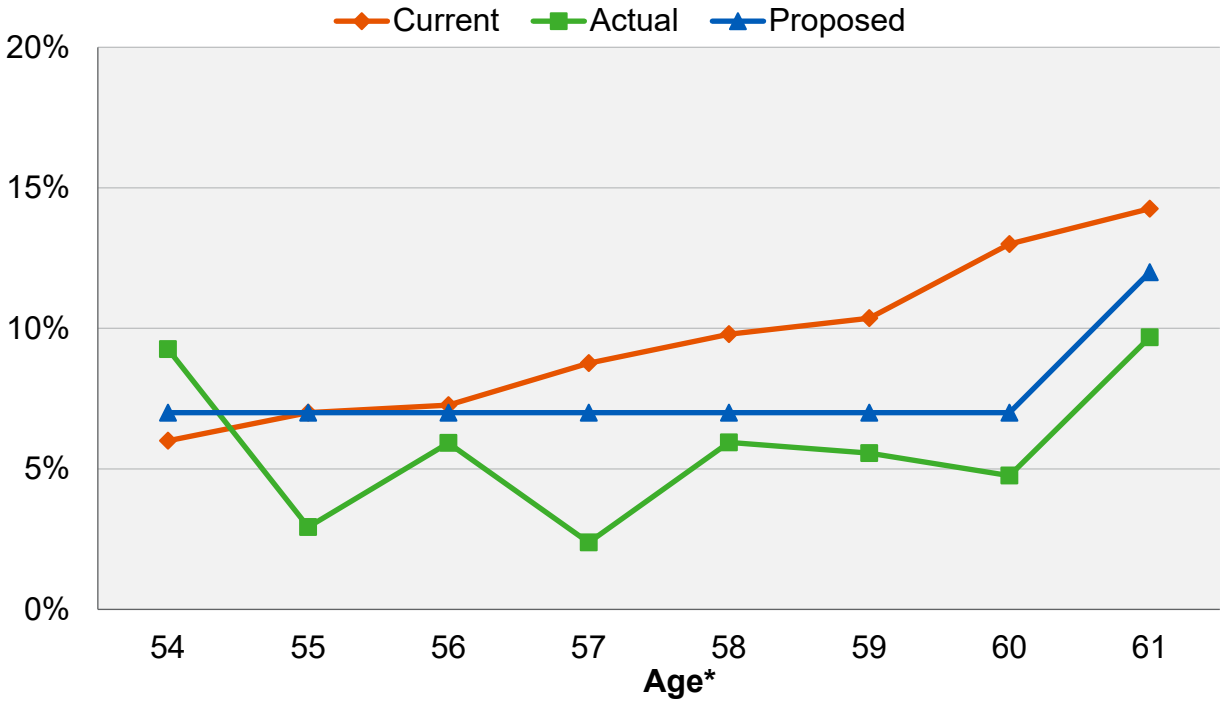
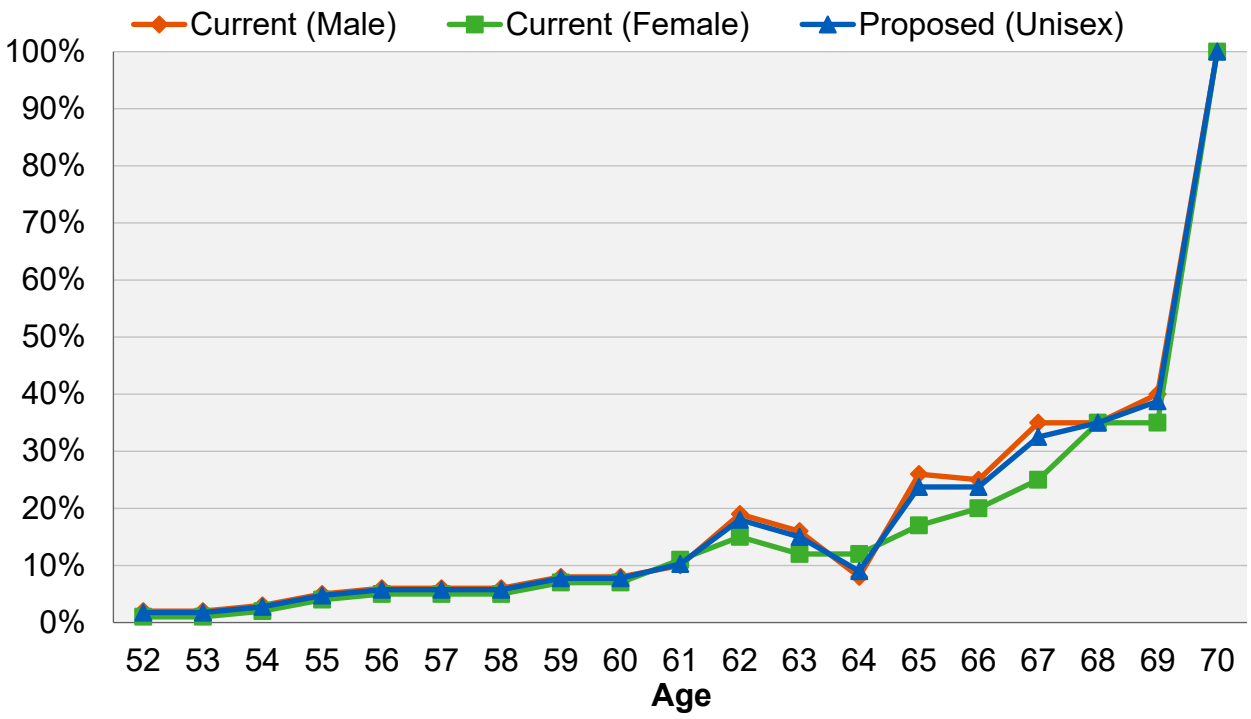


Chart 3: Retirement Rates
1955/1980 Plan – Not Eligible for an Unreduced Benefit



* For ages 62 and over, all 1955/1980 Plan members eligible for retirement satisfy the age and service requirement for an unreduced benefit.

Chart 4: Retirement Rates
2013 Tier



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. The tables currently being used for post-service retirement mortality rates are the Headcount-Weighted RP-2014 Healthy Annuitant Mortality Tables (separate tables for males and females) set forward two years for males and set forward one year for females, projected 20 years with the two-dimensional mortality improvement scale MP-2015. Beneficiaries are assumed to have the same mortality as members of the opposite sex who are receiving a service (non-disability) retirement.

When we conducted the last experience study, we alerted the Board that for the Pension Plan we may recommend a switch from a Headcount-Weighted to a Benefit-Weighted table once the Society of Actuaries (SOA) provided mortality tables based on public sector experience comparable to the RP-2014 mortality tables developed using data collected from private and multi-employer pension plans. (We note that a Headcount-Weighted table would continue to be appropriate for the Health Plan.)

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

As the Pub-2010 study shows that benefit (or salary for employees) is a significant predictor of mortality, the Pub-2010 family of mortality tables also includes mortality rates based on population with above-median benefit amount (or salary for employees), below-median benefit amount (or salary for employees) and total population within each job category. The median benefit amounts used to determine the above-median mortality rates as shown in the Pub-2010 report for General are as follows:

	Median Benefit Amounts by Gender, Job Category, and Status			
	Males		Females	
Job Category	**Employees**	**Retirees**	**Employees**	**Retirees**
General	$45,800	$21,200	$34,700	$11,900

Note: Values shown as of 2010.

When we adjust the above amounts by a reasonable measure of U.S. price inflation from 2010 to 2020 for a total increase of around 34%, the benefit amounts (or salaries) paid to EBMUDERS’ members were generally greater than the adjusted median amounts shown above. Therefore, we recommend that the above-median version of the mortality tables be used for the Pension Plan.

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 pension 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 used by EBMUDERS is still used by CalPERS, the generational approach is now the established 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.

We understand that RPEC intends to publish annual updates to their mortality improvement scales. Improvement scale MP-2020 is the latest improvement scale available (released October 2020). **We recommend that for the Pension Plan, the Board adopt the Benefit-Weighted Above-Median Pub-2010 mortality tables (adjusted for EBMUDERS experience, based on credibility), and project mortality improvement generationally using the MP-2020 mortality improvement scale.**

In order to reflect more EBMUDERS experience in our analysis, we have used experience for a twelve-year period by using data from the current (from July 1, 2016 through June 30, 2020) and the last two (from July 1, 2012 through June 30, 2016 and from July 1, 2008 through June 30, 2012) experience study periods in order to analyze this assumption.

Even with the use of twelve years of experience, based on standard statistical theory the data is only partially credible especially under the recommended benefit-weighted basis when dispersion of retirees' benefit amounts is taken into account. In 2008 the SOA published an article recommending that mortality assumptions include an adjustment for credibility. Under this approach, the number of deaths needed for full credibility for a headcount-weighted mortality table is just over 1,000, where full credibility means a 90% confidence that the actual experience will be within 5% of the expected value. Therefore, in our recommended assumptions, we have only partially adjusted the Pub-2010 mortality tables to fit EBMUDERS' experience. In future experience studies, more data will be available which may further increase the credibility of the EBMUDERS experience.

Pre-Retirement Mortality

The table currently being used for pre-retirement mortality rates is the Headcount-Weighted RP-2014 Employee Mortality Table (separate tables for males and females) set forward two years for males and set forward one year for females, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

For members in the Pension Plan, we recommend changing the pre-retirement mortality to follow the Pub-2010 General Employee Amount-Weighted Above-Median Mortality

Tables (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020.

For members in the Health Plan, we recommend changing the pre-retirement mortality to follow the Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Tables (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2020.

