Los Angeles City Employees'
Retirement System

Actuarial Experience Study

**Analysis of Actuarial Experience During the Period
July 1, 2019 through June 30, 2022**

✴ Segal

June 21, 2023

Board of Administration
Los Angeles City Employees' Retirement System
977 N. Broadway
Los Angeles, CA 90012-1728

Re: Review of Actuarial Assumptions for the June 30, 2023 Actuarial Valuation

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience for the Los Angeles City Employees' Retirement System (LACERS). This study utilizes the census data for the period July 1, 2019 to June 30, 2022 and provides the proposed actuarial assumptions, both economic and demographic, to be used in the June 30, 2023 valuations.

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

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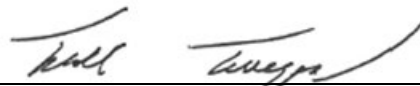
Sincerely,

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

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

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1. Introduction, Summary, and Recommendations

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

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

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

This study was undertaken in order to review the economic and demographic actuarial assumptions and to compare the actual experience with that expected under the current assumptions during the three-year experience period from July 1, 2019 through June 30, 2022. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27 "Selection of Economic Assumptions for Measuring Pension Obligations"[2] and ASOP No. 35 "Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations." These Standards of Practice provide guidance for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected future experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for inflation, merit and promotion salary increases, retirement from active employment, retirement age for deferred vested (non-reciprocal) members, reciprocal salary increases, pre-retirement mortality, post-retirement

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[1]   An analysis of the ongoing impact of the COVID-19 pandemic is beyond the scope of the current experience study.
[2]   References made later in this report are with respect to the revised ASOP 27 adopted in June 2020.

healthy and disabled life mortality, termination, disability incidence (non-service connected and service connected), and allocation of total present value of future benefits for actives. For the retiree health (OPEB) plan related assumptions, we are recommending no changes in the assumptions. That is, we will maintain the current retiree health assumptions for the percentage of eligible retirees who choose to be covered by the health plan, spouse/domestic partner coverage, and spouse/domestic partner age difference.

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

Pg #	Actuarial Assumption Categories	Recommendation
12	**Inflation:** Future increases in the Consumer Price Index (CPI), which drives investment returns and active member salary increases.	Reduce the inflation assumption from 2.75% to 2.50% per annum as discussed in Section (3)(A).
	Crediting Rate for Employee Contributions: Future increases in the account balance of a member between the date of the valuation and the date of separation from active service.	Reduce the interest crediting rate for employee contributions from 2.75% to 2.50% per annum as described in Section (3)(A).
15	**Retiree Cost of Living Increases:** Future increases in the cost of living adjustment for retirees.	For Tier 1 and Tier 1 Enhanced which have a 3.00% maximum cost of living adjustment, maintain the retiree cost of living assumption at 2.75% per annum (based on our recommended inflation assumption of 2.50% plus a margin for adverse deviation of 0.25%) as discussed in Section (3)(A).
		For Tier 3 which has a 2.00% maximum cost of living adjustment, maintain the retiree cost of living assumption at 2.00% per annum as discussed in Section (3)(A).
17	**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 investment return assumption at 7.00% per annum as discussed in Section (3)(B).
26	**Individual Salary Increases:** Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components: • Inflationary salary increases • Real "across the board" salary increases • Merit and promotion increases	Reduce the current inflationary salary increase assumption from 2.75% to 2.50% and maintain the current real "across the board" salary increase assumption at 0.50%. This means that the combined inflationary and real "across the board" salary increases will decrease from 3.25% to 3.00%. We recommend adjusting the merit and promotion rates of salary increase as developed in Section (3)(C) to reflect past experience. Overall future merit and promotion salary increases are higher under the proposed assumptions. The recommended total rates of salary increase anticipate slightly lower increases overall than the current assumptions.

Pg #	Actuarial Assumption Categories	Recommendation
30	**Retirement Rates:** The probability of retirement at each age at which participants are eligible to retire. **Other Retirement Related Assumptions including:** • Retirement age for deferred vested members • Future reciprocal members and reciprocal salary increases • Percent married/domestic partner and spousal age differences for members not yet retired • Allocation of total present value of future benefits (PVFB) for actives	For active members, adjust the current retirement rates to those developed in Section (4)(A). The retirement rate assumptions anticipate earlier retirements overall. For inactive vested members that work for a reciprocal employer, maintain the assumed retirement age of 59. For inactive vested members that do not work for a reciprocal employer, increase the assumed retirement age from 59 to 60. For future deferred vested members, maintain the percent assumed to work at a reciprocal system at 5%. For all reciprocal members, decrease the compensation increase assumption from 4.25% to 4.00%. For active and inactive members, maintain the percent married/domestic partner at retirement assumption for males at 76% and for females at 52%. For active and inactive members, maintain the assumption that male members are 3 years older than their female spouses and that female members are 2 years younger than their male spouses. We are recommending a refinement in the method used to allocate total present value of future benefits (PVFB) between the current and future Normal Costs and Actuarial Accrued Liability (AAL) to produce a cost attribution period that is more consistent with each member's participation in LACERS. Even though this refinement does not increase the PVFB, there is a higher allocation of the PFVB to the current and future Normal Costs and a lower allocation to the AAL. See the last subsection of Section 4(A) for further details.

Pg #	Actuarial Assumption Categories	Recommendation
40	**Mortality Rates:** The probability of dying at each age. Mortality rates are used to project life expectancies.	**Healthy Retirees:** *Retirement Plan* Current & recommended base table: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 10% for males. *Health Plan* Current & recommended base table: Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Table with rates increased by 10% for males. **All Beneficiaries:** *Retirement Plan* Current base table – both not in pay status at the valuation and in pay status at the valuation: Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table increased by 10% for males and females. Recommended base table – not in pay status at the valuation: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 10% for males. Recommended base table – in pay status at the valuation: Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table increased by 5% for males and increased by 10% for females. *Health Plan* Current base table – both not in pay status at the valuation and in pay status at the valuation: Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Table increased by 10% for males and females. Recommended base table – not in pay status at the valuation: Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Table with rates increased by 10% for males. Recommended base table – in pay status at the valuation: Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Table increased by 5% for males and increased by 10% for females. For the purposes of the actuarial valuations (for funding and financial reporting), when calculating the liability for the continuance to a beneficiary of a surviving member we recommend that the General Healthy Retiree mortality tables be used for beneficiary mortality both before and after the expected death of the General member. Upon the actual death of the member (i.e. for all beneficiaries in pay status as of the valuation date), we recommend for the purposes of the actuarial valuations that we use the Contingent Survivor mortality tables as stated above. **Pre-Retirement Mortality:** *Retirement Plan* Current & recommended base table: Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table increased by 10% for males and females. *Health Plan* Current & recommended base table: Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Table increased by 10% for males and females.

Pg #	Actuarial Assumption Categories	Recommendation
		Disabled Retirees:
		Retirement Plan
		Current base table: Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table increased by 10% for males and decreased by 5% for females.
		Recommended base table: Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table increased by 5% for males and decreased by 5% for females.
		Health Plan
		Current base table: Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Table increased by 10% for males and decreased by 5% for females.
		Recommended base table: Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Table increased by 5% for males and decreased by 5% for females.
		All current tables are projected generationally with the two-dimensional mortality improvement scale MP-2019.
		All recommended tables are projected generationally with the two-dimensional mortality improvement scale MP-2021. This is the most recent projection scale, as an updated projection scale was not published in 2022.
52	**Termination Rates:** The probability of leaving employment at each age and receiving either a refund of member contributions or a deferred vested retirement benefit.	We recommend adjusting the termination rates to those developed in Section (4)(D) to reflect a slightly lower incidence of termination.
55	**Disability Incidence Rates:** The probability of becoming disabled at each age.	We recommend adjusting the disability rates to those developed in Section (4)(E) to reflect a slightly lower incidence of disability overall.
58	**Retiree Health Assumptions:** Assumptions related to the Other Postemployment Benefits (OPEB) plan.	We recommend maintaining the current assumptions.

We have estimated the impact of all the recommended economic and demographic assumptions as if they were applied to the June 30, 2022 actuarial valuations. The tables below shows the changes in the employer contribution rate, unfunded actuarial accrued liability (UAAL), and funded ratio due to the proposed assumption changes.

Cost Impact of the Recommended Assumptions
Based on June 30, 2022 Actuarial Valuation

Impact on Employer Contribution Rate	Retirement Plan	Health Plan	Total
Increase/(decrease) in Normal Cost rate	0.34%	0.52%	0.86%
Increase/(decrease) in UAAL rate	(0.25)%	(0.16)%	(0.41)%
Total increase/(decrease) in employer rate	**0.09%**	**0.36%**	**0.45%**

Impact on UAAL and Funded Ratio	Retirement Plan	Health Plan	Total
Increase/(decrease) in UAAL	$(142,672,096)	$(52,416,871)	$(195,088,967)
Change in funded ratio	From 73.3% to 73.7%	From 97.0% to 98.4%	From 76.4% to 76.9%

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

2. Background and Methodology

In this report, we analyzed both economic and demographic ("non-economic") assumptions. The primary economic assumptions reviewed are inflation, investment return, and salary increases. Demographic assumptions include the probabilities of certain events occurring in the population of members, referred to as "decrements," e.g., termination from service, disability retirement, service retirement, and death before and after retirement. In addition to decrements, other demographic assumptions reviewed in this study include the percentage of members with an eligible spouse or domestic partner, spousal age difference, percent of members assumed to go on to work for a reciprocal system, and reciprocal salary increases. There are also retiree health (OPEB) plan related assumptions (e.g., percentage of eligible retirees who chose to be covered by the health plan, spouse/domestic partner coverage, and spouse/domestic partner age difference) that we have studied in this report.

Economic Assumptions

Economic assumptions consist of:

- **Inflation:** Increases in the price of goods and services. The inflation assumption reflects the basic return that investors expect from securities markets. It also reflects the expected basic salary increase for active employees and drives increases in the allowances of retired members (if any).

- **Investment Return:** Expected long-term rate of return on the System's investments after accounting for certain investment expenses and all administrative expenses. This assumption has a significant impact on contribution rates.

- **Salary Increases:** In addition to inflationary increases, it is assumed that salaries will also grow by real "across the board" pay increases in excess of price inflation. It is also assumed that employees will receive raises above these average increases as they advance in their careers. These are commonly referred to as merit and promotion increases. Payments to amortize any Unfunded Actuarial Accrued Liability (UAAL) are assumed to increase each year by the price inflation rate plus any real "across the board" pay increases that are assumed.

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

Demographic Assumptions

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

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

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

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

3. Economic Assumptions

A. Inflation

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

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

Historical Consumer Price Index – 1930 to 2022[1]
(U.S. City Average - All Urban Consumers)
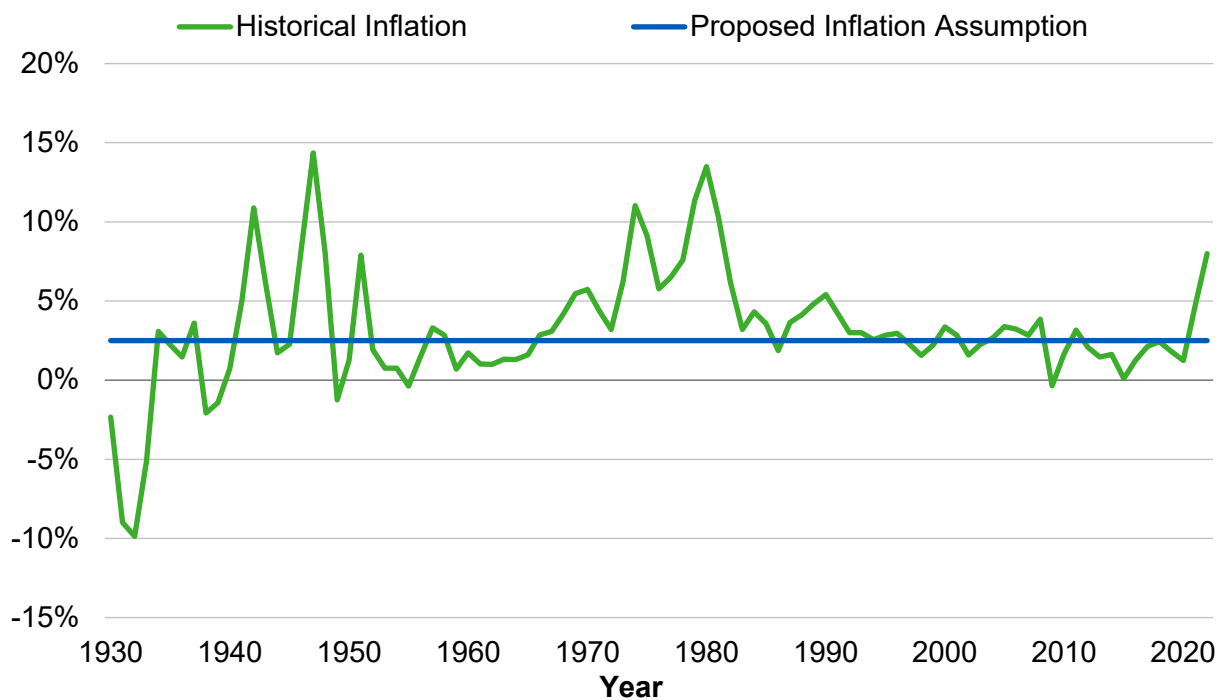
There has been a spike in inflation that started in the second quarter of 2021 and continued into 2022. However, the rate of inflation, while still elevated, has been relatively steady since the Federal Reserve began to increase interest rates starting around the second quarter of 2022.

Based on information found in the Public Plans Database, which is produced in partnership with the National System of State Retirement Administrators (NASRA), the median inflation assumption used by 194 large public retirement funds in their 2021 fiscal year valuations was

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

2.50%.[1] In California, CalSTRS, LACERS and ten[2] 1937 Act CERL systems currently use an inflation assumption of 2.75%, ten 1937 Act CERL systems use an inflation assumption of 2.50%[3] and CalPERS uses an inflation assumption of 2.30%.

LACERS' investment consultant, New England Pension Consultants (NEPC), anticipates an annual inflation rate of 2.60% (reduced from 2.75% when we conducted the last review in 2020), while the average inflation assumption provided by NEPC and five other investment advisory firms retained by Segal's California public sector clients, as well as Segal's investment advisory division (Segal Marco Advisors)[4], was 2.43% (increased from 2.36% when we conducted the last review in 2020). Note that, in general, investment consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation.[5]

To find a forecast of inflation based on a longer time horizon, we referred to the Social Security Administration's (SSA) 2023 report on the financial status of the Social Security program.[6] The projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.40% (unchanged from 2.40% when we conducted the last review in 2020). The SSA report also includes alternative projections using lower and higher inflation assumptions of 1.80% and 3.00%, respectively.

We also compared the yields on the thirty-year inflation indexed U.S. Treasury bonds to comparable traditional U.S. Treasury bonds.[7] This "break-even rate" is commonly regarded as a market-based gauge of future inflation expectations. As of May 2023, the difference in yields is about 2.26% which provides a measure of market expectations of inflation. This market expectation for long term inflation can be quite volatile and has dropped from a high of 2.55% over the last 12 months, which is illustrated in the table below. It is worth noting that even during the peak of the recent inflation spike this break-even rate exceeded 2.50% in only a single month, April 2022.