Post-Retirement Mortality (Service Retirements)

Among all retired members, the actual deaths compared to the expected deaths weighted by benefit amounts under the current assumptions for the last twelve years are shown in the table below. We also show the deaths weighted by benefit amount under the proposed assumptions. We are recommending the use of a generational mortality table, which incorporates a more explicit assumption for future mortality improvement. Accordingly, the goal is to adjust the base table so that actual deaths would be about 100% of those assumed (i.e., without a margin for future mortality improvement), because future mortality improvement is already reflected in the generational projection.

The proposed mortality tables also reflect current experience to the extent that the experience is credible based on standard statistical theory. For EBMUDERS, the volume of retiree data makes it only partially credible. That is why, as shown in the table below, the proposed mortality tables (which include adjustments to the base table to reflect recent experience) has an actual to expected ratio of 104%. In future years the ratio should remain around 104% as long as actual mortality improves at the same rate as anticipated by the generational mortality tables.

The number of actual deaths compared to the number expected under the current and proposed assumptions weighted by benefit amounts[33] for the last twelve years are as follows:

	Healthy ($ in millions)		
Gender	**Current Expected Weighted-Deaths**	**Actual Weighted-Deaths**	**Proposed Expected Weighted-Deaths**
Male	$1.42	$1.34	$1.26
Female	0.20	0.17	0.19
Total	**$1.62**	**$1.52**	**$1.45**
Actual / Expected	93%		104%

Notes: (1) Experience shown above is weighted by monthly benefit amounts for deceased members instead of by headcounts.

(2) Expected amounts under the proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the experience study period.

(3) Results may not add due to rounding.

[33] The results in the table are "benefit weighted deaths" which are measured in dollar amounts. For instance, there were 324 healthy male retiree deaths over the last twelve years, as shown in the table on the next page, and the total monthly benefits for those members amounted to $1.34 million,

For healthy post-retirement mortality, for members in the Pension Plan, we recommend updating the current tables to the Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Tables (separate tables for males and females), with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020. The recommended mortality tables have an actual to expected ratio of 104%.

For the purpose of setting the assumptions for the Health Plan, we have also provided in the table below the actual and expected deaths computed without weighting these by benefit amounts using the headcount-weighted version of the Pub-2010 tables. This is similar to how actual and expected death ratios were developed based on the prior headcount approach.

	Healthy (Headcounts)		
Gender	**Current Expected Deaths**	**Actual Deaths**	**Proposed Expected Deaths**
Male	311	324	295
Female	63	61	63
Total	**374**	**385**	**358**
Actual / Expected	103%		108%

Notes: *(1) Experience shown above is weighted by headcounts for deceased members instead of by monthly benefit amounts.*

(2) The proposed expected deaths are based on the Pub-2010 Headcount-Weighted Above-Median Mortality Tables.

(3) Results may not add due to rounding.

For healthy post-retirement mortality, for members in the Health Plan, we recommend updating the current tables to the Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Tables (separate tables for males and females), with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020. The recommended mortality tables will have an actual to expected ratio of 108%.

Chart 5 that follows later in this section compares actual to expected deaths on a benefit-weighted basis under the current and proposed assumptions over the past twelve years for the Pension Plan.

Chart 6 compares actual to expected deaths on a headcount-weighted basis for members under the current and proposed assumptions over the past twelve years provided for the Health Plan.

Chart 7 shows the life expectancies (i.e., expected future lifetime) under the current and the proposed tables on a benefit-weighted basis. Life expectancies under the proposed generational mortality rates are based on age as of 2020. In practice, assumed life expectancies will increase as a result of the mortality improvement scale.

Beneficiaries Mortality

In studying the mortality for all beneficiaries in our prior experience study, we reviewed the actual deaths compared to the expected deaths and recommended the same mortality tables for

retirees and all beneficiaries. However, Pub-2010 has separate mortality tables for healthy retirees and contingent annuitants.

The Pub-2010 Contingent Survivors Table is developed based only on contingent survivor data after the death of the retirees. This is consistent with the mortality experience that we have available for beneficiaries. The Pub-2010 contingent survivor mortality rates are comparable to EBMUDERS' actual mortality experience for beneficiaries.

For all beneficiaries under the Pension Plan, we recommend changing the mortality assumption to follow the Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Tables (separate tables for males and females) with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2020.

For all beneficiaries under the Health Plan, we recommend changing the mortality assumption to follow the Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Tables (separate tables for males and females) with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2020.

Mortality Table for Optional Forms

For optional forms of payment, there are some administrative issues that we may need to resolve with EBMUDERS and its vendor maintaining the pension administration software before we would recommend a comparable generational scale to anticipate future mortality improvement. For determining optional forms of payment, one emerging practice is to approximate the use of a generational mortality table by the use of a static table with projection of the mortality improvement from the measurement year over a period that is close to the duration of the benefit payments for active members retiring in the next four years. For EBMUDERS, we have estimated the duration of the benefit payments for active members retiring in the next for years to be approximately 14 years (from 2019). Accordingly, for purposes of costing the assumption changes recommended in this report, we have used a 25-year static projection (from 2010, the base year of the recommended mortality tables) of the mortality improvement scale for purposes of determining the optional forms of benefit. However, we will work with EBMUDERS and its software vendor following adoption of any assumptions from this report to determine the vendor's capabilities of incorporating generational projections of mortality improvement into the assumptions to be used for optional benefits.

For healthy retirements, we have used the corresponding base tables and adjustments described within this section, projected 25 years with the two-dimensional mortality improvement scale MP-2020 along with weighting based on actual gender distributions (the weighting is 75% male and 25% female) to determine optional forms of benefit for costing purposes in this report.

For all beneficiaries, we have used the corresponding base tables and adjustments described within this section, projected 25 years with the two-dimensional mortality improvement scale MP-2020 along with weighting based on the inverse of the actual gender distributions of members (i.e., 25% male and 75% female) to determine the optional forms of benefit for costing purposes in this report.

Chart 5: Post-Retirement Benefit-Weighted Deaths (In Millions)
Non-Disabled Members (July 1, 2008 through June 30, 2020)

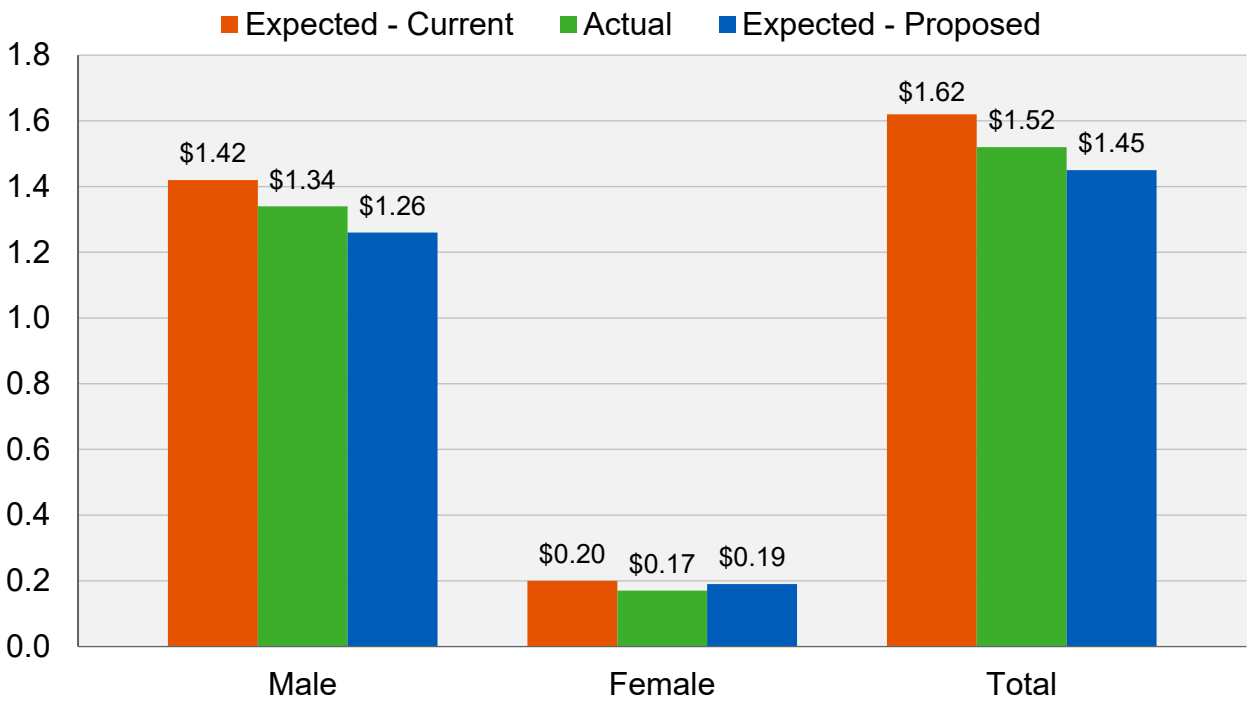


Chart 6: Post-Retirement Headcount-Weighted Deaths
Non-Disabled Members (July 1, 2008 through June 30, 2020)
For Health Plan