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[1] Among 219 large public retirement funds, the 2021 fiscal year inflation assumption was not available for 25 of the public retirement funds in the survey data as of March 2023.

[2] We note that out of these ten 1937 Act CERL Systems, five of those are served by Segal and we would generally expect to recommend 2.50% as the inflation assumption in their next experience study.

[3] Four of these 1937 Act CERL systems use a 2.50% inflation assumption with a 2.75% COLA assumption.

[4] We note that this is the first time we have included inflation and real rate of return assumptions used by Segal Marco Advisors in our review of economic assumptions for LACERS.

[5] The time horizon used by the six investment consultants included in our review generally ranges from 20 years to 30 years, and NEPC uses 30 years.

[6] Source: Social Security Administration: The 2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds

[7] Source: Board of Governors of the Federal Reserve System.

Observation Month	Difference in Yields	Observation Month	Difference in Yields
December 2021	2.27%	September 2022	2.27%
January 2022	2.24%	October 2022	2.33%
February 2022	2.18%	November 2022	2.40%
March 2022	2.49%	December 2022	2.26%
April 2022	2.55%	January 2023	2.24%
May 2022	2.47%	February 2023	2.29%
June 2022	2.47%	March 2023	2.26%
July 2022	2.21%	April 2023	2.23%
August 2022	2.29%	May 2023	2.26%

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

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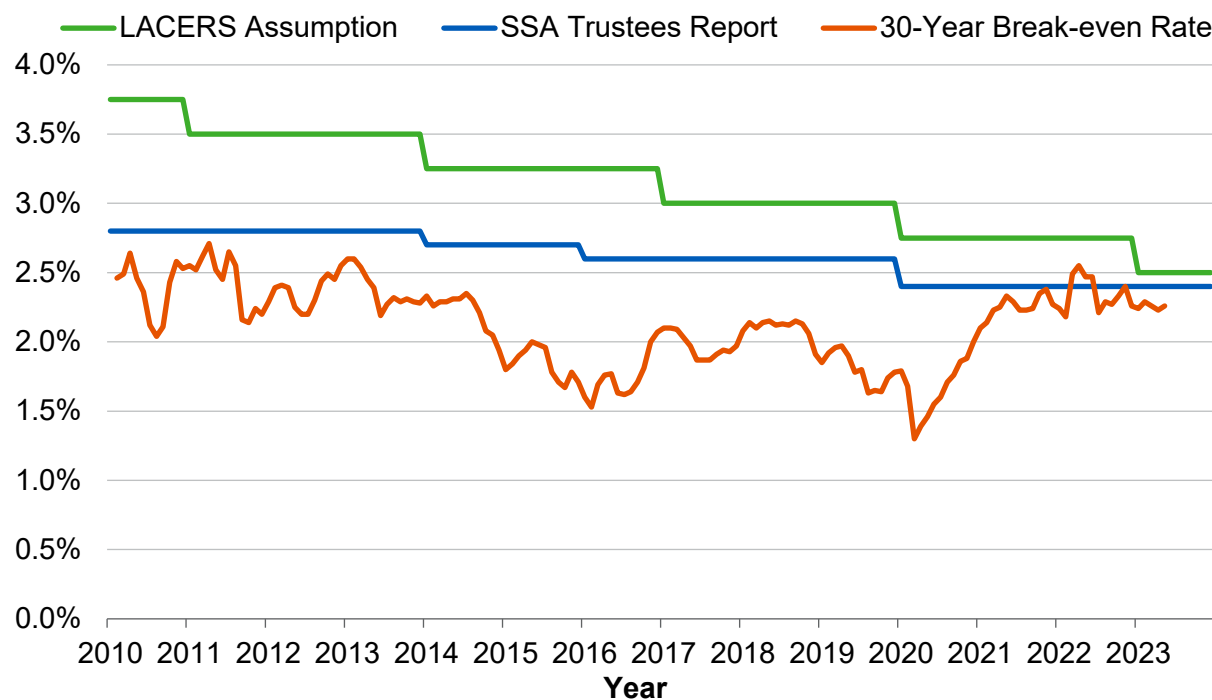
The setting of the inflation assumption using the information outlined above is a somewhat subjective process, and Segal does not apply a specific weight to each of the metrics in determining our recommended inflation assumption. Based on a consideration of all of the above metrics, beginning in 2021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

Based on all of the above information, we recommend reducing the annual inflation assumption from 2.75% to 2.50%.

Crediting Rate for Employee Contributions

We note that the interest credited to employee contributions is based on the average rates of a five-year U.S. Treasury Note. Currently, an assumption of 2.75% is used to approximate that crediting rate, and the 2.75% crediting rate assumption is tied to the current inflation assumption.

In conjunction with our recommendation to lower the current 2.75% annual inflation assumption to 2.50% for the June 30, 2023 valuation, as discussed above, and assuming the Board wishes to maintain the linkage between the two, we would also recommend that the assumed interest crediting rate for employee contributions be lowered from 2.75% to 2.50%.

Retiree Cost of Living Increases

In our last experience study as of June 30, 2019, consistent with the 2.75% annual inflation assumption adopted by the Board, the Board adopted a 2.75% retiree cost-of-living adjustment (COLA) for Tier 1 and Tier 1 Enhanced and a 2.00% retiree cost-of-living adjustment for Tier 3.

In the last experience study, we set the recommended post-retirement cost-of-living adjustment (COLA) assumption to be equal to our recommended inflation assumption for Tier 1 and Tier 1 Enhanced. However, we observed in the table below that during the most recent 5-year, 10-year and 20-year periods ending before December 31, 2022, the changes in the annual average CPI based on the Los Angeles-Long Beach-Anaheim Area used by the Board to set COLAs have exceeded those of the annual average CPI for the U.S. City Average.

	Change in Annual Average CPI for Los Angeles-Long Beach-Anaheim	Change in Annual Average CPI for U.S. City Average
5-Year Period	3.94%	3.61%
10-Year Period	2.76%	2.46%
20-Year Period	2.71%	2.46%

In order to reflect this experience and to mitigate actuarial losses which may arise from future COLA increases greater than the inflation assumption, we believe it is reasonable for the Board to consider adopting an extra margin above the general price inflation in anticipating future COLAs for Tier 1 and Tier 1 Enhanced members.

Accordingly, for Tier 1 and Tier 1 Enhanced retirees with a maximum 3.00% COLA, our recommended COLA assumption is 2.75%. This recommendation includes a 0.25% margin above our recommended inflation assumption and leaves the COLA assumption unchanged. For Tier 3 retirees with a maximum 2.00% COLA, our recommended COLA assumption is 2.00%, which also leaves the COLA assumption unchanged for Tier 3 as shown below. These recommendations are summarized as follows:

Tier	Maximum COLA	Current Assumption	Proposed Assumption
Tier 1	3.00%	2.75%[1]	2.75%[1]
Tier 3	2.00%	2.00%	2.00%

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

- The results of the stochastic modeling are significantly dependent on assuming that lower levels of inflation will persist in the early years of the projections. If this is not assumed, then the stochastic modeling will produce results similar to our proposed COLA assumptions.

- Using lower long-term COLA assumptions based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption of 2.50% is met in a year. We question the reasonableness of this result.

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

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

B. Investment Return

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

Real Rate of Investment Return

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

The 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 NEPC's total or "nominal" December 31, 2022 return assumptions by their assumed 2.60% inflation rate. The second column of returns (except for the final three asset classes) represents the average of a sample of real rate of return assumptions. The sample includes the expected annual real rate of return provided to us by NEPC and five other investment advisory firms retained by Segal's public sector clients, as well as Segal's investment advisory division. We believe these averages are a reasonable current consensus forecast of long-term future market returns in excess of inflation.[1]

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

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

Asset Class	Percentage of Portfolio	NEPC's Assumed Real Rate of Return[1]	Average Assumed Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[2]
Large Cap U.S. Equity	15.00%	5.60%	6.00%
Small/Mid Cap U.S. Equity	6.00%	6.70%	6.65%
Developed Int'l Large Cap Equity	15.00%	5.80%	7.01%
Developed Int'l Small Cap Equity	3.00%	7.40%	7.34%
Emerging Markets Equity	6.67%	10.30%	8.80%
Core Bonds	11.25%	2.20%	1.97%
High Yield Bonds	1.50%	5.20%	4.63%
Bank Loans	1.50%	4.60%	4.07%
TIPS	3.60%	1.90%	1.77%
Emerging Market External Debt	2.00%	5.00%	4.72%
Emerging Market Local Currency Debt	2.00%	4.30%	4.53%
Real Estate - Core	4.20%	3.50%	3.86%
Cash & Equivalents	1.00%	0.80%	0.63%
Private Equity	16.00%	10.30%	9.84%
Private Credit (Private Debt)	5.75%	7.10%	6.47%
Emerging Market Small-Cap Equity	1.33%	11.10%	11.10%[3]
REIT	1.40%	6.80%	6.80%[3]
Real Estate - Non Core	2.80%	5.40%	5.40%[3]
Total	**100.00%**	**6.28%**	**6.27%**

The above are representative of "indexed" returns and do not include any additional returns ("alpha") from active management. This is consistent with the Actuarial Standard of Practice No. 27, Section 3.8.3.d, which states:

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

[1] The rates shown have been estimated by Segal by taking NEPC's nominal arithmetic returns and reducing by NEPC's assumed 2.60% inflation rate to develop the assumed real rate of return shown.

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

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

that such superior or inferior returns represent a reasonable expectation over the measurement period."

The following are some observations about the returns provided above:

1. The investment consultants to our California public sector clients, as well as Segal's investment advisory division, have each provided us with their expected real rates of return for each asset class, over various future periods of time. However, in general, the returns available from investment consultants are projected over time periods that are shorter than the durations of a retirement plan's liabilities.

2. As discussed in the next section, the real rates of return provided this year by the investment consultants reflect a change in how investment expenses are reported.

3. Using a sample average of expected real rate of returns allows LACERS' investment return assumption to reflect a broader range of capital market information and should help reduce year to year volatility in the investment return assumption.

4. Therefore, we recommend that the 6.27% portfolio net real rate of return be used to determine LACERS' investment return assumption, but with some caution. This return is 0.77% higher than the 5.50% gross return that was used three years ago in the review of the recommended investment return assumption for the June 30, 2020 valuation.

5. The difference is due to changes in the System's target asset allocation (+0.28%) and changes in the real rate of return assumptions provided to us by the investment advisory firms (+0.50%) and the interaction effect between these changes (-0.01%). We believe the increase in the real rates of return may be due to the very low returns earned in the 2021-2022 plan year, as well as the increase in the federal funds rate during 2022, and so should be used with caution in selecting a long-term investment return assumption.

System Expenses

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

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

The following table provides the administrative and investment expenses in relation to the actuarial value of assets as of the beginning of the year for the three-year period ending June 30, 2022.

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

Year Ending June 30	Actuarial Value of Assets[1]	Administrative Expenses[2]	Investment Expenses[3]	Administrative %	Investment %	Total %
2020	17,711,462	27,422	5,148	0.15	0.03	0.18
2021	18,697,966	31,084	8,741	0.17	0.05	0.22
2022	20,083,918	31,237	10,718	0.16	0.05	0.21
Three-Year Average (excluding investment management fees)				**0.16**	**0.04**	**0.20**
Current Assumption (including investment management fees)				**0.15**	**0.25**	**0.40**
Proposed Assumption (excluding investment management fees)				**0.16**	**0.04**	**0.20**

Based on the above experience, we recommend reducing the expense component of the investment return assumption from 0.40% to 0.20%.

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

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

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.

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[1] In this study, we use Actuarial Value of Assets as of the beginning of the plan year. In prior studies, we used the Actuarial Value of Assets as of the end of the plan year.

[2] Note that some California public retirement systems (including LAFPP) have taken the approach of including an explicit charge for administrative expenses instead of a reduction in the investment return assumption to implicitly defray the administrative expenses.

[3] Includes investment consulting fee, miscellaneous investment expense, and investment related administrative expense.

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

The 6.27% expected real rate of return developed earlier in this report was based on expected arithmetic average returns. A retirement system using an expected arithmetic average return as the discount rate in a funding valuation is expected on average to have no surplus or asset shortfall relative to its expected obligations assuming all actuarial assumptions are met in the future.[2] That is the basis used in Segal's previous experience studies for LACERS.

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

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

For comparison purposes we first consider how the earlier model would look if used in this year's study. Three years ago, the Board adopted an investment return assumption of 7.00%. Under the model used in that experience study, that return implied a risk adjustment of 0.85%, corresponding to a 15-year confidence level of 59%, based on an annual portfolio return standard deviation of 13.33% provided by NEPC in 2020.

If we use the same 59% 15-year confidence level from our last study to set this year's risk adjustment and the current annual portfolio return standard deviation of 14.90% provided by NEPC, the corresponding risk adjustment would be 0.95%. Together with the other investment return components (including for this comparison updated expected arithmetic average returns and the same expense adjustment as used in the prior study), this would result in an investment return assumption of 7.42%, which is higher than the current assumption of 7.00%.

Based on the general practice of using one-quarter percentage point increments for economic assumptions, we evaluated the effect on the confidence level of other alternative investment return assumptions. We also considered that, as discussed above, the increase in the real rates of return provided by the investment consultants may reflect the very low returns earned in the 2021-2022 plan year, as well as the increase in the federal funds rate during 2022, and so could be overly optimistic for use in selecting a long-term investment return assumption. For that reason, for this comparison value we considered a net investment return assumption of 6.75% which, together with the other investment return components, would produce a risk adjustment of 1.62% which corresponds to a confidence level of 66% under the model and expense

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

adjustment used in prior studies. For comparison, the current net investment return assumption of 7.00% would now produce a risk adjustment of 1.37% and have a confidence level of 63% under the model and expense adjustment used in prior studies.

As noted above, beginning with this study, in addition to no longer including an explicit adjustment for investment management fees, we are converting the portfolio's expected arithmetic average return to an expected geometric average return. For any given asset portfolio, the expected geometric average return will be less than the expected arithmetic average return.[1] The difference depends on the variability of the portfolio as measured by its standard deviation. Based on the annual portfolio return standard deviation of 14.90% provided by NEPC, the adjustment to an expected geometric average return reduces the expected return by 1.03%.

Together with the other investment return components (now excluding investment management expenses) and prior to any risk adjustment, this would result in a median expected assumption of 7.54%, which is higher than the current assumption of 7.00%. In applying this model to LACERS for the first time we again considered a net investment return assumption of 6.75% which, together with the other investment return components, would produce a risk adjustment of 0.79% which under the expected geometric average return model corresponds to a confidence level of 58%. For comparison, the current net investment return assumption of 7.00% would produce a risk adjustment of 0.54% and have a confidence level of 56% under this model.

Recommended Investment Return Assumption

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

Assumption Component	June 30, 2023 Recommended Value	June 30, 2023 Comparison Value	June 30, 2020 Adopted Value
Inflation	2.50%	2.50%	2.75%
Portfolio Expected Arithmetic Real Rate of Return	6.27%	6.27%	5.50%
Expense Adjustment	(0.20)%	(0.40)%[2]	(0.40)%
Adjustment to Expected Geometric Real Rate of Return	(1.03)%	N/A	N/A
Risk Adjustment	(0.54)%	(1.37)%	(0.85)%
Total	**7.00%**	**7.00%**	**7.00%**
Confidence Level	**56%**	**63%**	**59%**

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

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

Based on this analysis, we recommend maintaining the investment return assumption at 7.00% per annum.

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

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

Years Ending June 30	Investment Return	Risk Adjustment	Corresponding Confidence Level
2011	7.75%	0.57%	57%
2014 (Alternative)	7.75%	0.69%	58%
2014 (Adopted)	7.50%	0.94%	61%
2014 (Adopted Value with Restated Expense Adjustment)	7.50%	0.74%	59%
2017 (Recommended)	7.00%	0.87%	60%
2017 (Alternative; Adopted)	7.25%	0.62%	57%
2018 (Recommended, with 2.75% inflation)	7.00%	0.72%	58%
2018 (Adopted, with 3.00% inflation)	7.25%	0.72%	58%
2020	7.00%	0.85%	59%
2023 (Comparison)	7.00%	1.37%	63%
2023 (Recommended)	7.00%	0.54%	56%

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 LACERS has positioned itself relative to risk over periods of time.[1] The use of either a 56% or 63% confidence level should be considered in context with other factors, including:

- As noted above, the confidence level is more of a relative measure than an absolute measure, and so can be reevaluated and reset for future comparisons. This is particularly true when comparing confidence levels developed using different models, as we are doing in this transitional year from one model to another.

- The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by NEPC. The standard deviation is a statistical measure of the future volatility of the portfolio and so is itself based on assumptions about future portfolio volatility and can be considered somewhat of a "soft" number.

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

- We have not taken into account any additional returns ("alpha") that might be earned on active management. This means that if active management generates enough alpha to cover its related expenses, this would increase returns. This aspect of Segal's model is further evaluated below.

As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the later section on "Comparison with Other Public Retirement Systems."

Comparison with Alternative Model used to Review Investment Return Assumption

In previous studies, we have consistently reviewed investment return assumptions based on our model that incorporates expected arithmetic real returns for the different asset classes and for the entire portfolio as one component of that model.[1] The use of "forward looking expected arithmetic returns" is one of the approaches discussed for use in the Selection of Economic Assumptions for measuring Pension Obligations under Actuarial Standards of Practice (ASOP) No. 27.

Besides using forward looking expected arithmetic returns, ASOP No. 27 also discusses setting investment return assumptions using an alternative "forward looking expected geometric returns" approach, which is the model we have used in this study.[2] Even though as noted earlier expected geometric returns are lower than expected arithmetic returns, public retirement systems that have set investment return assumptions using this geometric approach have in practice adopted investment return assumptions that are comparable to those adopted by the Board for LACERS under the arithmetic approach. This is because under the model used by those retirement systems and by Segal in this report, the investment return assumption is not reduced to anticipate future investment management expenses.

In the interest of still having an alternative model for comparison, we evaluated the recommended 7.00% assumption based on the expected geometric return for the entire portfolio gross of management investment expenses, but using a fully stochastic approach and a different source for capital market assumptions. Under this alternative model, over a 15-year period, there is a 55% likelihood that future average geometric returns will meet or exceed 7.00%[3] developed using the capital market assumptions compiled by Horizon Actuarial Services based their most recent survey published in August 2022. This 55% likelihood is lower than the corresponding likelihood of 59% that we observed in this comparison during the review of 2020. However, note that some of the investment advisory firms that participated in the 2022 Horizon survey have since raised their capital market assumptions and it is reasonable to expect the 55% likelihood to increase if we were to revise these results using the updated capital market assumptions when the 2023 Horizon survey becomes available.

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

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

[3] We performed this stochastic simulation using the capital market assumptions included in the 2022 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 2022 survey that included responses from 24 investment advisors.

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.

While we are recommending that LACERS maintain the 7.00% investment return assumption, an investment return of 6.75% or lower is becoming more common among California public sector retirement systems. In particular, of the twenty 1937 Act CERL systems, eight use a 7.00% investment return assumption, eight use 6.75%, two use 6.50% and one uses 6.25%. The remaining 1937 Act CERL system currently uses a 7.25% earnings assumption. Furthermore, CalSTRS currently uses a 7.00% earnings assumption and CalPERS uses a 6.80% earnings assumptions, while the San Jose and San Diego City retirement systems use investment return assumptions of 6.625% and 6.50%, respectively.

The following table compares the System's recommended net investment return assumption against those of the 210 large public retirement funds in their 2021 fiscal year valuations based on information found in the Public Plans Database, which is produced in partnership with NASRA:[1]

Assumption	LACERS	Public Plans Data[2]		
		Low	Median	High
Net Investment Return	7.00%	4.25%	7.00%	8.25%

The detailed survey results show that over 80% of the systems have an investment return assumption in the range of 6.75% to 7.50%. Also, over half of the systems have reduced their investment return assumption from 2017 to 2021. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

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[1] Among 219 large public retirement funds, the 2021 fiscal year investment return assumption was not available for 9 of the public retirement funds in the Public Plans Database as of March 2023.

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

C. Salary Increase

Salary increases impact plan costs in two ways: (1) by increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and (2) 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 recommend reducing the annual inflation assumption from 2.75% to 2.50%. This inflation component is used as part of the salary increase assumption.

2. **Real "Across the Board" Pay Increases:** These increases are typically termed productivity increases since they are considered to be derived from the ability of an organization or an economy to produce goods and services in a more efficient manner. As that occurs, at least some portion of the value of these improvements can provide a source for pay increases. These increases are typically assumed to extend to all employees "across the board". The State and Local Government Workers Employment Cost Index produced by the Department of Labor provides evidence that real "across the board" pay increases have averaged about 0.5% – 0.8% 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 March 2023. In that report, real "across the board" pay increases are forecast to be 1.14% per year under the intermediate assumptions.

    The real pay increase assumption is generally considered a more "macroeconomic" assumption that is not necessarily based on individual plan experience. However, recent salary experience with public systems in California as well as anecdotal discussions with plans and plan sponsors indicate lower future real wage growth expectations for public sector employees. We note that for LACERS' active members, the actual average inflation plus "across the board" increase (i.e., wage inflation) over the three year period ending June 30, 2022 was 2.78%, which is less than the change in CPI of 4.30% during that same period. However, this gap is due in large part to the spike in inflation during 2022.

Valuation Date	Actual Average Increase[1]	Actual Change in CPI[2]
June 30, 2020	6.44%	1.62%
June 30, 2021	0.67%	3.83%
June 30, 2022	1.24%	7.45%
Three-Year Average	**2.78%**	**4.30%**

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

[2] Based on the change in the annual average CPI for the Los Angeles-Long Beach-Anaheim Area. For instance, the result of 7.45% shown for the June 30, 2022 valuation date represents the change in the 2022 annual average CPI vs. the 2021 annual average CPI.

Based on all of the above information, we recommend maintaining the real "across the board" salary increase assumption at 0.50%. This means that the combined inflation and "across the board" salary increase assumption will decrease from 3.25% to 3.00%.

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

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

a. Measuring each continuing member's actual salary increase over each year of the experience period on a salary-weighted basis, with higher weights assigned to experience from members with larger salaries;

b. Excluding any members with increases of more than 50% or decreases of more than 25% during any particular year;

c. Categorizing these increases according to member demographics;

d. Removing the wage inflation component from these increases (assumed to be equal to the increase in the members' average salary during the year);

e. Averaging these annual increases over the experience period; and

f. Modifying current assumptions to reflect some portion of these measured increases reflective of their "credibility."

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

In past valuations, we only applied one-half year of combined inflation and real "across the board" salary increase to the annualized salary rate provided as of the valuation date to project the salary following the date of the valuation. With this experience study, we recommend the projection to also include one-half year of expected merit and promotion increases.

The following table shows the actual average merit and promotion increases by years of service over the three-year period from July 1, 2019 through June 30, 2022. The current and proposed assumptions are also shown. The actual increases were reduced by the actual average inflation plus "across the board" increase (i.e. wage inflation, estimated as the increase in average salaries) for each year during the experience period (2.78% on average for the three-year period).

Rate (%)

Years of Service	Current Assumption	Actual Average Increase	Proposed Assumption
Less than 1	6.70	5.14	6.00
1 – 2	6.50	5.33	5.90
2 – 3	5.80	4.91	5.40
3 – 4	4.00	4.36	4.20
4 – 5	3.00	4.03	3.50
5 – 6	2.20	3.38	2.80
6 – 7	2.00	2.90	2.50
7 – 8	1.80	2.31	2.10
8 – 9	1.60	1.99	1.80
9 – 10	1.40	1.73	1.60
10 – 11	1.00	1.92	1.50
11 – 12	1.00	1.68	1.40
12 – 13	1.00	1.40	1.30
13 – 14	1.00	1.28	1.20
14 – 15	1.00	0.95	1.10
15 & Over	1.00	0.75	1.00

Based on this experience, we recommend decreasing the merit and promotion salary increase assumptions during the earlier years of service and increasing the assumptions during the later years of service (up to and including the 14 – 15 years of service category). The overall salary increase assumptions will decrease slightly after taking into account the lower inflation component of the salary increase assumption.

Chart 1 that follows later in the section compares the actual merit and promotion increase experience with the current and proposed assumptions. Also shown is the actual merit and promotion increases.

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 members' future benefits.

Consistent with the combined recommended inflation and real "across the board" salary increase assumptions, we recommend reducing the payroll growth assumption from 3.25% to 3.00% annually.

Chart 1: Merit and Promotion Salary Increase Rates
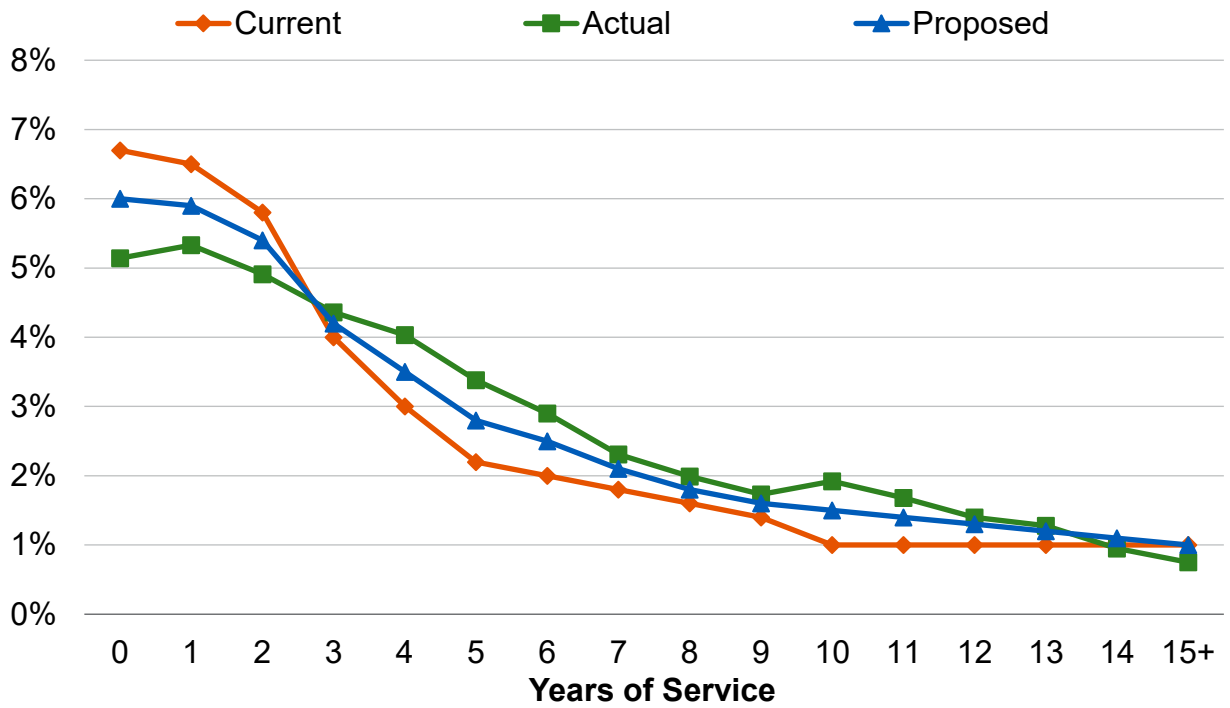
4. Demographic Assumptions

A. Retirement Rates

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

The current retirement assumptions, separately for Tier 1, Tier 1 Enhanced, and Tier 3, are bi-furcated for those members who are age 55 or older and with 30 or more years of service ("55/30"), and for those who do not meet both of those age and service thresholds ("non-55/30").

The retirement experience during the current three-year period indicated that there were more actual retirements than expected under age 70, likely due in large part to actual retirements under the City's Separation Incentive Program (CSIP) that occurred during fiscal year (FY) 2020/2021.[1] This was especially true for those members in the 55/30 category noted above. Because of this, we have also reviewed the retirement experience over a six-year period from July 1, 2016 through June 30, 2022 for Tier 1 members, in order to dampen the effect of the CSIP.

All Tier 1 Airport Peace Officers (including certain fire fighters) appointed to their positions before January 7, 2018 who elected to remain at LACERS after January 6, 2018 and who paid their mandatory additional contribution of $5,700 to LACERS before January 8, 2019, or prior to their retirement date, whichever was earlier, are designated as Tier 1 Enhanced. We noted in our prior experience study report covering the period from July 1, 2016 through June 30, 2019 that "retirement experience for Tier 1 Enhanced members is only starting to emerge. In setting the proposed retirement rates for Tier 1 Enhanced, we have looked at the actual experience over the full 3-year period ending June 30, 2019, though the available experience would only cover about 1-1/2 years (i.e., from January 2018 through June 30, 2019). As there were a lot more retirements in the first six-month period immediately after the Tier 1 Enhanced benefit was adopted, we believe it would not be unreasonable to assume that some Tier 1 Enhanced members might have been waiting to retire in anticipation of receiving an enhanced benefit after the new plan provisions were adopted, so we have looked only at the experience for the period from July 1, 2018 through June 30, 2019 in setting the proposed Tier 1 Enhanced assumptions. This was done to try to eliminate the effect of possible short-term fluctuation in retirement experience when setting long-term retirement assumptions…" Accordingly, for Tier 1 Enhanced we have reviewed the retirement experience over the current three-year period as well as over the most recent approximately 4.5-year period.

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[1] The number of Tier 1 and Tier 1 Enhanced retirements (for those who retired under the age of 70) over each of the three years of the recent experience study period were as follows:

	FY 2019/2020	FY 2020/2021	FY 2021/2022
Tier 1	612	1,733	573
Tier 1 Enhanced	11	21	5

Over the recent three-year experience study period, we only observed one Tier 3 service retirement from active service under age 70 at retirement. Even though there is virtually no experience available for Tier 3, we are recommending adjustments in the Tier 3 retirement assumptions, specifically the non-55/30 assumptions, to maintain consistency with the changes we are recommending for Tier 1, as the rates for Tier 3 were initially developed based, in part, on the benefit level comparisons to Tier 1.