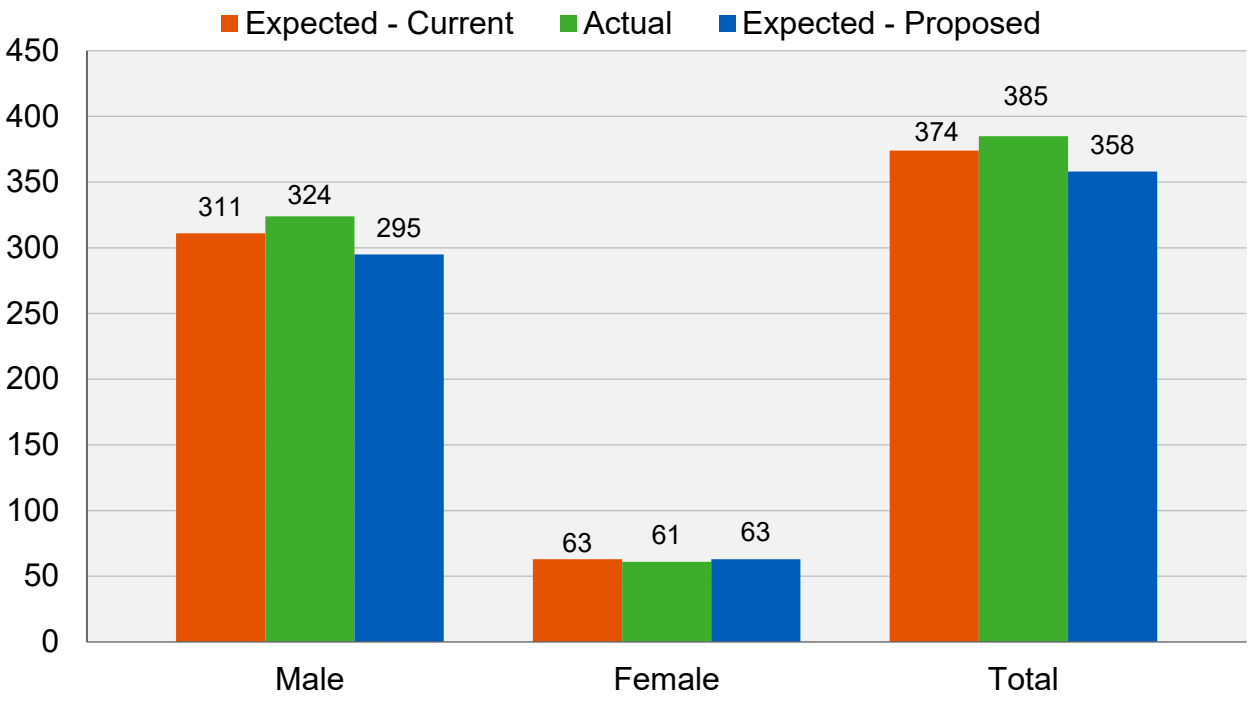
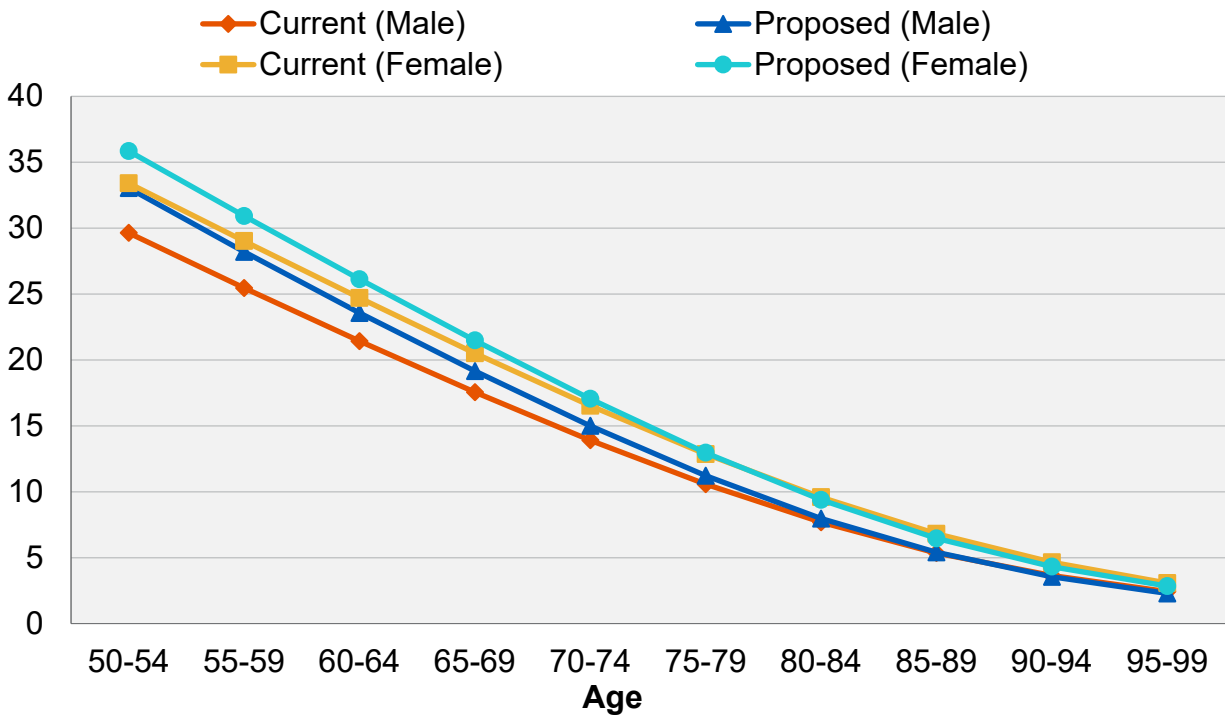


Chart 7: Benefit-Weighted Life Expectancies
Non-Disabled Members



C. Mortality Rates - Disabled

Since mortality rates for disabled members can vary from those of healthy members, a different mortality assumption is often used. The tables currently being used are the Headcount-Weighted RP-2014 Healthy Annuitant Mortality Tables (separate tables for males and females), set forward nine years for males and for females, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

Similar to mortality rates for service retirees, the proposed mortality tables reflect current experience to the extent that the experience is credible based on standard statistical theory. For EBMUDERS, there is far less data for disabled retirees, so it is given little credibility. The proposed mortality tables (as shown in the table below) after adjustments for partial credibility has an actual to expected ratio of 123%. In future years the ratio should remain around 123% as long as actual mortality improves at the same rate as anticipated by the generational mortality tables.

The number of actual deaths compared to the number expected under the current and proposed assumptions weighted by benefit amounts for the last twelve years are as follows:

	Disabled ($ in thousands)		
Gender	**Current Expected Weighted-Deaths**	**Actual Weighted-Deaths**	**Proposed Expected Weighted-Deaths**
Male	$37.87	$50.07	$36.59
Female	13.82	14.29	15.56
Total	**$51.69**	**$64.36**	**$52.15**
Actual / Expected	125%		123%

Notes: *(1) Experience shown above is weighted by monthly benefit amounts for deceased members instead of by headcounts.*

(2) Expected amounts under the proposed generational mortality table are based on mortality rates from the base year projected with mortality improvements to the experience study period.

(3) Results may not add due to rounding.

The Pub-2010 family of mortality tables provides separate disabled retiree mortality tables for Non-Safety disabled retirees and Safety disabled retirees.

For disabled members in the Pension Plan, we recommend updating the current tables to the Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Tables (separate tables for males and females) with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020. The recommended mortality tables will have an actual to expected ratio of 123%.

For the purpose of setting the assumptions for the Health Plan, we have also provided in the table below the actual and expected deaths computed without weighting these by benefit amounts and using the headcount-weighted version of the Pub-2010 tables. This is similar to how actual and expected death ratios were developed based on the prior headcount approach.

	Disabled (Headcounts)		
Gender	Current Expected Deaths	Actual Deaths	Proposed Expected Deaths
Male	21	25	21
Female	9	8	9
Total	**30**	**33**	**31**
Actual / Expected	109%		107%

Notes: *(1) Experience shown above is weighted by headcounts for deceased members instead of by monthly benefit amounts.*

(2) The proposed expected deaths are based on the Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Tables.

(3) Results may not add due to rounding.

For disabled members in the Health Plan, we recommend updating the current tables to the Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Tables (separate tables for males and females) with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020. The recommended mortality tables will have an actual to expected ratio of 107%.

Chart 8 compares actual to expected deaths on a benefit-weighted basis for disabled members under the current and proposed assumptions over the past twelve years.

Chart 9 compares actual to expected deaths on a headcount-weighted basis for disabled members under the current and proposed assumptions over the past twelve years for the Health Plan.

Chart 10 shows the life expectancies (i.e., expected future lifetime) under the current and the proposed tables for disabled members on a benefit-weighted basis. Life expectancies under the proposed generational mortality rates are based on age as of 2020. In practice, life expectancies will be assumed to increase based on the mortality improvement scale.

Chart 8: Post-Retirement Benefit-Weighted Deaths (In Thousands)
Disabled Members (July 1, 2008 through June 30, 2020)

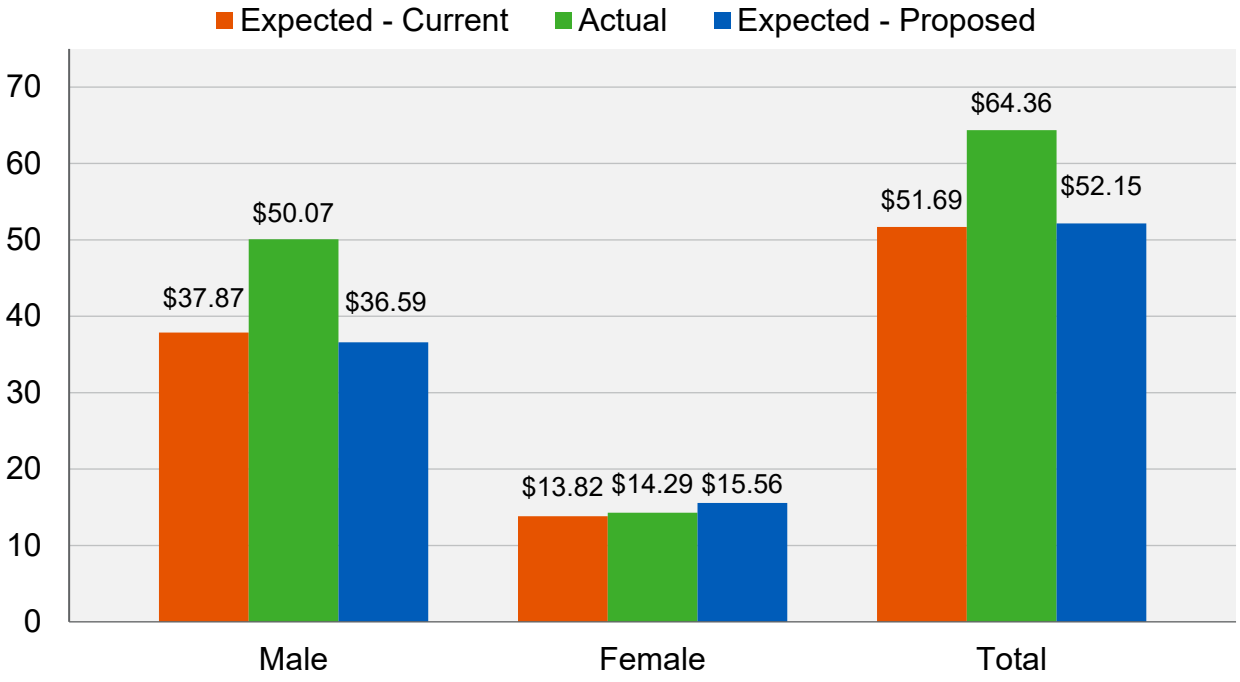


Chart 9: Post-Retirement Headcount-Weighted Deaths
Disabled Members (July 1, 2008 through June 30, 2020)
For Health Plan

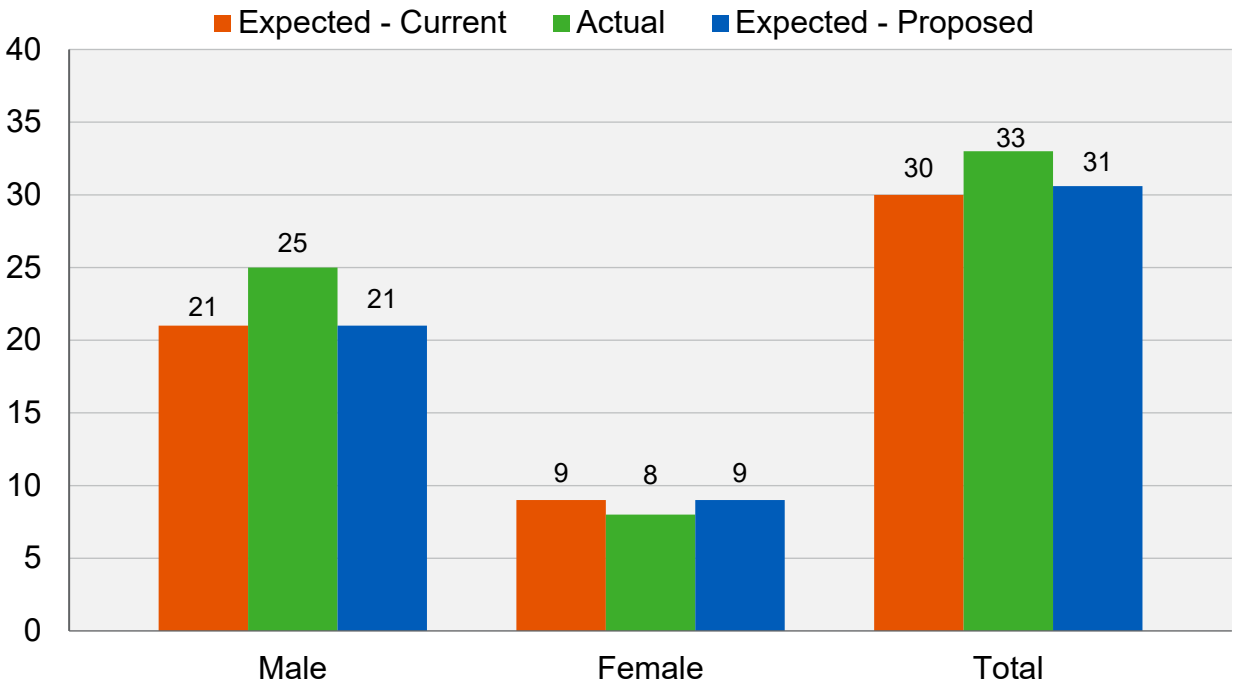
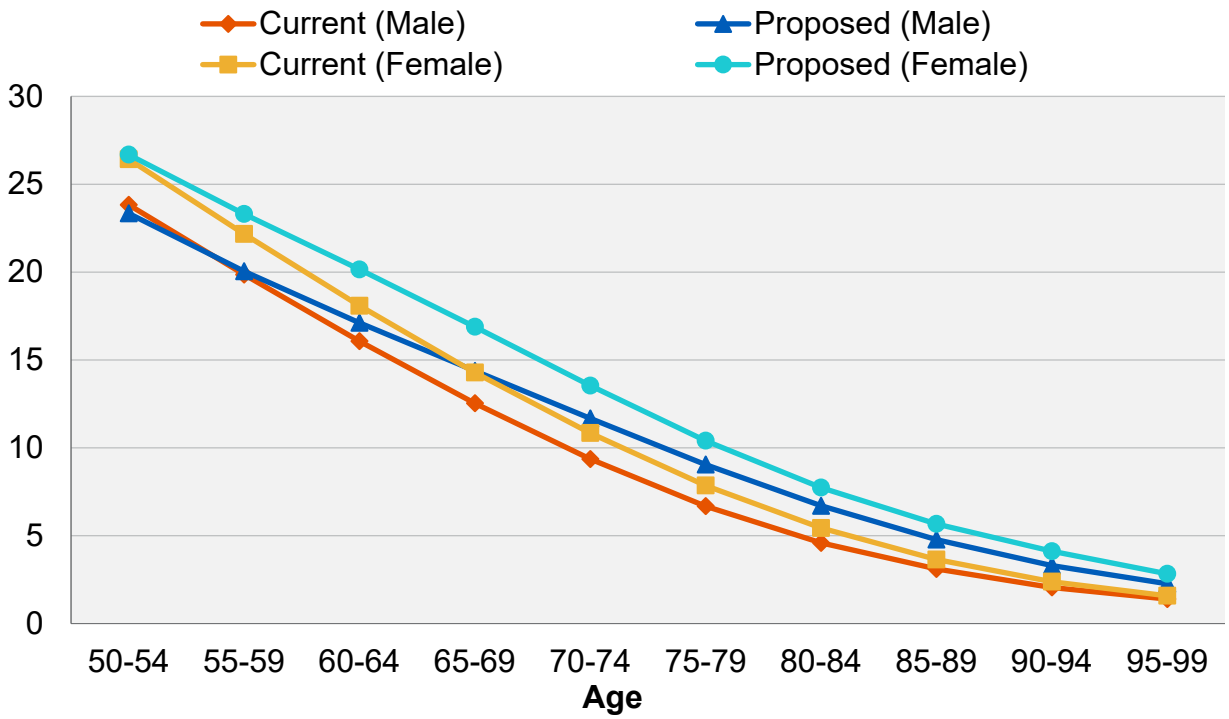


Chart 10: Benefit-Weighted Life Expectancies
Disabled Members



D. Termination Rates

Termination rates include all terminations for reasons other than death, disability, or retirement. Under the current assumption structure, members are assumed to withdraw their contributions (an ordinary withdrawal) based on service (i.e., a service-based assumption) with less than five years of service, and based on age (i.e., an age-based assumption) with five or more years of service. Members are assumed to take a deferred vested benefit (a vested termination) based on age (i.e., an age-based assumption). The current assumptions for termination are further split by male and female.

Starting with this experience review, we have combined the ordinary withdrawal and vested termination assumptions, and, consistent with the retirement rates, have developed rates on a unisex basis. Under the proposed assumptions, members with less than five years of service are assumed to terminate based on years of service (i.e., a service-based assumption), and members with five or more years of service are assumed to terminate based on age (i.e., an age-based assumption). The termination experience over the last four years is shown by years of service for the first five years of service, and by age after five years of service. Please note that we have excluded any members that were eligible for retirement, unless the member actually terminated. In addition, termination liability continues to be based on the greater actuarial value of a refund of member contributions and a deferred vested retirement benefit.

Rates of Termination

Less than Five Years of Service

	Termination rate (%)		
Years of Service	Current Rate[1]	Actual Rate	Proposed Rate
Less than 1	6.00	7.60	6.75
1 – 2	4.77	3.61	4.25
2 – 3	4.43	3.72	4.00
3 – 4	3.94	3.04	3.50
4 – 5	3.30	1.57	2.50

Five or More Years of Service

	Termination Rate (%)		
Age	Current Rate[1,2]	Actual Rate	Proposed Rate[2]
20 – 24	7.36	0.00	2.40
25 – 29	6.22	0.00	2.30
30 – 34	5.33	1.41	2.20
35 – 39	3.11	0.53	2.10
40 – 44	2.53	1.78	2.00
45 – 49	1.79	1.61	1.75
50 – 54	0.79	0.84	1.50
55 – 59	0.47	100.00	1.25
60 – 64	0.00	100.00	1.00

[1] *This is the combined rate for males and females, weighted by exposures, based on the current assumptions.*

[2] *At central age in the age range shown.*

It is important to note that, in the table above, not every age 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 age categories since more members in those categories are eligible to retire and, therefore, they have been excluded from our review of this experience (unless the member actually terminated).

Chart 11 compares the actual number of terminations for members with less than five years of service over the past four years to that expected under both the current and proposed assumptions. The proposed termination rates were adjusted to reflect the past four years' experience.

Chart 12 shows actual termination rates for members with less than five years of service, compared to the currently assumed and proposed rates.