The following table shows the observed service retirement rates for Tier 1 members based on the actual experience over the past three years and the past six years, separately for those members who are age 55 or older and with 30 or more years of service (55/30), and those who do not meet both of those age and service thresholds (non-55/30). The actual 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 2. Also shown are the current assumed rates and the rates we propose.

Tier 1
Rate of Retirement (%)

	Non-55/30				55/30			
Age	Current Rate	Actual Rate (6 Years)	Actual Rate (3 Years)	Proposed Rate	Current Rate	Actual Rate (6 Years)	Actual Rate (3 Years)	Proposed Rate
50	5.00	3.65	5.26	5.00	0.00	0.00	0.00	0.00
51	3.00	2.60	1.47	3.00	0.00	0.00	0.00	0.00
52	3.00	2.42	3.96	3.00	0.00	0.00	0.00	0.00
53	3.00	2.23	1.81	3.00	0.00	0.00	0.00	0.00
54	18.00	18.48	16.56	18.00	0.00	0.00	0.00	0.00
55	6.00	5.41	5.11	6.00	27.00	34.73	38.82	27.00
56	6.00	4.94	3.82	6.00	18.00	25.79	30.75	18.00
57	6.00	5.20	4.93	6.00	18.00	24.14	29.41	18.00
58	6.00	4.99	5.14	6.00	18.00	24.46	28.95	18.00
59	6.00	5.00	4.62	6.00	18.00	25.75	29.21	18.00
60	7.00	9.37	11.49	9.00	18.00	25.58	29.89	18.00
61	7.00	8.69	10.64	9.00	18.00	25.82	31.73	18.00
62	7.00	10.09	11.80	9.00	18.00	25.61	32.67	18.00
63	7.00	9.48	11.92	9.00	18.00	25.14	32.59	18.00
64	7.00	10.50	13.00	9.00	18.00	28.39	35.00	18.00
65	14.00	16.01	19.53	16.00	21.00	31.01	35.65	21.00
66	14.00	16.50	16.64	16.00	21.00	29.24	35.16	21.00
67	14.00	17.12	19.92	16.00	21.00	26.74	31.41	21.00
68	14.00	18.17	20.85	16.00	21.00	29.87	38.13	21.00
69	14.00	18.62	20.45	16.00	21.00	28.09	30.39	21.00
70 & Over	100.00	16.24	18.62	100.00	100.00	26.54	31.16	100.00

Based on this experience, we recommend increasing the Tier 1 non-55/30 retirement rate assumption at ages 60 – 69 and maintaining the Tier 1 55/30 retirement rate assumption. Overall, the proposed rates represent an increase from the current rates for Tier 1 members.

Chart 2 that follows later in this section compares the actual retirement experience with the current and proposed assumptions for Tier 1 non-55/30 members. Chart 3 shows the same information for Tier 1 55/30 members.

The following table shows the observed service retirement rates for Tier 1 Enhanced members based on the actual experience over the past three years and the past six years, separately for those members who are age 55 or older and with 30 or more years of service (55/30), and those who do not meet both of those age and service thresholds (non-55/30). Also shown are the current assumed rates and the rates we propose.

Tier 1 Enhanced
Rate of Retirement (%)

| | Non-55/30 | | | | 55/30 | | | |
Age	Current Rate	Actual Rate (~4.5 Years)	Actual Rate (3 Years)	Proposed Rate	Current Rate	Actual Rate (~4.5 Years)	Actual Rate (3 Years)	Proposed Rate
50	7.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00
51	5.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
52	5.00	8.33	9.09	5.00	0.00	0.00	0.00	0.00
53	5.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
54	20.00	16.67	11.11	18.00	0.00	0.00	0.00	0.00
55	8.00	9.76	10.00	10.00	30.00	45.00	33.33	30.00
56	8.00	3.03	4.55	10.00	22.00	28.57	25.00	22.00
57	8.00	7.14	7.14	10.00	22.00	7.14	14.29	22.00
58	8.00	14.29	13.33	10.00	22.00	66.67	66.67	22.00
59	8.00	23.81	23.08	10.00	22.00	77.78	75.00	22.00
60	9.00	14.29	0.00	11.00	22.00	50.00	100.00	22.00
61	9.00	30.77	28.57	11.00	22.00	40.00	0.00	22.00
62	9.00	28.57	20.00	11.00	22.00	50.00	66.67	22.00
63	9.00	0.00	0.00	11.00	22.00	50.00	50.00	22.00
64	9.00	0.00	0.00	11.00	22.00	80.00	50.00	22.00
65	16.00	25.00	50.00	20.00	26.00	50.00	0.00	26.00
66	16.00	33.33	0.00	20.00	26.00	0.00	0.00	26.00
67	16.00	50.00	50.00	20.00	26.00	0.00	0.00	26.00
68	16.00	100.00	100.00	20.00	26.00	50.00	0.00	26.00
69	16.00	0.00	0.00	20.00	26.00	50.00	0.00	26.00
70 & Over	100.00	0.00	0.00	100.00	100.00	25.00	50.00	100.00

Based on this experience, we recommend increasing the Tier 1 Enhanced non-55/30 retirement rate assumption at ages 60 – 69 and maintaining the Tier 1 Enhanced 55/30 retirement rate assumption. Overall, the proposed rates represent an increase from the current rates for Tier 1 Enhanced members.

Chart 4 that follows later in this section compares the actual retirement experience with the current and proposed assumptions for Tier 1 Enhanced non-55/30 members. Chart 5 shows the same information for Tier 1 Enhanced 55/30 members.

Due to the lack of actual experience for Tier 3, the following table only shows the current assumed rates and the rates we propose for that tier.

Tier 3
Rate of Retirement (%)

| Age | Non-55/30 | | 55/30 | |
	Current Rate	Proposed Rate	Current Rate	Proposed Rate
50	5.00	5.00	0.00	0.00
51	3.00	3.00	0.00	0.00
52	3.00	3.00	0.00	0.00
53	3.00	3.00	0.00	0.00
54	17.00	17.00	0.00	0.00
55	0.00[1]	0.00[1]	26.00	26.00
56	0.00[1]	0.00[1]	17.00	17.00
57	0.00[1]	0.00[1]	17.00	17.00
58	0.00[1]	0.00[1]	17.00	17.00
59	0.00[1]	0.00[1]	17.00	17.00
60	6.00	8.00	17.00	17.00
61	6.00	8.00	17.00	17.00
62	6.00	8.00	17.00	17.00
63	6.00	8.00	17.00	17.00
64	6.00	8.00	17.00	17.00
65	13.00	15.00	20.00	20.00
66	13.00	15.00	20.00	20.00
67	13.00	15.00	20.00	20.00
68	13.00	15.00	20.00	20.00
69	13.00	15.00	20.00	20.00
70 & Over	100.00	100.00	100.00	100.00

As alluded to above, we recommend increasing the Tier 3 non-55/30 retirement rate assumption at ages 60 – 69 and maintaining the Tier 3 55/30 retirement rate assumption. Overall, the proposed rates represent an increase from the current rates for Tier 3 members.

Chart 6 that follows later in this section compares the current and proposed assumptions for Tier 3 non-55/30 members. Chart 7 shows the same information for Tier 3 55/30 members.

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[1] Not eligible to retire under the provisions of the Tier 3 plan.

Deferred Vested Members

Under the current assumptions, deferred vested members are assumed to retire at age 59, regardless if the member went on to work at a reciprocal retirement system or not. The following table shows the observed deferred vested retirement ages based on the actual experience over the past three years, separately for those who went on to work at a reciprocal retirement system and those that did not. Also shown are the current assumed retirement ages and the retirement ages we propose.

Deferred Vested Retirement Age

	Reciprocal Members	Non-Reciprocal Members
Current Assumption	59.0	59.0
Actual Average Age	58.9	61.5
Proposed Assumption	**59.0**	**60.0**

Based on this experience, we recommend maintaining the deferred vested retirement age assumption at age 59 for those who went on to work at a reciprocal retirement system and increasing the assumption from age 59 to age 60 for non-reciprocal members.

Reciprocity

Based on data available from current inactive vested participants, there is a much lower incidence of members who went to work for a reciprocal system when compared to that observed at our other California public retirement systems. We have observed that as of June 30, 2022, about 4% of all the inactive vested membership has worked for a reciprocal system, compared to the current assumption of 5%. In addition, only about 1% of members who left active service and terminated from the System over the 3-year experience study period established reciprocity with another entity. We do not recommend using the approximate 1% proportion of only newly terminated employees to set this assumption because it may be the case that not all members had yet reported their reciprocal status.

Therefore, we recommend maintaining the reciprocity assumption of 5% for the June 30, 2023 valuation. We will continue to monitor this assumption in future valuations.

It is assumed that all current and future members covered under a reciprocal retirement system will receive annual salary increases from termination until their date of retirement. Under the current assumption, these annual salary increases are 4.25% per year. This salary increase assumption is based on the current ultimate merit and promotion salary increase assumption (1.00%), together with the current inflation (2.75%) and real "across the board" salary increase (0.50%) assumptions.

Based on the recommended ultimate 1.00% merit and promotion salary increase assumption, together with the recommended 2.50% inflation assumption and 0.50% real "across the board" salary increase assumption, we recommend reducing the reciprocal salary increase assumption from 4.25% to 4.00%.

Survivor Continuance Under the Unmodified Option

Under current assumptions for the Retirement Plan, it is assumed that 76% of all active and inactive male members and 52% of all active and inactive female members would be married or have an eligible domestic partner at the time of their retirement or pre-retirement death. We reviewed experience for new retirees during the three-year period and determined the actual percentage of these new retirees that had an eligible spouse or eligible domestic partner at the time of retirement. The results of that analysis are shown below.

New Retirees – Actual Percent with Eligible Spouse or Domestic Partner

Year Ending December 31	Male	Female
2020	76%	58%
2021	76%	50%
2022	73%	57%
Total	**75%**	**53%**

Based on this experience, we recommend maintaining the percent married assumption for male and female members at 76% and 52%, respectively.

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

1. Since most of the actual survivors are of the opposite sex, even with the inclusion of domestic partners, **we will continue to assume that all active and inactive members have a survivor of the opposite sex.**

2. **Based on the below experience, we recommend maintaining the spouse age difference assumption that male retirees are three years older than their spouses and maintaining the spouse age difference assumption that female retirees are two years younger than their spouses.** These assumptions will continue to be monitored in future experience studies.

Member's Age as Compared to Spouse's Age

	Male Retiree	Female Retiree
Current Assumption	3 years older	2 years younger
Actual Experience	3.3 years older	2.0 years younger
Proposed Assumption	**3 years older**	**2 years younger**

Refinements in the Method used to Allocate Total Present Value of Future Benefits (PFVB) for Actives

With this experience study, we are recommending a refinement in the application of the Entry Age actuarial cost method used to allocate PVFB between the current and future Normal Costs and Actuarial Accrued Liability (AAL) to produce a cost attribution period that is more consistent with each member's participation in LACERS. This refinement includes (a) rounding a member's benefit service down to the number of completed years, (b) subtracting that service from the year of the valuation, and (c) using that result to set the year of entry into LACERS for purposes of applying the Entry Age actuarial cost method. Even though this refinement does not increase the PVFB, it does result in a higher allocation of the PFVB to the current and future Normal Costs and a lower allocation to the AAL.
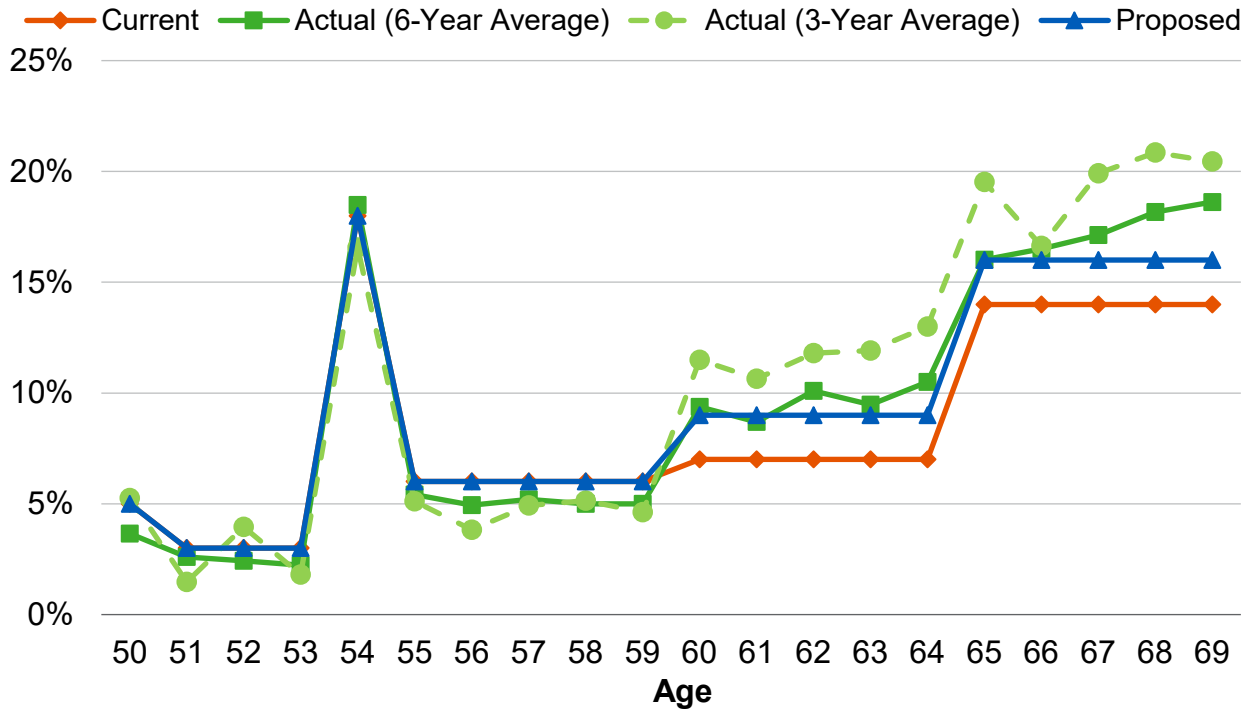
Chart 2: Retirement Rates
Tier 1 – Non-55/30