Chart 13 compares the actual number of terminations for members with five or more years of service over the past four years to that expected under both the current and proposed assumptions. The proposed termination rates were adjusted to reflect the past four years' experience.

Chart 14 shows actual termination rates for members with five or more years of service, compared to the currently assumed and proposed rates.

Based on recent experience, for members with less than five years of service, we propose decreases to most of the termination rates. For members with five or more years of service, we propose decreases to most termination rates at the younger ages and increases at the older ages. We now assume that all termination rates are zero for all members eligible to retire as long as a retirement rate is present; that is, it is assumed that members eligible to retire at termination will retire rather than defer their benefit or withdraw their contributions.

Chart 11: Actual Number of Terminations Compared to Expected
Less than Five Years of Service

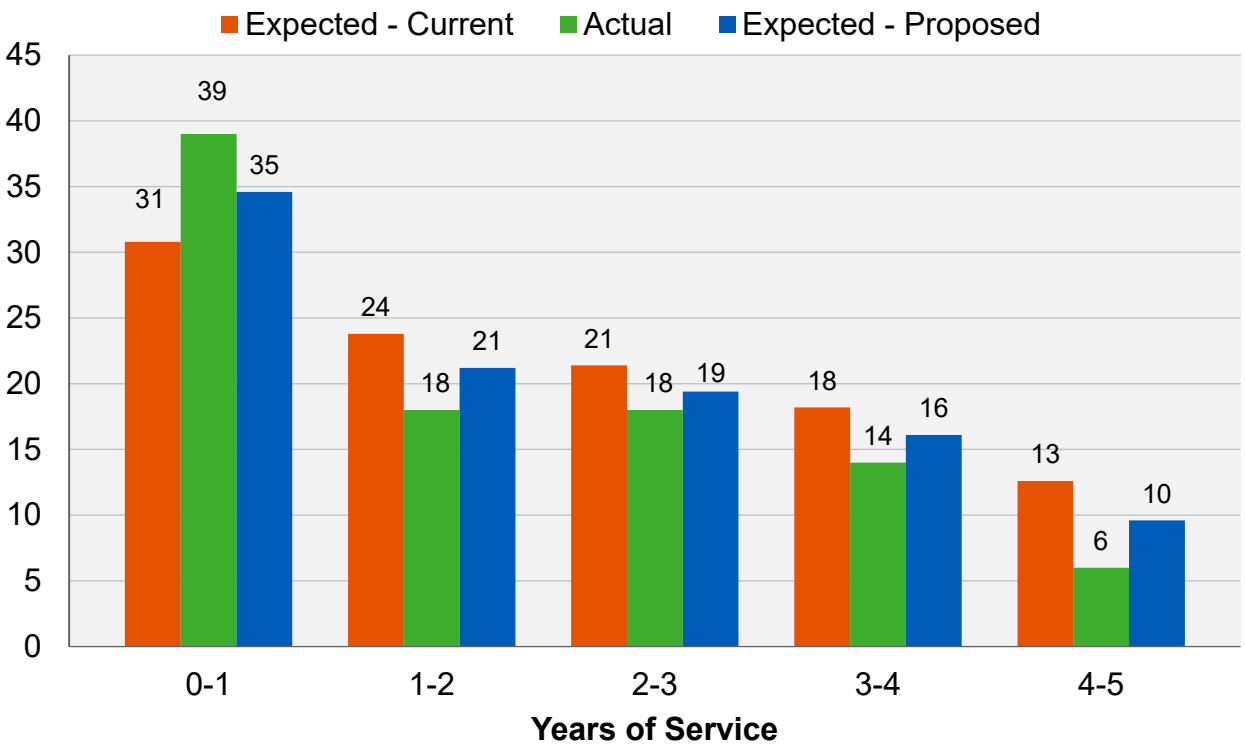


Chart 12: Termination Rates
Less than Five Years of Service

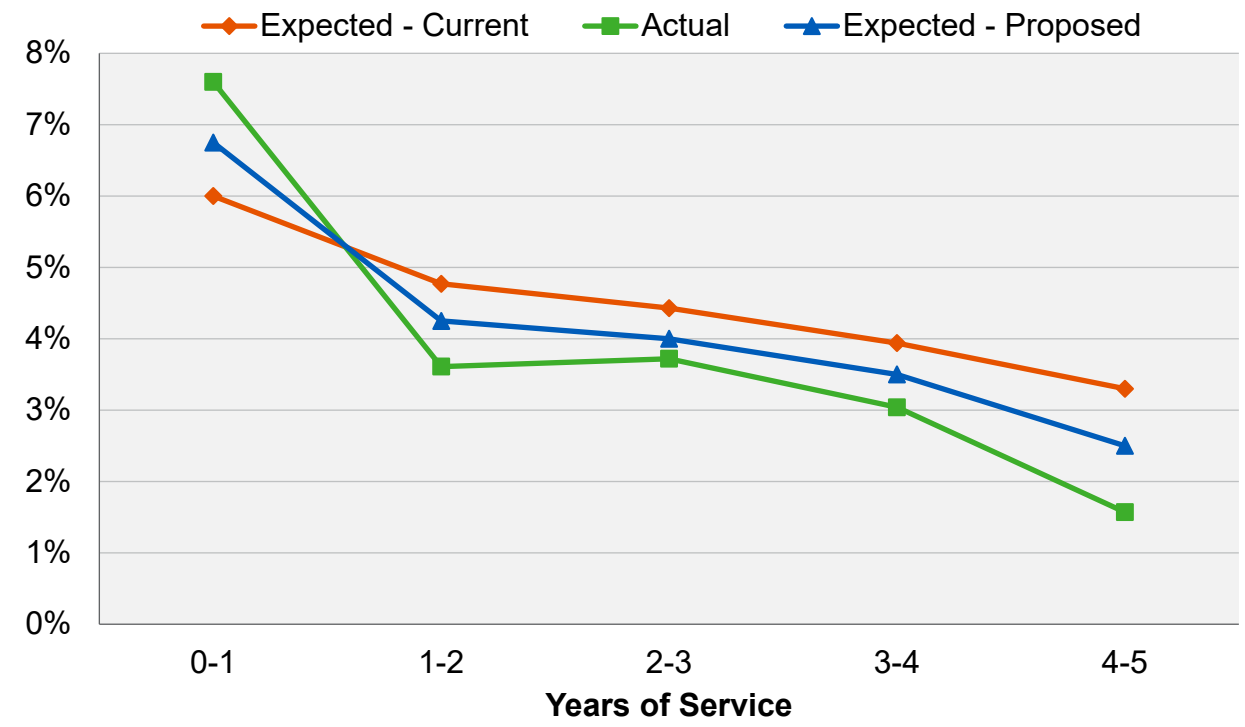


Chart 13: Actual Number of Terminations Compared to Expected
Five or More Years of Service

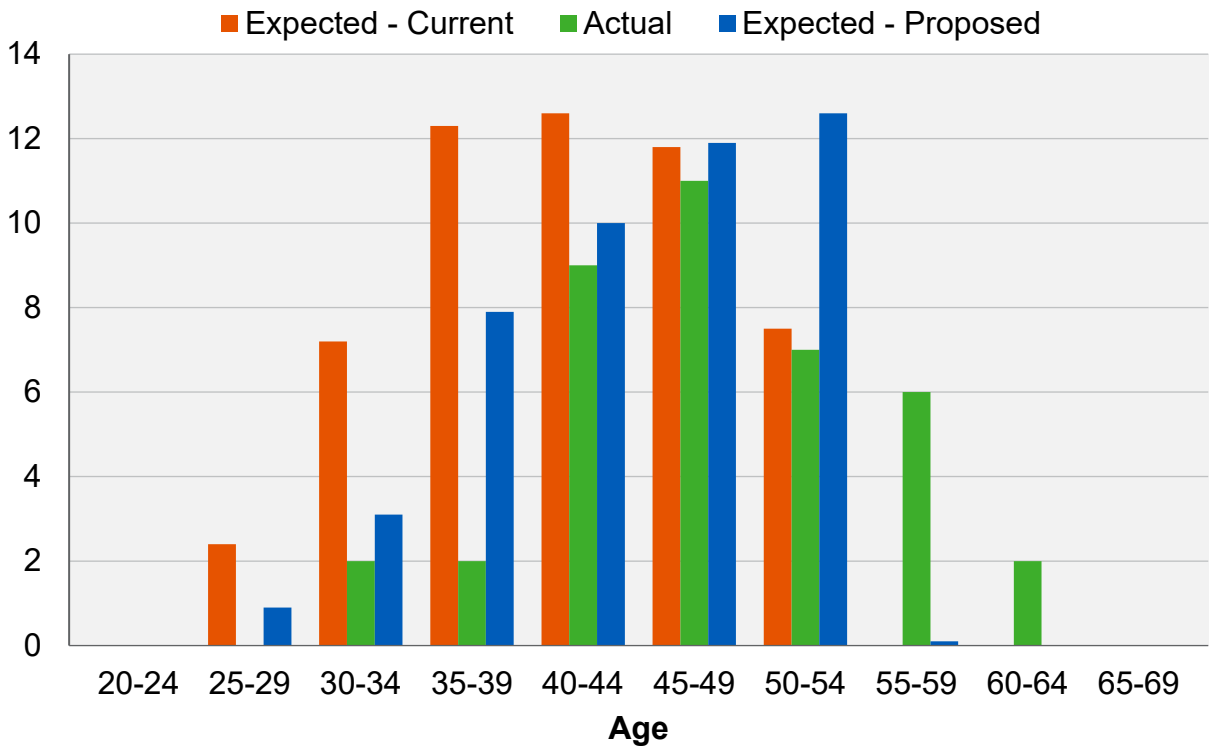
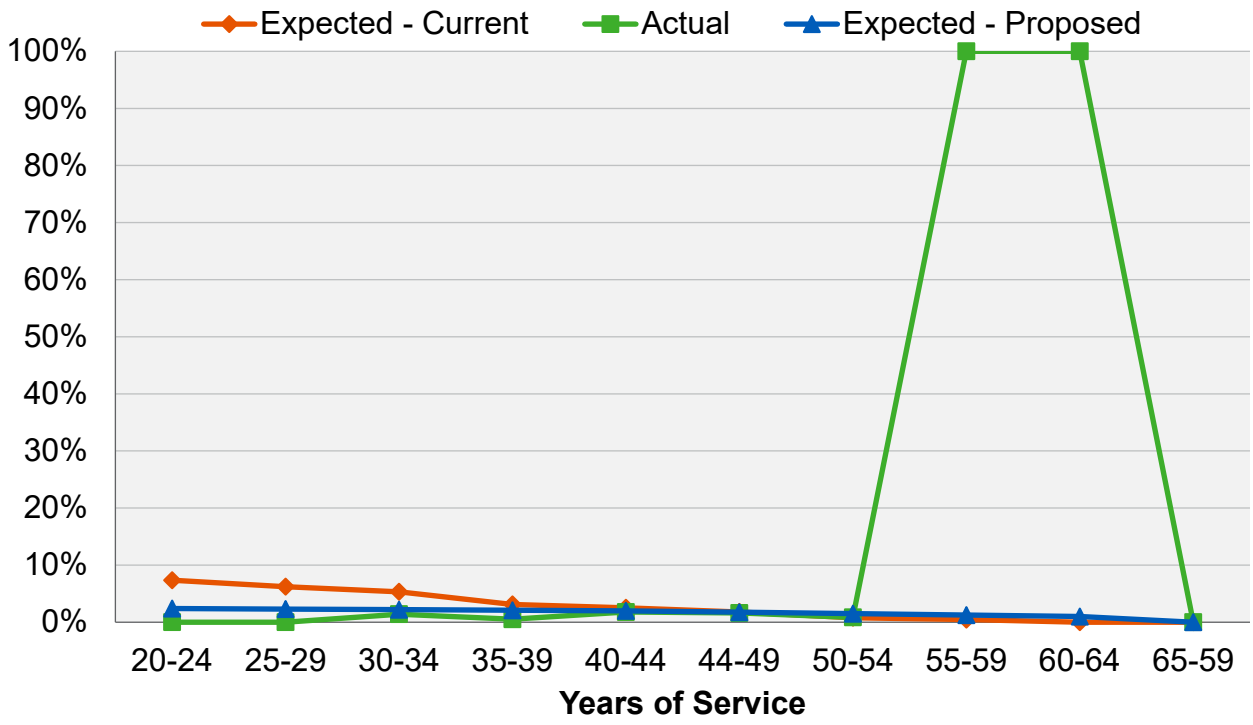


Chart 14: Termination Rates
Five or More Years of Service



E. Disability Incidence Rates

When a member becomes disabled, he or she is generally entitled to a monthly benefit equal to 1/3 of their Final Compensation.

Consistent with our recommendation for retirement and termination rates, disability incidence rates have been developed on a unisex basis instead of a sex distinct basis used in the past. The following summarizes the actual incidence of disabilities over the past four years compared to the current and proposed assumptions:

Rates of Disability Incidence

	Disability Incidence Rate (%)		
Age	Current Rate[1,2]	Actual Rate	Proposed Rate[2]
20 – 24	0.000	0.000	0.000
25 – 29	0.000	0.000	0.000
30 – 34	0.020	0.000	0.010
35 – 39	0.040	0.000	0.030
40 – 44	0.173	0.000	0.120
45 – 49	0.250	0.339	0.170
50 – 54	0.247	0.000	0.170
55 – 59	0.273	0.099	0.190
60 – 64	0.343	0.153	0.240
65 – 69	0.464	0.000	0.320

[1] *This is the combined rate for males and females, weighted by exposures, based on the current assumptions.*

[2] *At central age in the age range shown.*

Based on recent experience, we have decreased the disability rates overall.

Chart 15 compares the actual number of disabilities over the past four years to that expected under both the current and proposed assumptions. The proposed disability rates were adjusted to reflect the past four years' experience.

Chart 16 shows actual disablement rates, compared to the assumed and proposed rates.

Chart 15: Actual Number of Disability Retirements Compared to Expected

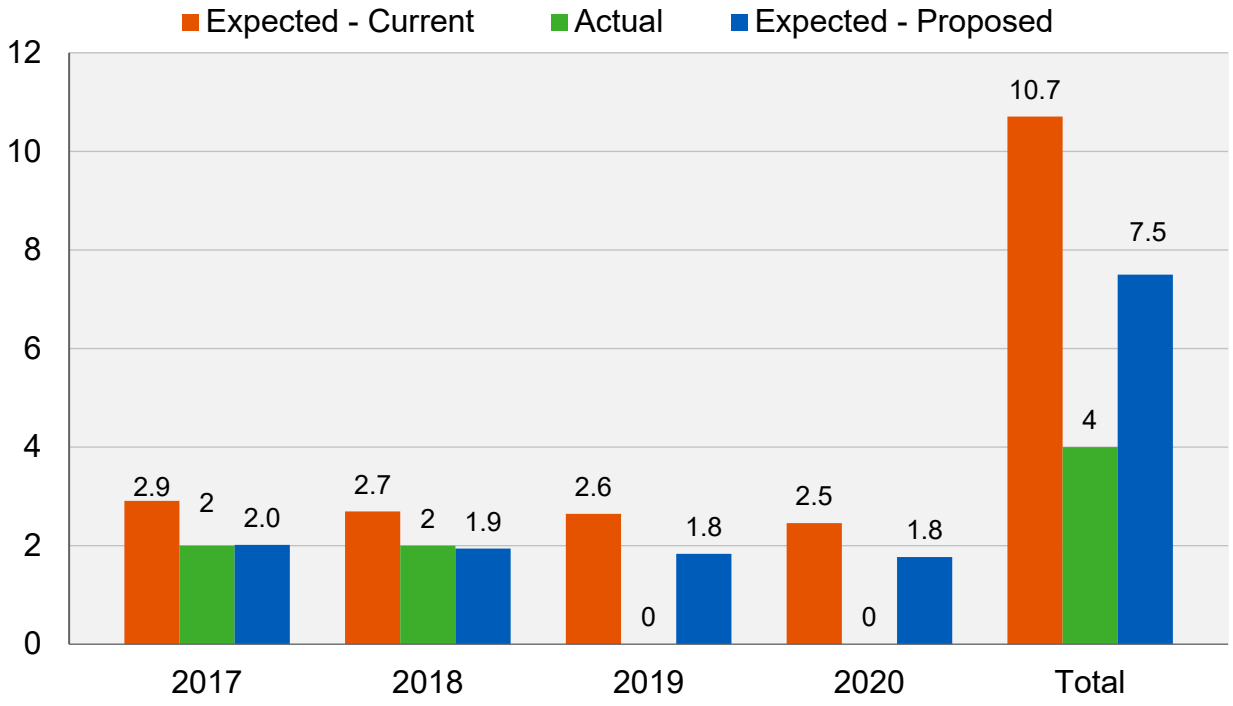
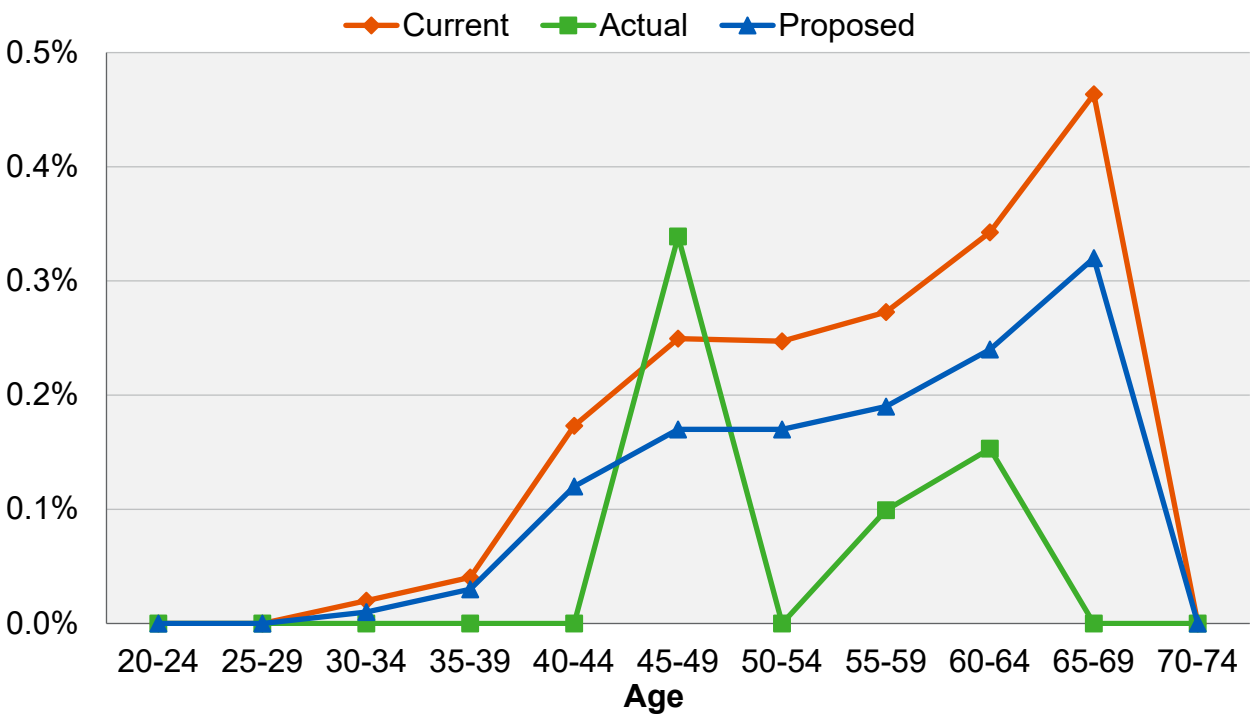


Chart 16: Disability Incidence Rates



V. Cost Impact

The tables below show the changes in the total normal cost, actuarial accrued liability, and employer contribution rates for the Pension Plan due to the recommended assumption changes, as if they were applied in the June 30, 2019 actuarial valuation. We note that the recommended economic and demographic assumptions are expected to have a relatively small impact on the Health Plan.