Legend: Current, Actual (6-Year Average), Actual (3-Year Average), Proposed

Chart 3: Retirement Rates
Tier 1 – 55/30

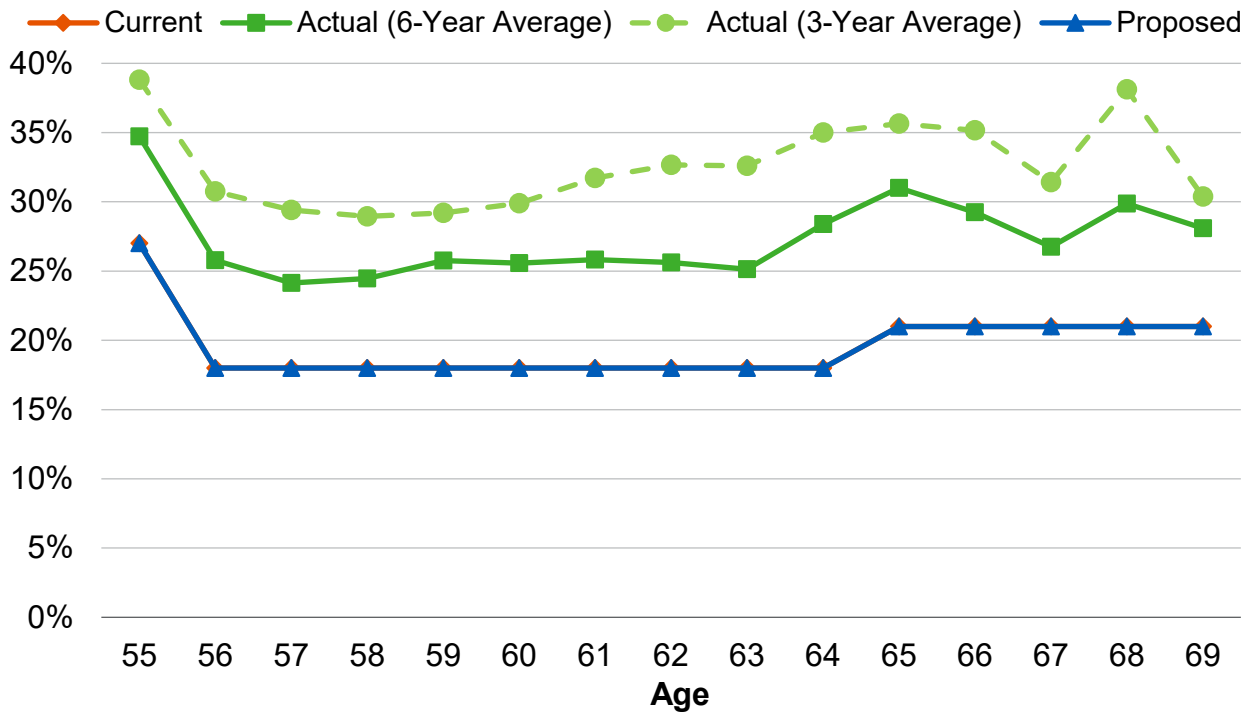Legend: Current, Actual (6-Year Average), Actual (3-Year Average), Proposed

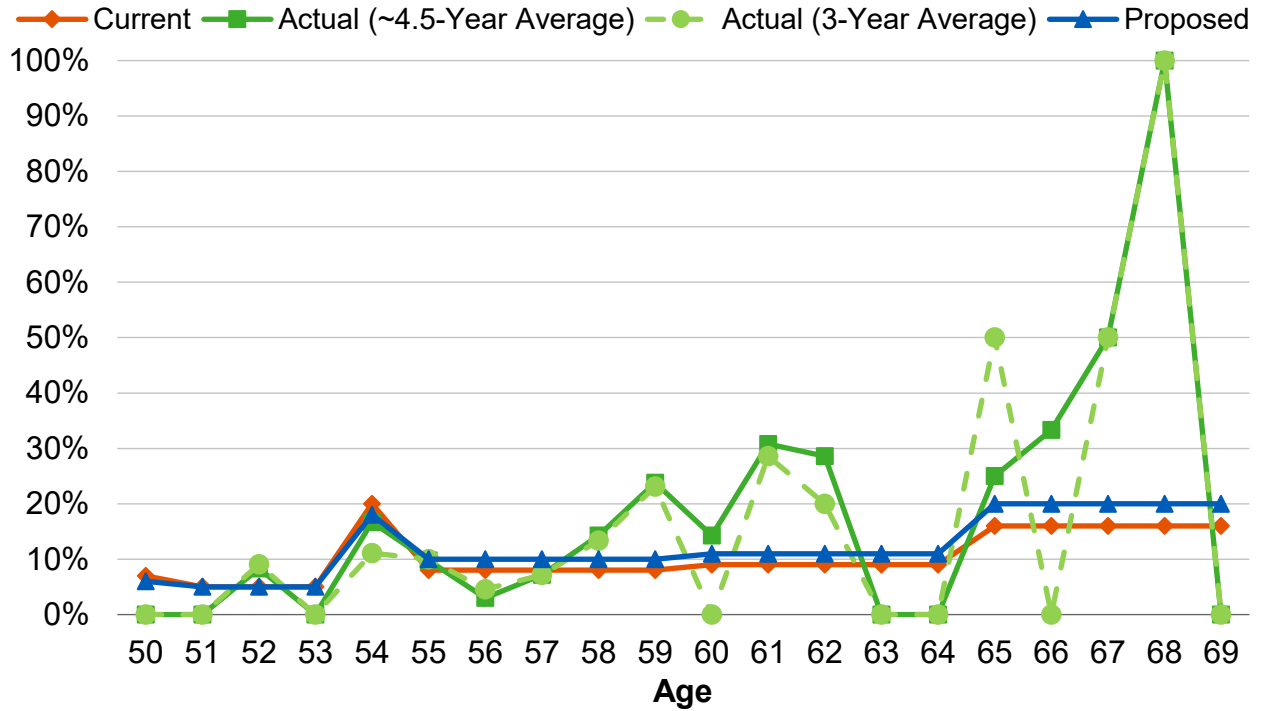# Chart 4: Retirement Rates
Tier 1 Enhanced – Non-55/30

Chart 5: Retirement Rates
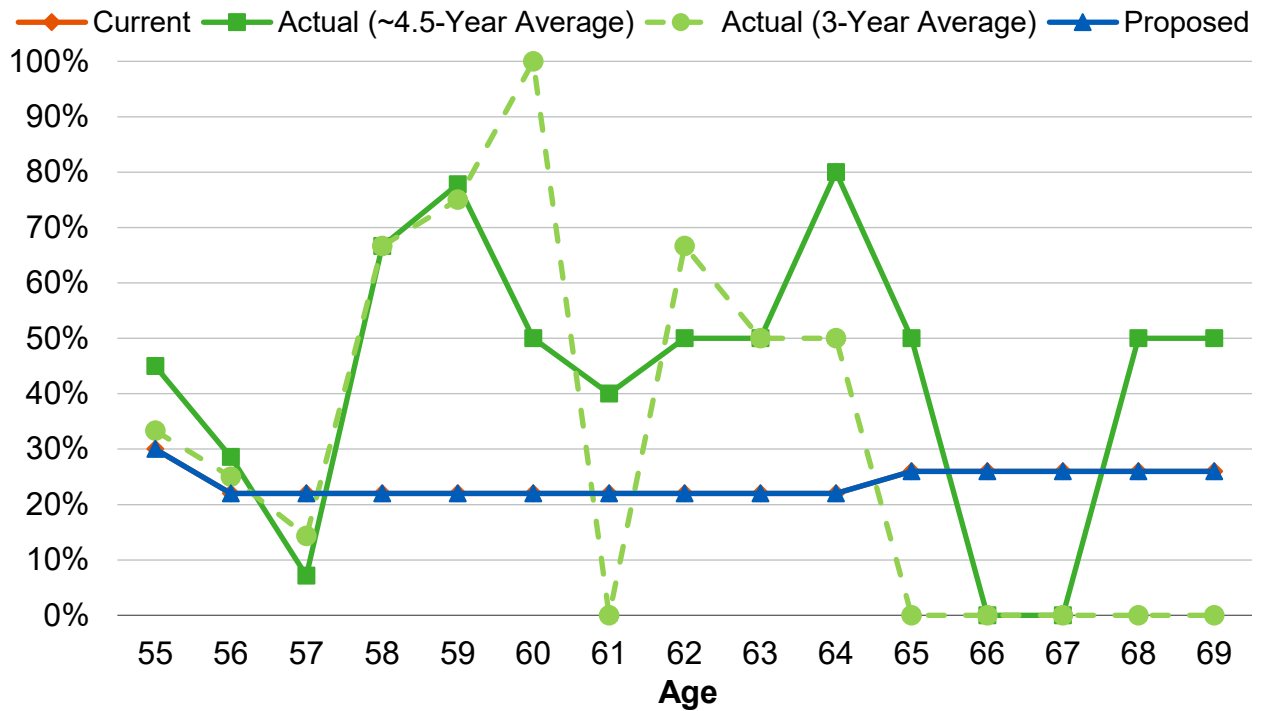## Tier 1 Enhanced – 55/30

Chart 6: Retirement Rates
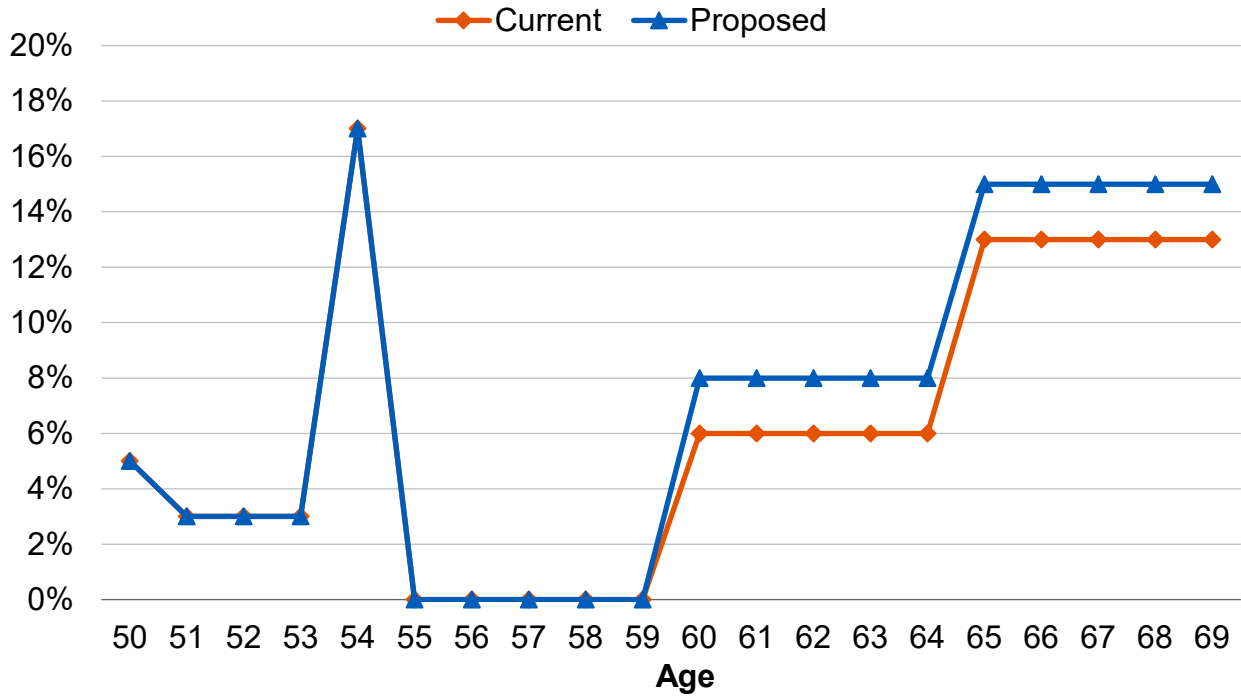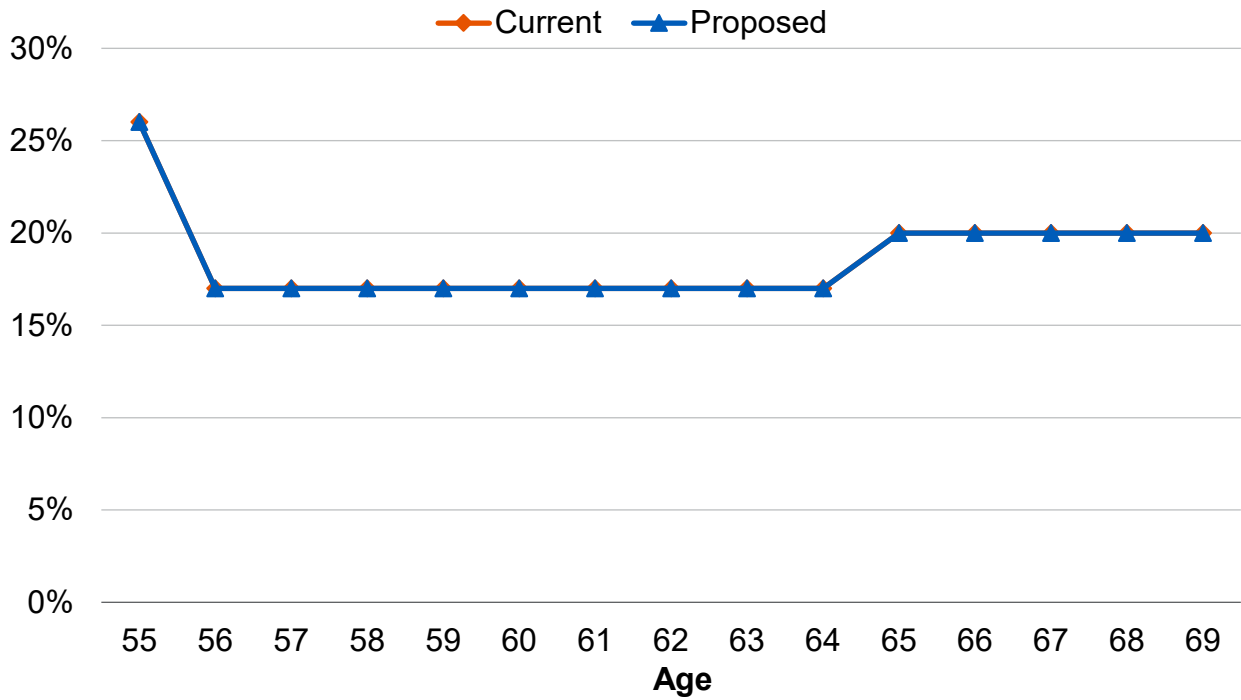## Tier 3 – Non-55/30

Chart 7: Retirement Rates
Tier 3 – 55/30

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 table currently being used for post-service retirement mortality rates for the Retirement Plan is the Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2019. The table currently being used for post-service retirement mortality rates for the Health Plan is the Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2019.

The Public Retirement Plans Mortality tables (Pub-2010) was published by the Retirement Plans Experience Committee (RPEC) of the SOA in 2019. 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 amount for healthy retirees and salary for employees are the most significant predictors of mortality differences within the job categories. Therefore, Pub-2010 includes mortality rates developed for annuitants on a "benefit" weighted basis, with higher credibility assigned to experience from annuitants receiving larger benefits. We continue to recommend using the "amount weighted" above-median version of the Pub-2010 mortality tables (adjusted for LACERS experience as discussed herein) for the Retirement Plan.

We also continue to recommend that the mortality improvement scale be applied generationally where each future year has its own mortality table that reflects the forecasted improvements, using the published improvement scales. 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.