Pension Plan

	Change in Plan Liabilities, as of June 30, 2019		
	Current Assumptions	**Proposed Assumptions**	**Increase / (Decrease)**
Total Employer and Employee Normal Cost	$47,722,000	$52,040,000	$4,318,000
Actuarial Accrued Liability			
Active Members	$824,068,000	$886,470,000	$62,402,000
Inactive Vested Members	49,349,000	52,408,000	3,059,000
Retired Members	1,467,356,000	1,501,295,000	33,939,000
Total	$2,340,773,000	$2,440,173,000	$99,400,000

The table below details the change in the cost due to the proposed assumption changes. The costs are shown with the increase in the actuarial accrued liability being amortized as a percentage of pay over 25 years. The cost increase was primarily due to the recommended change in the assumptions for merit and promotion salary increases (about 1/6 of the costs) and mortality (about 3/4 of the costs).

As shown in the table below, the total percent of pay cost increase based on the 25-year amortization period is approximately 5.30% for the 1955/1980 Plan and 3.06% for the 2013 Tier, for the Pension Plan only. The expected payroll for plan year 2019/2020 is $145,611,673 for 1955/1980 Plan members and $67,126,549 for 2013 Tier members.

	Change in Plan Costs, 25-Year Amortization (% of Pay)[34]	
	1955/1980 Plan	**2013 Tier**
Increase in Employer Normal Cost	2.46%	0.22%
Increase in UAAL	2.84%	2.84%
Total Increase in Costs	5.30%	3.06%

Of the various changes to assumptions, the cost increase on the employer's rate is primarily from the change in the assumptions for merit and promotion salary increases (about 1/6 of the costs in aggregate) and mortality (about 3/4 of the costs in aggregate).

[34] The average total employer rate for both tiers combined is 4.59% of pay, based on projected payrolls for 1955/1980 Plan members and 2013 Tier members combined of $212,738,222 for plan year 2019/2020.

It should also be noted that in adopting the contribution rates in the June 30, 2019 valuations, the Board decided to carry over unchanged the higher contribution rates approved as part of the June 30, 2018 valuations. Those higher rates totaled 1.01% of payroll for the 1955/1980 Plan and 1.02% for the 2013 Tier for the Pension and Health Plans combined and may be used to offset a portion of the contribution rate increase due to assumption changes adopted by the Board and/or other unfavorable actuarial experience (e.g., investment return after smoothing less than expected by the current 7.00% assumption, etc.) in the June 30, 2020 valuations.

Development of Changes in Employee and Employer Normal Cost Rates for the 2013 Tier

Pursuant to Section 7522.30(a) of the Government Code, 2013 Tier members are required to contribute at least 50% of the normal cost rate. Furthermore, Section 7522.30(d) of the Government Code states that the 2013 Tier member contribution rates, "once established,…shall not be adjusted on account of a change to the normal cost rate unless the normal cost rate increases or decreases by more than 1 percent of payroll above or below the normal cost rate in effect at the time the employee contribution rate is first established or, if later, the normal cost rate in effect at the time of the last adjustment to the employee contribution rate under this section."

An initial total normal cost rate of 17.56% was determined in the first CalPEPRA valuation, as we have noted in our annual valuation reports. After rounding to the nearest quarter of 1% pursuant to Section 7522.30(c), the member contribution rate for 2013 Tier members was initially established at 8.75% of payroll, and that rate has continued to be paid by the members since then. Under the recommended assumptions in this report, the increase in the total normal cost rate for the 2013 Tier (measured as of June 30, 2019) would trigger an increase in the 2013 Tier member rate, as that tier's new total normal cost rate of 18.87% would have gone up by more than 1% of payroll when compared to the initial rate of 17.56%. Specifically, we have determined that the employee contribution rate would increase to 9.50% of pay for the 2013 Tier members in the Pension Plan if all of the recommended assumptions in this report are adopted.

Based on this information, we have also developed the increase in the employer normal cost rate for the 2013 Tier of 0.22% under the recommended assumptions (shown on the prior page) as follows:

Development of Change in Employer Normal Cost Rate for the 2013 Tier under Recommended Assumptions	
	2013 Tier
1. Normal Cost Rate from first CalPEPRA Valuation:	
a. Total Normal Cost Rate	17.56%
b. Employee Normal Cost Rate*	-8.75%
c. Employer Normal Cost Rate	8.81%
2. Recalculated Normal Cost Rate as of June 30, 2019 under Recommended Assumptions (Reflecting 50% Provision of Section 7522.30(a)):	
a. Total Normal Cost Rate	18.87%
b. Employee Normal Cost Rate*	-9.50%
c. Employer Normal Cost Rate	9.37%
3. Employer Normal Cost Rate from June 30, 2019 Valuation under Current Assumptions	9.15%
4. Recalculated Employer Normal Cost Rate as of June 30, 2019 under Recommended Assumptions (item 2c)	9.37%
5, Increase in Employer Normal Cost Rate as of June 30, 2019 under Recommended Assumptions (item 4 – item 3)	0.22%

* The initial employee normal cost rate was rounded to the nearest quarter of 1%, pursuant to Section 7522.30(c). We have continued to round the recalculated employee normal cost rate as of June 30, 2019 under the recommended assumptions as mandated by Section 7522.30(d) to the nearest quarter of 1%. As this is the first time we would change the member rate for the 2013 Tier, we would consult with EBMUDERS' legal counsel to confirm that we are correctly applying the rounding of the employee normal cost rate under that Section (we understand that CalPERS does apply the quarter of 1% rounding).

If the recommended actuarial assumptions are adopted from this study, they would be first applied in the June 30, 2020 valuation. The effect of the new assumptions on the 2013 Tier total normal cost rate would be recalculated at that time, and that recalculated rate would become the new baseline for determining if subsequent changes to the employee rate for the 2013 Tier would be necessary.

Appendix A: Current Actuarial Assumptions

Economic Assumptions

Net Investment Return:	7.00%, net of administrative and investment expenses. Expected administrative and investment expenses represent about 0.16% of the average Market Value of Assets.
Employee Contribution Crediting Rate:	7.00%, compounded semi-annually.
Consumer Price Index:	Increase of 2.75% per year. Retiree COLA increases due to CPI are subject to a 2.75% maximum change per year (for members with a sufficient COLA bank, withdrawals from the bank can be made to increase the retiree COLA up to 3% per year).
Payroll Growth:	Inflation of 2.75% per year plus real "across the board" salary increases of 0.50% per year, used to amortize the Unfunded Actuarial Accrued Liability as a level percentage of payroll.
Increases in Internal Revenue Code Section 401(a)(17) Compensation Limit:	Increase of 2.75% per year from the valuation date.
Increase in California Government Code Section 7522.10 Compensation Limit:	Increase of 2.75% per year from the valuation date.

Salary Increases

Inflation: 2.75% per year; plus real "across the board" salary increases of 0.50% per year; plus the following merit and promotion increases.

Merit and Promotion Increases	
Years of Service	**Rate (%)**
Less than 1	6.00
1 – 2	5.00
2 – 3	4.00
3 – 4	3.00
4 – 5	2.00
5 – 6	1.00
6 – 7	0.80
7 & Over	0.50

Demographic Assumptions

Post-Retirement Mortality Rates – Healthy

- **Males:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Table, set forward two years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.
- **Females:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Table, set forward one year, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

Post-Retirement Mortality Rates – Disabled

- **Males:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Table, set forward nine years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.
- **Females:** Headcount-Weighted RP-2014 (RPH-2014) Healthy Annuitant Mortality Table, set forward nine years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

Mortality Rates – Beneficiaries

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

Mortality Rates – Pre-Retirement

- **Males:** Headcount-Weighted RP-2014 (RPH-2014) Employee Mortality Table, set forward two years, projected 20 years with the two-dimensional mortality improvement scale MP-2015.
- **Females:** Headcount-Weighted RP-2014 (RPH-2014) Employee Mortality Table, set forward one year, projected 20 years with the two-dimensional mortality improvement scale MP-2015.

	Rate (%)	
Age	Male	Female
20	0.04	0.01
25	0.04	0.02
30	0.05	0.02
35	0.05	0.03
40	0.07	0.04
45	0.11	0.07
50	0.19	0.12
55	0.33	0.19
60	0.58	0.27
65	0.96	0.39

Disability Incidence Rates

	Rate (%)	
Age	Male	Female
25	0.000	0.000
30	0.006	0.030
35	0.016	0.068
40	0.068	0.212
45	0.160	0.330
50	0.200	0.380
55	0.200	0.460
60	0.230	0.560
65	0.310	0.660

Disability rates are applicable after eight years of service.