We understand that RPEC intends to publish annual updates to their mortality improvement scales. Improvement scale MP-2021 is the latest improvement scale available as RPEC decided not to release an updated projection scale in 2022. According to RPEC, they have been relying on the most recent population mortality experience in their model to project future mortality trends. In 2022, if they were to follow their past practice, they would have relied on the newest mortality data available from 2020 to prepare the "MP-2022" mortality improvement scale. However, population data from 2020 was severely affected by the COVID-19 pandemic. They believed it would not be appropriate to incorporate, without adjustment, the substantially higher rates of population mortality experience from 2020 into their graduation and projection models used to forecast future mortality. As a result, they elected not to release a new mortality improvement scale for 2022. We recommend that the Board adopt the Amount-Weighted

Above-Median Pub-2010 mortality tables (adjusted for LACERS experience as discussed herein), and project the mortality improvement generationally using the MP-2021 mortality improvement scale, for the Retirement Plan.

In order to reflect more LACERS experience in our analysis, we contemplated using experience for an eleven-year period by using data from the current (from July 1, 2019 through June 30, 2022) and the last three (from July 1, 2016 through June 30, 2019; from July 1, 2014 through June 30, 2017; and from July 1, 2011 through June 30, 2014) experience study periods in order to analyze this assumption. However, LACERS had previously provided us with information on the number of COVID-19 related deaths during fiscal years 2020/2021 and 2021/2022, and based on the relatively higher number of COVID-19 related and other deaths during that period we have decided to exclude mortality experience during the period from July 1, 2020 – June 30, 2022 in our review of the mortality assumption. Accordingly, we are proposing mortality assumptions using LACERS experience for a nine-year period from July 1, 2011 through June 30, 2020.

Even with the use of nine years of experience, based on standard statistical theory the data is only partially credible especially under the recommended amount-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 LACERS' experience. In future experience studies, more data will be available which may further increase the credibility of the LACERS experience.

Post-Retirement Mortality (Service Retirements)

Among all retired members, the actual deaths weighted by benefit amounts under the current assumptions for the nine years included in the review of the mortality assumption are shown in the table below. We also show the deaths weighted by benefit amount under the proposed assumptions. We continue to recommend the use of a generational mortality table, which incorporates a more explicit assumption for future mortality improvement. Accordingly, the goal is to start with a mortality table that closely matches the current experience (without a margin for future mortality improvement), and then reflect mortality improvement by projecting lower mortality rates in future years.

The proposed mortality table also reflects current experience to the extent that the experience is credible based on standard statistical theory. For LACERS, the volume of member data makes it relatively credible. As shown in the table below, the proposed mortality table for the Retirement Plan has an actual to expected ratio of 98%, after an adjustment to male rates for partial credibility. In future years the ratio should remain around 98%, as long as actual mortality improves at the same rates 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 nine years included in the review of the mortality assumption are as follows:

Healthy Retiree Mortality Experience – Benefit Weighted
($ in millions)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$10.80	$10.56	$10.79
Female	$2.49	$2.49	$2.48
Total	**$13.29**	**$13.05**	**$13.27**
Actual / Expected	**98%**		**98%**

Notes:

1. Experience shown above is weighted by monthly benefit amounts for deceased members.
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.

For healthy members in the Retirement Plan valuation, we recommend maintaining the healthy mortality to follow the Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table (separate tables for males and females), with rates increased by 10% for males and unadjusted for females, projected generationally, but updated with the two-dimensional mortality improvement scale MP-2021.

For the purpose of setting the assumptions for the Health Plan valuation, we have also provided in the table below the actual and expected deaths computed without weighting these by benefit amounts.

Healthy Retiree Mortality Experience – Headcount Weighted

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	2,798	2,957	2,794
Female	875	943	874
Total	**3,673**	**3,900**	**3,668**
Actual / Expected	**106%**		**106%**

For healthy members in the Health Plan valuation, we recommend maintaining the healthy mortality to follow the Pub-2010 General Healthy Retiree Headcount-Weighted Mortality Table (separate tables for males and females) with rates increased by 10% for males and unadjusted for females, projected generationally, but updated with the two-dimensional mortality improvement scale MP-2021.

Chart 8 that follows later in this section compares the number of actual to expected deaths on a benefit-weighted basis over the nine years included in the review of the mortality assumption for the current and proposed assumptions for service retirement members.

Chart 9 that follows later in this section compares the number of actual to expected deaths on a headcount-weighted basis over the nine years included in the review of the mortality assumption for the current and proposed assumptions for service retirement members.

Chart 10 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 2023. In practice, assumed life expectancies will increase as a result of the mortality improvement scale.

Beneficiary Mortality

For all beneficiaries, the table currently being used for the Retirement Plan is the Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2019. The table currently being used for the Health Plan is the Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2019.

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 LACERS' actual mortality experience for beneficiaries. However, in contrast to service retirees, there is much less beneficiary data, so it is given little credibility when adjusting the base table. As shown in the table below, the proposed mortality tables have an actual to expected ratio of 99%, after adjustments for partial credibility. In future years the ratio should remain around 99% as long as actual mortality improves at the same rates 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 nine years included in the review of the mortality assumption are as follows:

Beneficiary Mortality Experience – Benefit Weighted
($ in millions)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$0.22	$0.22	$0.21
Female	$3.31	$3.27	$3.30
Total	**$3.52**	**$3.49**	**$3.51**
Actual / Expected	**99%**		**99%**

Notes:

1. Experience shown above is weighted by monthly benefit amounts for deceased beneficiaries.
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.

For all beneficiaries in the Retirement Plan, we recommend maintaining the beneficiary mortality to follow the Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females), but updated with rates increased by 5% for males and increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

For the purpose of setting the assumptions for the Health Plan valuation, we have also provided in the table below the actual and expected deaths computed without weighting these by benefit amounts.

Beneficiary Mortality Experience – Headcount Weighted

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	144	154	138
Female	1,677	1,694	1,674
Total	**1,821**	**1,848**	**1,812**
Actual / Expected	**101%**		**102%**

For all beneficiaries in the Health Plan, we recommend maintaining the beneficiary mortality to follow the Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), but updated with rates increased by 5% for males and increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

As stated above, the Contingent Survivor mortality tables are developed based on contingent survivor data only <u>after</u> the death of the retirees (i.e., it does not reflect any contingent survivor data before the death of the retirees). In the last experience study, we recommended that the Board applied the Contingent Survivor mortality tables to predict the mortality rates for the beneficiaries both before and after the death of the retirees. According to analysis provided by RPEC, the mortality rates for the beneficiaries could be somewhat overstated <u>before</u> the death of the retirees as the Contingent Survivor mortality tended to be higher than retiree mortality and the difference was statistically significant. Based on that analysis, for the purposes of the actuarial valuations (for funding and financial reporting), when calculating the liability for the continuance to a beneficiary of a surviving member, we recommend that the Healthy Retiree mortality tables be used for beneficiary mortality both before and after the expected death of the member. Upon the actual death of the member (i.e., for all beneficiaries in pay status as of the valuation date), we recommend for the purposes of the actuarial valuations that we use the Contingent Survivor mortality tables as stated above. We note that the use of different mortality tables (before and after the death of the member) has been found by the RPEC to be reasonable.

Pre-Retirement Mortality

The table currently being used for pre-retirement mortality rates for the Retirement Plan is the Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional scale MP-2018. The table currently being used for pre-retirement mortality rates for the Health Plan is the Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional scale MP-2018.

When analyzing pre-retirement mortality, there is much less data available, so it is given little credibility when adjusting the base table. As shown in the table below, the proposed mortality tables have an actual to expected ratio of 126%, after adjustments for partial credibility. In future years the ratio should remain around 126% as long as actual mortality improves at the same rates 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 annual salary for the nine years included in the review of the mortality assumption are as follows:

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

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$20.52	$25.68	$20.52
Female	$6.89	$8.72	$6.85
Total	**$27.41**	**$34.40**	**$27.37**
Actual / Expected	**126%**		**126%**

Notes:

1. Experience shown above is weighted by annual salary for deceased members.
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.

For members in the Retirement Plan, we recommend maintaining the pre-retirement mortality to follow the Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10% for males and females, projected generationally, but updated with the two-dimensional mortality improvement scale MP-2021.

For members in the Health Plan, we recommend maintaining the pre-retirement mortality to follow the Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10% for males and females, projected generationally, but updated with the two-dimensional mortality improvement scale MP-2021.

Currently, our assumption is that all Tier 1 Enhanced pre-retirement deaths are service connected. **We recommend maintaining the current assumption for Tier 1 Enhanced members.**

Mortality Table for Determining Actuarial Equivalences

Given that our current and recommended post-retirement mortality assumptions include a generational mortality improvement scale, there are some administrative issues that need to be resolved with LACERS and its vendor maintaining the pension administration software before we could recommend a comparable generational scale to anticipate future mortality improvement. Upon the completion of the last experience study, we have been directed by LACERS to engage in such discussions with the vendor. We will provide a recommendation to LACERS for use in reflecting mortality improvement for determining actuarial equivalences after we conclude those discussions with the vendor.

Chart 8: Post-Retirement Benefit-Weighted Deaths ($ In Millions)
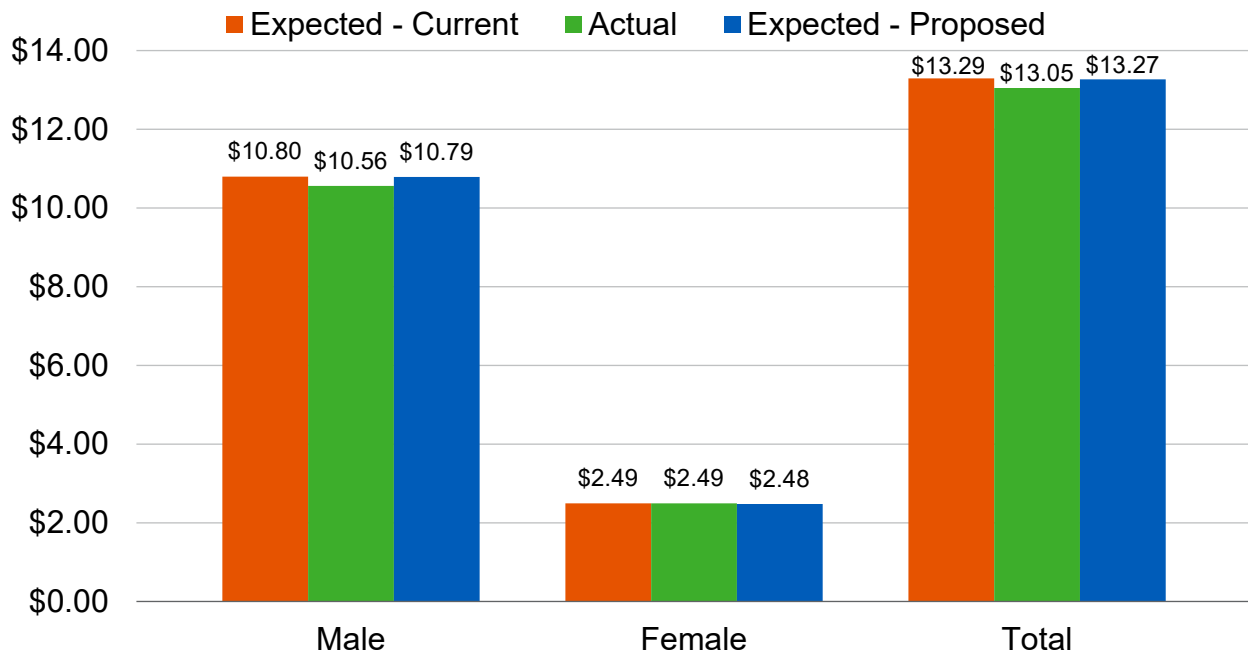## Service Retirement Members
(July 1, 2011 through June 30, 2020)

Legend: ■ Expected - Current ■ Actual ■ Expected - Proposed

	Expected - Current	Actual	Expected - Proposed
Male	$10.80	$10.56	$10.79
Female	$2.49	$2.49	$2.48
Total	$13.29	$13.05	$13.27

Chart 9: Post-Retirement Headcount-Weighted Deaths
Service Retirement Members
(July 1, 2011 through June 30, 2020)

Legend: ■ Expected - Current ■ Actual ■ Expected - Proposed

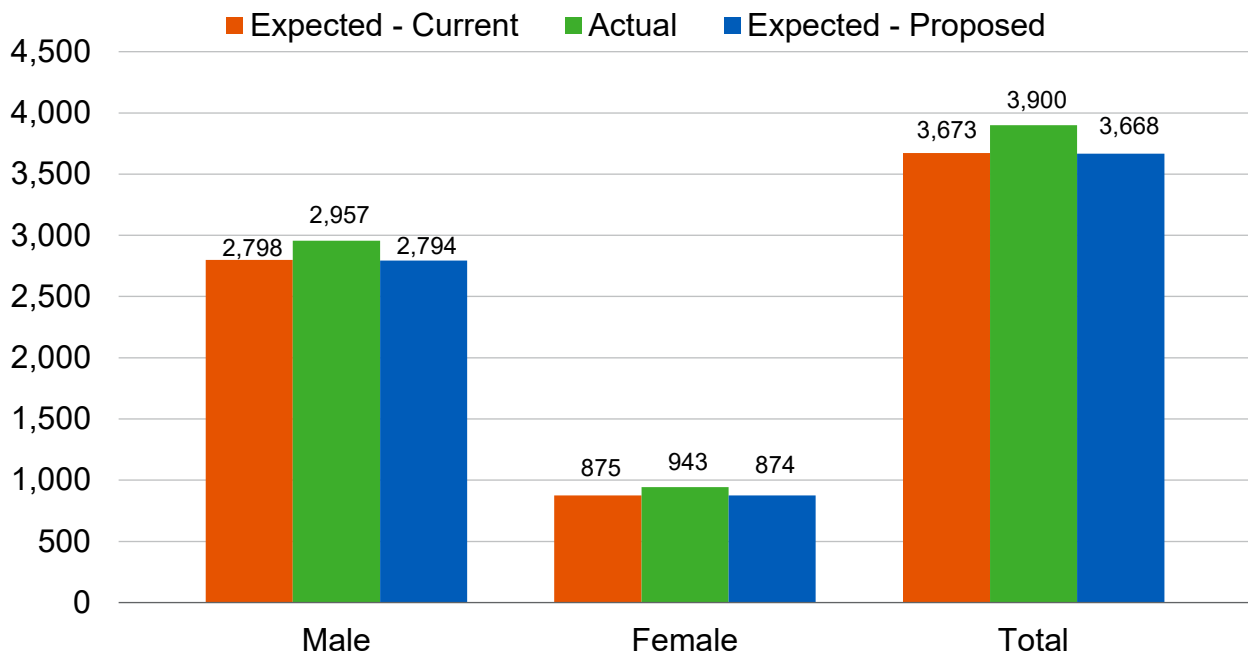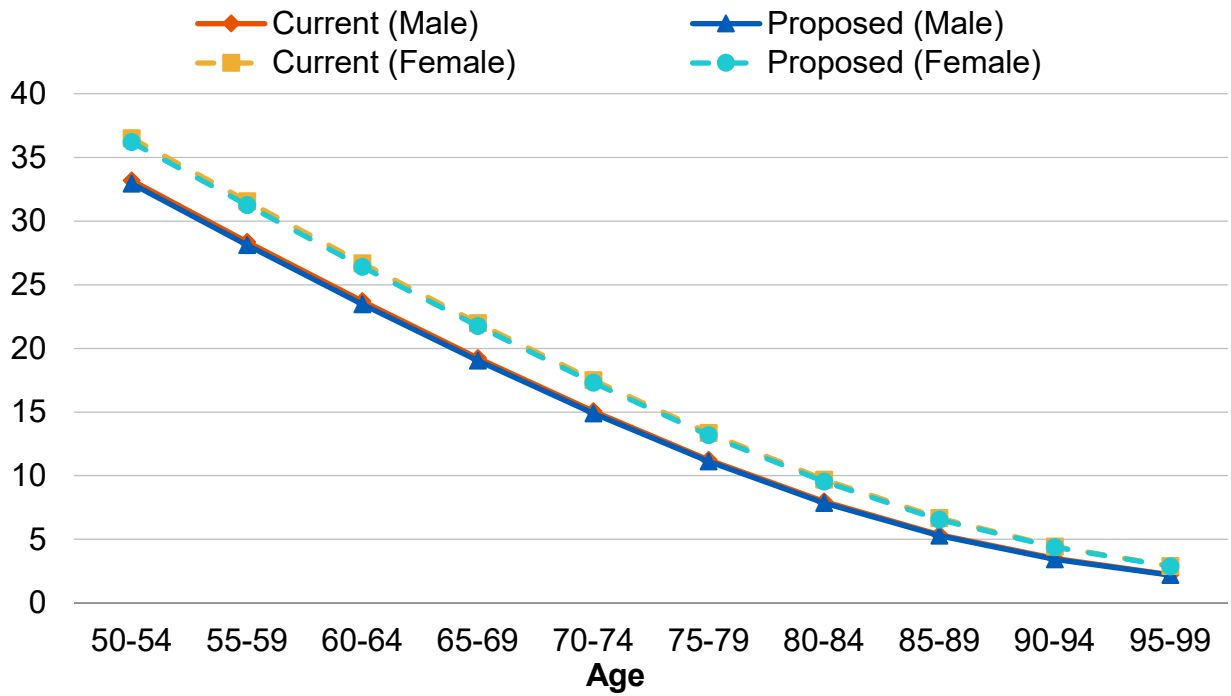|	Expected - Current	Actual	Expected - Proposed
Male	2,798	2,957	2,794
Female	875	943	874
Total	3,673	3,900	3,668