Termination Rates

Ordinary Withdrawal – Less than Five Years of Service

	Rate (%)	
Years of Service	**Male**	**Female**
Less than 1	2.25	3.00
1 – 2	1.00	2.50
2 – 3	0.75	2.25
3 – 4	0.50	2.00
4 – 5	0.25	1.25

Ordinary Withdrawal - Five or More Years of Service

	Rate (%)	
Age	**Male**	**Female**
25	0.230	0.640
30	0.205	0.540
35	0.180	0.440
40	0.155	0.340
45	0.130	0.240
50	0.105	0.140
55	0.080	0.085
60	0.055	0.060

Vested Termination

	Rate (%)	
Age	**Male**	**Female**
25	6.40	7.00
30	5.40	6.40
35	3.50	4.80
40	2.20	3.40
45	1.70	2.40
50	0.96	1.40
55	0.48	0.70
60	0.34	0.50

Retirement Rates

	Rate (%)			
	1955/1980 Plan		2013 Tier	
Age	Male	Female	Male	Female
52	0.00	0.00	2.00	1.00
53	0.00	0.00	2.00	1.00
54[1]	6.00	6.00	3.00	2.00
55	7.00	7.00	5.00	4.00
56	7.00	8.00	6.00	5.00
57	9.00	8.00	6.00	5.00
58	10.00	9.00	6.00	5.00
59	10.00	12.00	8.00	7.00
60	13.00	13.00	8.00	7.00
61	13.00	19.00	10.00	11.00
62	25.00	19.00	19.00	15.00
63	20.00	17.00	16.00	12.00
64	15.00	17.00	8.00	12.00
65	25.00	17.00	26.00	17.00
66	25.00	30.00	25.00	20.00
67	20.00	30.00	35.00	25.00
68	25.00	30.00	35.00	35.00
69	40.00	30.00	40.00	35.00
70 & Over	100.00	100.00	100.00	100.00

[1] The retirement rate for 1955/1980 Plan members age 54 with 30 or more years of service (i.e., eligible for unreduced benefits) is 50% for males and females.

<table>
<tr><td>Retirement Age for Inactive Vested Members:</td><td>59</td></tr>
<tr><td>Reciprocity:</td><td>30% of members who terminate with a vested benefit are assumed to enter a reciprocal system. For reciprocals, 3.75% compensation increases are assumed per annum.</td></tr>
<tr><td>Future Benefit Accruals:</td><td>1.0 year of service per year of employment, plus 0.036 years of additional service to anticipate conversion of unused sick leave for each year of employment. As directed by EBMUDERS, this assumption has been applied to active members in the 1955/1980 Plan and the 2013 Tier.</td></tr>
<tr><td>Unknown Data for Members:</td><td>Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.</td></tr>
<tr><td>Percent Married/Domestic Partnership:</td><td>The percent married/domestic partnership at retirement is assumed to be 80% for male members and 50% for female members.</td></tr>
<tr><td>Age and Gender of Spouses/Domestic Partner:</td><td>Female (or male) spouses/domestic partners are 3 years younger (or older) than the members. Spouses/domestic partners of active and inactive members are assumed to be the opposite sex of the member.</td></tr>
<tr><td>Form of Payment:</td><td>At retirement, members with spouses or domestic partners are assumed to elect the following form of payment (single members are assumed to elect the Unmodified option):
<table>
<tr><th>Form of Payment</th><th>Election Percentage</th></tr>
<tr><td>Unmodified or Option 1</td><td>50%</td></tr>
<tr><td>Option 2 (100% Continuance)</td><td>10%</td></tr>
<tr><td>Option 3 (50% Continuance)</td><td>20%</td></tr>
<tr><td>Option 4 (25% Continuance)</td><td>20%</td></tr>
</table></td></tr>
</table>

Appendix B: Proposed Actuarial Assumptions

Economic Assumptions

Net Investment Return:	7.00%, net of administrative and investment expenses. Expected administrative and investment expenses represent about 0.34% of the average Market Value of Assets.
Employee Contribution Crediting Rate:	7.00%, compounded semi-annually.
Consumer Price Index:	Increase of 2.75% per year. Retiree COLA increases due to CPI are subject to a 2.75% maximum change per year (for members with a sufficient COLA bank, withdrawals from the bank can be made to increase the retiree COLA up to 3% per year).
Payroll Growth:	Inflation of 2.75% per year plus real "across the board" salary increases of 0.50% per year, used to amortize the Unfunded Actuarial Accrued Liability as a level percentage of payroll.
Increases in Internal Revenue Code Section 401(a)(17) Compensation Limit:	Increase of 2.75% per year from the valuation date.
Increase in California Government Code Section 7522.10 Compensation Limit:	Increase of 2.75% per year from the valuation date.

Salary Increases

The annual rate of compensation increase includes: inflation at 2.75%, plus real "across the board" salary increases of 0.50% per year, plus the following merit and promotion increases:

Merit and Promotion Increases	
Time from Hire (Years)	**Rate (%)**
Less than 1	6.25
1 – 2	6.00
2 – 3	5.00
3 – 4	3.75
4 – 5	2.50
5 – 6	1.50
6 – 7	1.25
7 – 8	1.25
8 – 9	1.00
9 – 10	1.00
10 & Over	0.75

Demographic Assumptions

Post-Retirement Mortality Rates – Healthy

- For the Pension Plan - Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Tables with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020.
- For the Health Insurance Benefit Plan - Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Tables with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020.

Post-Retirement Mortality Rates – Disabled

- For the Pension Plan - Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Tables with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020.
- For the Health Insurance Benefit Plan - Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Tables with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2020.

Mortality Rates – Beneficiaries

- For the Pension Plan - Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Tables with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2020.
- For the Health Insurance Benefit Plan - Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Table with rates increased by 5% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2020.

Mortality Rates – Pre-Retirement

For the Pension Plan - Pub-2010 General Employee Amount-Weighted Above-Median Mortality Tables, projected generationally with the two-dimensional mortality improvement scale MP-2020.

	Rate (%)	
Age	Male	Female
20	0.04	0.01
25	0.02	0.01
30	0.03	0.01
35	0.04	0.02
40	0.06	0.03
45	0.09	0.05
50	0.13	0.08
55	0.19	0.11
60	0.28	0.17
65	0.41	0.27

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

For the Health Insurance Benefit Plan - Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Tables, projected generationally with the two-dimensional mortality improvement scale MP-2020.

Disability Incidence Rates

Disability Incidence	
Age	**Rate (%)**
25	0.000
30	0.006
35	0.022
40	0.084
45	0.150
50	0.170
55	0.182
60	0.220
65	0.288

Disability rates are applicable after eight years of service.

Termination Rates

Less than Five Years of Service

Termination (< 5 Years of Service)	
Years of Service	**Rate (%)**
Less than 1	6.75
1 – 2	4.25
2 – 3	4.00
3 – 4	3.50
4 – 5	2.50

Five or More Years of Service

Termination (5+ Years of Service)	
Age	**Rate (%)**
25	2.34
30	2.24
35	2.14
40	2.04
45	1.85
50	1.60
55	1.35
60	1.10

No termination is assumed after a member is eligible for retirement (as long as a retirement rate is present).

Retirement Rates

	Rate (%)		
	1955/1980 Plan		
Age	Unreduced Pension[1]	Reduced Pension	2013 Tier
52	0.00	0.00	1.75
53	0.00	0.00	1.75
54	55.00	7.00	2.75
55	16.00	7.00	4.75
56	16.00	7.00	5.75
57	16.00	7.00	5.75
58	16.00	7.00	5.75
59	16.00	7.00	7.75
60	16.00	7.00	7.75
61	16.00	12.00	10.25
62	16.00	N/A[2]	18.00
63	16.00	N/A	15.00
64	16.00	N/A	9.00
65	16.00	N/A	23.75
66	27.00	N/A	23.75
67	27.00	N/A	32.50
68	27.00	N/A	35.00
69	27.00	N/A	38.75
70 & Over	100.00	N/A	100.00

[1] For example, a 1955/1980 Plan member age 54 with 30 or more years of service would receive the full 2.60% per year of service accrual.

[2] For ages 62 and over, all 1955/1980 Plan members who are eligible for retirement receive the full 2.60% per year of service accrual.

<table>
<tr><td>Retirement Age for Inactive Vested Members:</td><td>59
1955/1980 Plan non-reciprocal members who are currently terminated with less than five years of service and are not vested are assumed to retire at age 65 if they decide to leave their contributions on deposit.</td></tr>
<tr><td>Reciprocity:</td><td>15% of members who terminate with a vested benefit are assumed to enter a reciprocal system. For reciprocals, 4.00% compensation increases are assumed per annum.</td></tr>
<tr><td>Future Benefit Accruals:</td><td>1.0 year of service per year of employment, plus 0.038 years of additional service to anticipate conversion of unused sick leave for each year of employment. As directed by EBMUDERS, this assumption has been applied to active members in the 1955/1980 Plan and the 2013 Tier.</td></tr>
<tr><td>Unknown Data for Members:</td><td>Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.</td></tr>
<tr><td>Percent Married/Domestic Partnership:</td><td>For all active and inactive members, 85% of male members and 60% of female members are assumed to be married or with domestic partner at pre-retirement death or retirement.</td></tr>
<tr><td>Age and Gender of Spouse/Domestic Partner:</td><td>For all active and inactive members, male members are assumed to have a female spouse who is 2 years younger than the member and female members are assumed to have a male spouse who is 3 years older than the member.</td></tr>
<tr><td>Form of Payment:</td><td>At retirement, members with spouses or domestic partners are assumed to elect the following form of payment (single members are assumed to elect the Unmodified option):
<table>
<tr><th>Form of Payment</th><th>Election Percentage</th></tr>
<tr><td>Unmodified or Option 1</td><td>50%</td></tr>
<tr><td>Option 2 (100% Continuance)</td><td>10%</td></tr>
<tr><td>Option 3 (50% Continuance)</td><td>20%</td></tr>
<tr><td>Option 4 (25% Continuance)</td><td>20%</td></tr>
</table></td></tr>
</table>