Chart 10: Benefit-Weighted Life Expectancies
Service Retirement 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 table currently being used for the Retirement Plan is the Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) increased by 10% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. The table currently being used for the Health Plan is the Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Table (separate tables for males and females) increased by 10% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Similar to mortality rates for service retirees, the proposed mortality table reflects current experience to the extent that the experience is credible based on standard statistical theory. For LACERS, there is far less data for disabled retirees, so it is given little credibility. As shown in the table below, the proposed mortality table for the Retirement Plan has an actual to expected ratio of 102%, after adjustments for partial credibility. In future years the ratio should remain around 102%, as long as actual mortality improves at the same rates as anticipated by the generational mortality table. The number of actual deaths compared to the number expected under the current and proposed assumptions weighted by benefit amounts for the nine years included in the review of mortality assumptions are as follows:

Disabled Retiree Mortality Experience – Benefit Weighted
($ in millions)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$0.34	$0.34	$0.32
Female	$0.11	$0.10	$0.11
Total	**$0.45**	**$0.44**	**$0.44**
Actual / Expected	**98%**		**102%**

Notes:
1. Experience shown above is weighted by monthly benefit amounts for deceased members.
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.

For disabled members in the Retirement Plan valuation, we recommend maintaining the disabled mortality to follow the Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), but updated with rates increased by 5% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

For the purpose of setting the assumptions for the Health Plan valuation, we have also provided in the table below the actual and expected deaths computed without weighting these by benefit amounts.

Disabled Retiree Mortality Experience – Headcount Weighted

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	221	217	210
Female	75	69	75
Total	**296**	**286**	**285**
Actual / Expected	**97%**		**100%**

For disabled members in the Health Plan valuation, we recommend maintaining the disabled mortality to follow the Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Table (separate tables for males and females) but updated with rates increased by 5% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Chart 11 compares the number of actual to expected deaths on a benefit-weighted basis over the nine years included in the review of mortality assumptions for the current and proposed assumptions for disabled members.

Chart 12 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 current and proposed generational mortality rates are based on age as of 2023. In practice, life expectancies will be assumed to increase based on applying the mortality improvement scale.

Chart 11: Post-Retirement Benefit-Weighted Deaths ($ In Millions)
Disabled Members
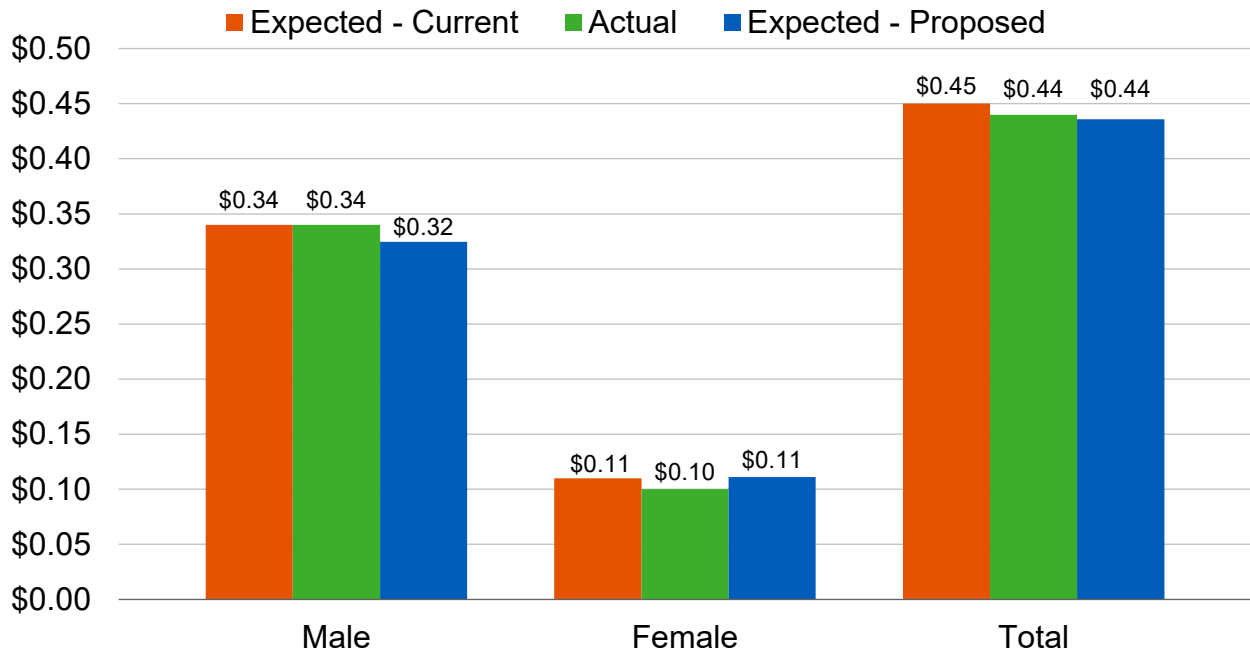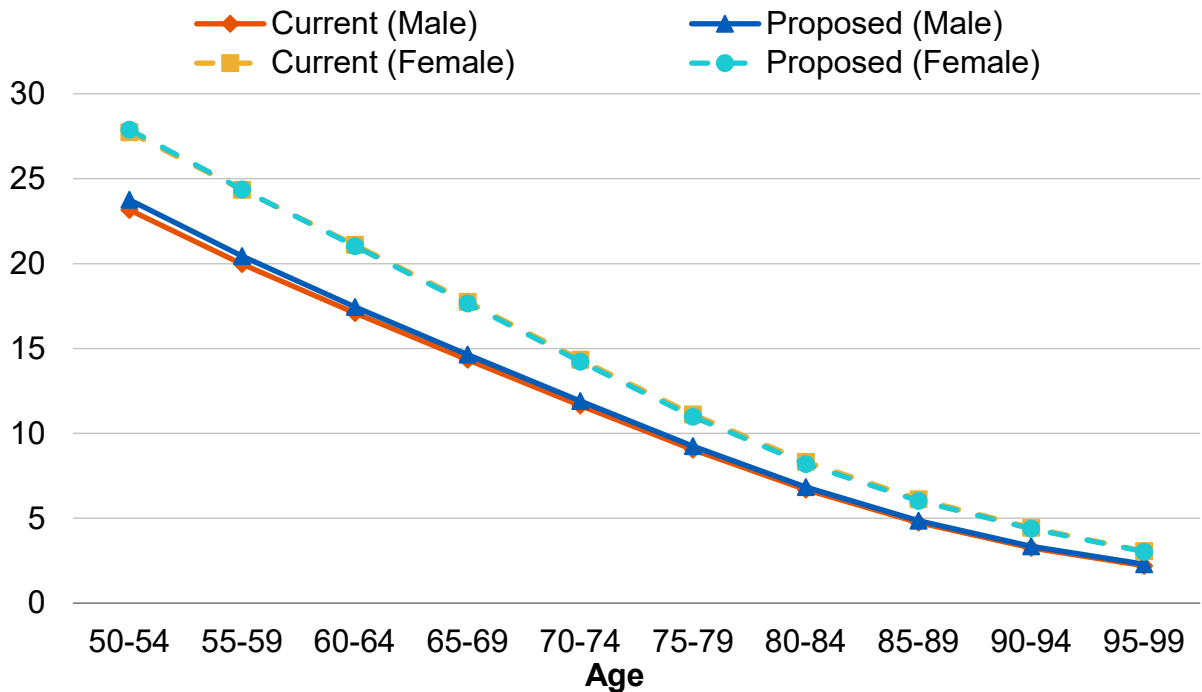## (July 1, 2011 through June 30, 2020)

Chart 12: 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 assumptions, all members who terminate with less than five years of service are assumed to receive a refund of contributions. For members who terminate with five or more years of service, the member is assumed to choose between a refund of contributions or a deferred vested benefit, whichever option is more valuable.

The current termination rates are service based for the first five years of service and age based after the first five years of service. During this experience study, we reviewed termination experience for members with five or more years of service based both on ages and on years of service. We determined that the termination rates correlate a little better with years of service than with ages, for members with five or more years of service. Therefore, with this experience study, we are recommending termination rates based only on a function of the member's years of service.

As we note in the next Subsection E regarding disability incidence rates, the observed disability experience includes members who went from inactive (i.e., terminated) status to disability status. In order to remove the effect of double counting members as both terminations one year and disabilities a subsequent year, we have removed an equal number of inactive to disability records over the experience study period from the active to termination experience herein.

The following table shows the observed termination rates based on the actual experience over the past three years. Also shown are the current assumed rates and the rates we propose. Please note that we have excluded any members that were eligible for retirement.

Termination
Rates (%)

Years of Service	Current Rate[1]	Actual Rate	Proposed Rate
Less than 1	11.50	9.54	10.50
1 – 2	10.00	10.20	10.00
2 – 3	8.50	9.44	9.00
3 – 4	7.75	8.00	7.75
4 – 5	7.00	5.41	6.25
5 – 6	4.58	5.13	5.25
6 – 7	4.40	5.74	5.00
7 – 8	4.14	3.47	4.75
8 – 9	3.99	4.95	4.50
9 – 10	3.87	5.97	4.25
10 – 11	4.08	4.09	4.00
11 – 12	3.92	4.46	3.75
12 – 13	3.75	3.32	3.50
13 – 14	3.57	2.56	3.00
14 – 15	3.45	2.23	2.75
15 & Over	3.14	1.72	2.50

[1] The current rates shown for five or more years of service are based on the current age-based rates applied to the last three years of exposures.

It is important to note that not every service category has enough exposures and/or decrements such that the results in that category are statistically credible.

Based on this experience, we recommend decreasing the termination rate assumption for certain service groups while increasing the termination rate assumption for other service groups. Overall, the proposed rates represent a slight decrease from the current rates.

We also continue to recommend that no termination is assumed after a member is first assumed to retire. In other words, at those ages members will either retire in accordance with the retirement rate assumptions or continue working, rather than terminate and defer their benefit.

Chart 13 compares the number of actual to expected terminations over the past three years for the current and proposed assumptions.

Chart 14 compares the actual termination experience with the current and proposed assumptions.

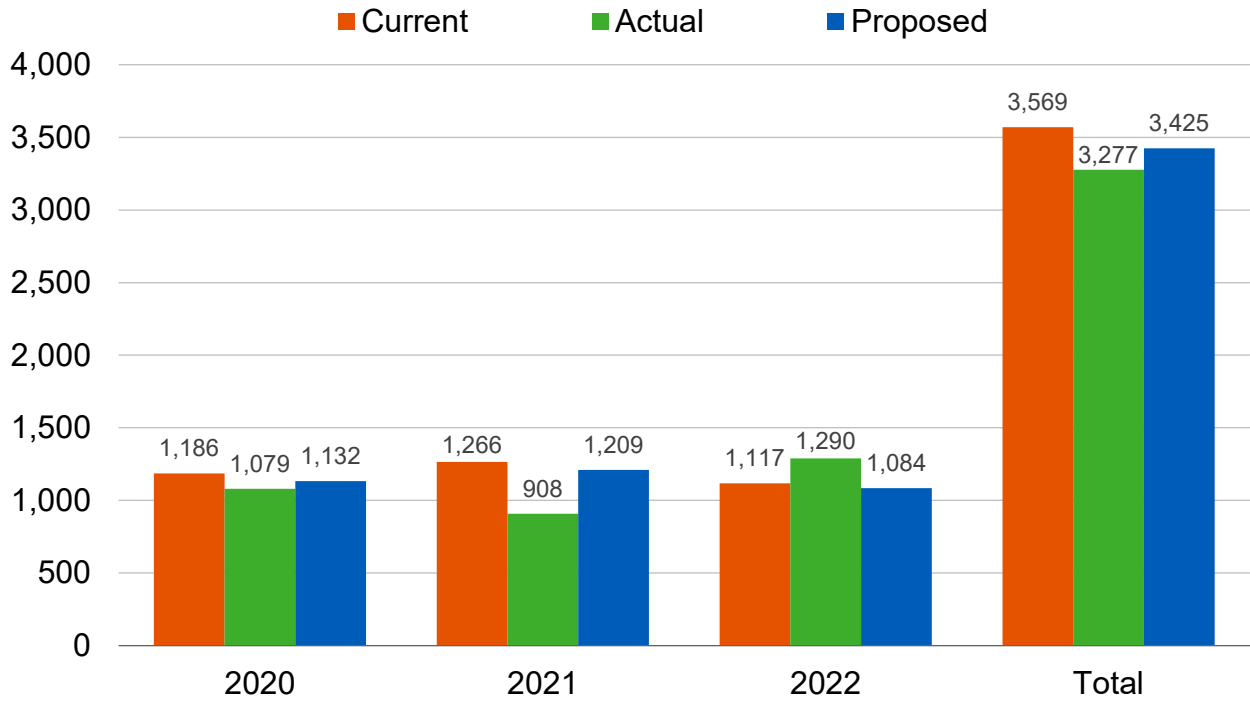# Chart 13: Actual Number of Terminations Compared to Expected

Legend: ■ Current ■ Actual ■ Proposed

Year	Current	Actual	Proposed
2020	1,186	1,079	1,132
2021	1,266	908	1,209
2022	1,117	1,290	1,084
Total	3,569	3,277	3,425

Chart 14: Termination Rates

Legend: ◆ Current ■ Actual ▲ Proposed

Years of Service
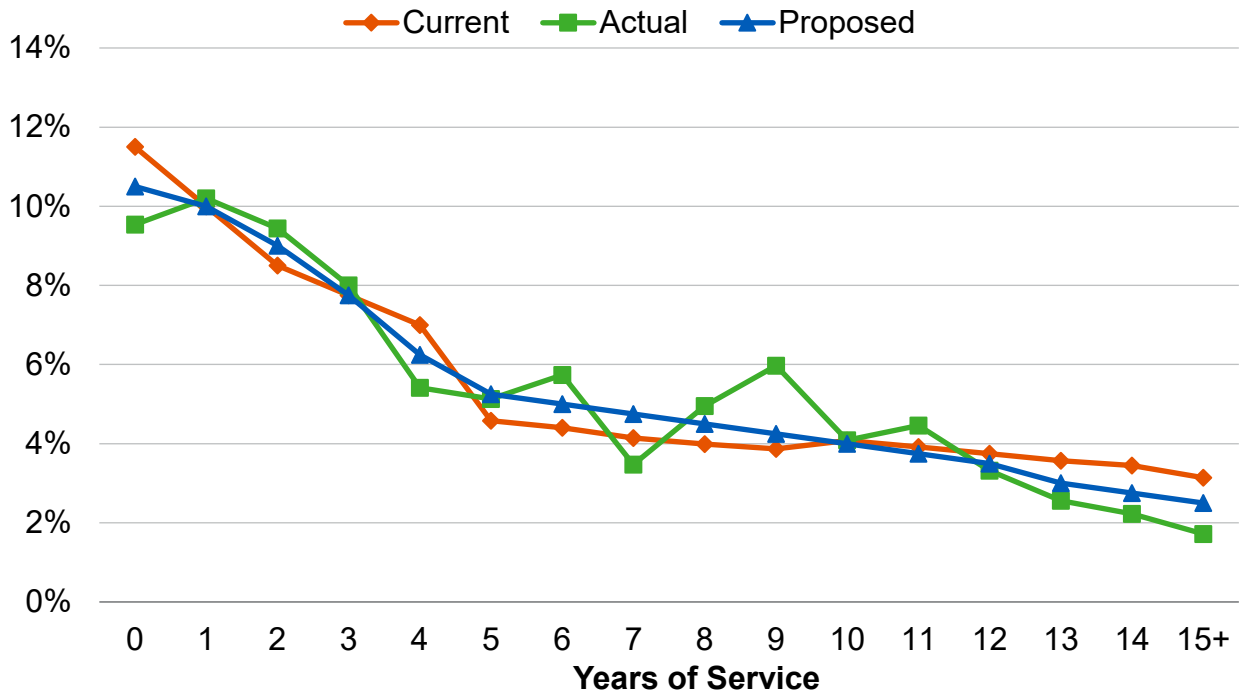
E. Disability Incidence Rates

When a Tier 1 or Tier 3 member becomes disabled, he or she is generally entitled to a monthly benefit equal to 1/3 of their final average monthly compensation. For Tier 1 Enhanced members, their disability benefits will be different based on the type of disability (service-connected or nonservice-connected) as well as the severity of the disability.

The following table shows the observed disability incidence rates based on the actual experience over the past three years for all disabilities.[1] Also shown are the current assumed rates and the rates we propose.

Disability Incidence[2]
Rates (%)

Age	Current Rate	Actual Rate	Proposed Rate
20 – 24	0.00	0.00	0.00
25 – 29	0.01	0.00	0.01
30 – 34	0.03	0.00	0.02
35 – 39	0.04	0.02	0.03
40 – 44	0.08	0.05	0.07
45 – 49	0.14	0.08	0.12
50 – 54	0.18	0.08	0.15
55 – 59	0.18	0.08	0.15
60 – 64	0.18	0.11	0.16
65 – 69	0.25	0.20	0.23

As shown above, we are recommending decreases to most of the assumed disability rates.

For Tier 1 Enhanced, currently 90% of disability retirements are assumed to be service-connected with service connected disability benefits based on years of service, as follows:

Service-Connected Disability Benefits

Years of Service	Benefit
Less than 20	55% of Final Average Monthly Compensation
20 – 30	65% of Final Average Monthly Compensation
More than 30	75% of Final Average Monthly Compensation

For Tier 1 Enhanced, currently 10% of disability retirements are assumed to be nonservice-connected with nonservice-connected disability benefits equal to 40% of Final Average Monthly Compensation.

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[1] The Tier 1 (including Tier 1 Enhanced) experience shown above reflects actual disabilities from the prior years' status of mostly inactive membership. Note that there was no disability experience for Tier 3 members over the experience study period.

[2] Total rates for all disabilities, at central ages in age ranges shown. (For Tier 1 and Tier 3 members, disabilities are not categorized as service-connected or nonservice connected, whereas they are categorized as such for Tier 1 Enhanced members.)

The following table shows the observed percentage of Tier 1 Enhanced members that received a service-connected versus nonservice-connected disability based on the actual experience over the past three years. Also shown are the current assumed percentages and the percentages we propose.

Service-Connected vs. Nonservice-Connected Disability – Tier 1 Enhanced

Disablements Receiving Service-Connected Disability			Disablements Receiving Non-Service Connected Disability
Current Assumption	Actual Percentage	Proposed Assumption	Proposed Assumption
90%	86%[1]	90%	10%

Note that for the seven observed Tier 1 Enhanced disability retirements over the experience study period included in the table above, we have *estimated* the actual disability benefit amounts expressed as a percentage of final average monthly compensation, based on the available data provided to us by LACERS for the annual valuations, as follows:

Estimated Benefit Percentage for new Tier 1 Enhanced Disabilities (% of Final Average Monthly Compensation)

Type of Disability	Years of Service	Number of Disabilities	Current Assumption	Estimated Average Actual %	Proposed Assumption
Service-Connected	Less than 20	4	55%	57%	55%
	20 – 30	1	65%	53%	65%
	More than 30	1	75%	78%	75%
Nonservice-Connected	N/A	1	40%	36%	40%

Based on the experience noted above for Tier 1 Enhanced members, we recommend maintaining the assumed percentage for service-connected disability at 90% with the remaining 10% assumed to be nonservice-connected disability. Furthermore, we recommend maintaining the current assumed benefit percentages for both service-connected disabilities (which vary by service) and nonservice-connected disabilities (i.e., 40%), as a percentage of final average monthly compensation, for Tier 1 Enhanced members.

Chart 15 below compares the number of actual to expected service-connected and nonservice-connected disabilities over the past three years for the current and proposed assumptions.

Chart 16 compares the actual disability incidence experience with the current and proposed assumptions.

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[1] Based on six out of seven Tier 1 Enhanced disability retirements over the experience study period. Note that five out of the seven were originally identified by LACERS as service-connected disabilities; an additional member was originally identified as a nonservice-connected disability, but then was subsequently reclassified by LACERS as a service-connected disability (and we have counted this member as a service-connected disability, ultimately).

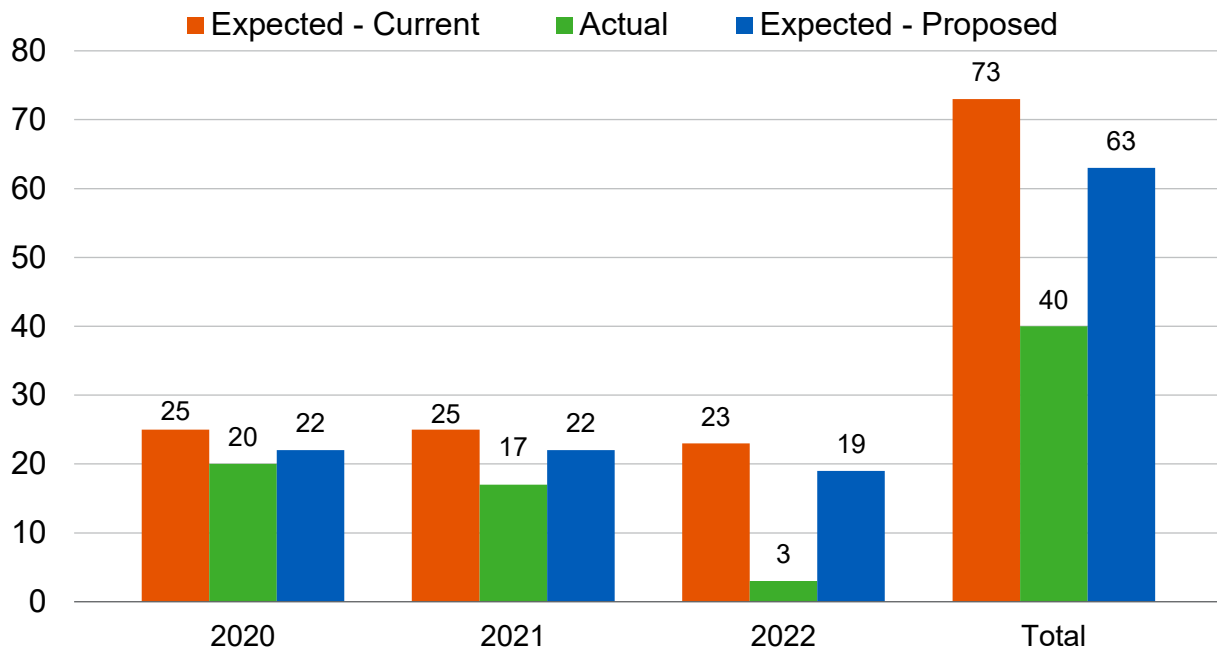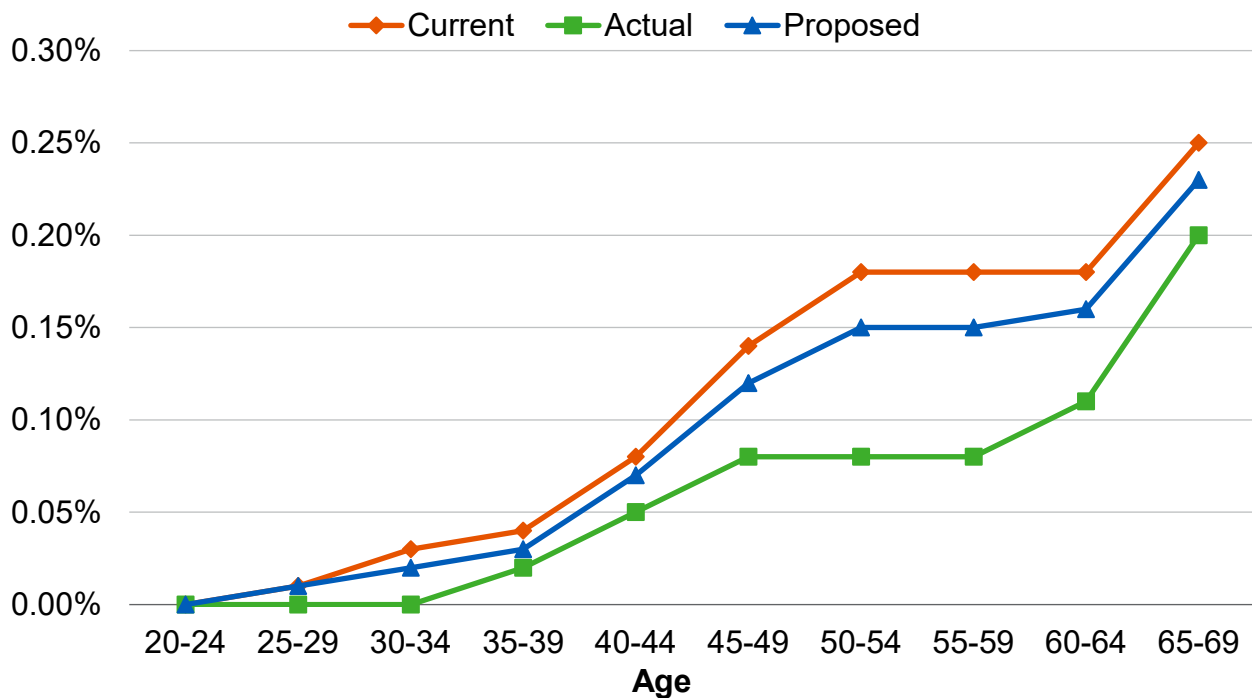# Chart 15: Actual Number of Disabilities Compared to Expected

Legend: ■ Expected - Current ■ Actual ■ Expected - Proposed

Year	Expected - Current	Actual	Expected - Proposed
2020	25	20	22
2021	25	17	22
2022	23	3	19
Total	73	40	63

Chart 16: Disability Incidence Rates

Legend: ◆ Current ■ Actual ▲ Proposed

Age	Current	Actual	Proposed
20-24	0.00%	0.00%	0.00%
25-29	0.01%	0.00%	0.01%
30-34	0.03%	0.00%	0.02%
35-39	0.04%	0.02%	0.03%
40-44	0.08%	0.05%	0.07%
45-49	0.14%	0.08%	0.12%
50-54	0.18%	0.08%	0.15%
55-59	0.18%	0.08%	0.15%
60-64	0.18%	0.11%	0.16%
65-69	0.25%	0.20%	0.23%

F. Retiree Health Assumptions

Retiree Medical Coverage Election

The member's retiree health subsidy amount varies depending on whether the retiree enrolls in a Board approved health carrier, the coverage tier elected, and the service level attained at retirement. Therefore, we make assumptions regarding health plan participation based on a member's service at retirement. The election rates shown below are based on all retirees reported in the valuation as of June 30, 2022. Also shown are the current and proposed assumptions.

Eligible Retirees who Elected Medical

Service Range	Current Rate	Actual Rate	Proposed Rate
10 – 14	60%	58.3%	60%
15 – 19	80%	76.7%	80%
20 – 24	90%	88.6%	90%
25 and over	95%	94.5%	95%

Based on the above, we recommend maintaining the current assumptions for all service ranges.

Spousal/Domestic Partner Coverage

The retiree medical subsidy amount varies depending on whether retirees receiving a medical subsidy elect to cover their spouse or domestic partner.

The following table shows the observed percentage of new retirees receiving a medical subsidy who were reported with a covered Spouse or Domestic Partner based on the actual experience over the past three years. Also shown are the current and proposed assumptions.

New Retirees with Spouse/Domestic Partner Coverage

	New Male Retiree	New Female Retiree
Current Assumption	60%	35%
Actual Experience	59%	33%
Proposed Assumption	**60%**	**35%**

Based on the above, we recommend maintaining the current assumptions.

Covered Spouse/Domestic Partner Age Difference

The following tables show the observed spouse's age for new retirees who elected to cover their spouse based on the actual experience over the past three years. Also shown are the current and proposed assumptions.

Covered Spouse/Domestic Partner's Age Compared to the Member's Age

	New Male Retiree	New Female Retiree
Current Assumption	4 years younger	2 years older
Actual Experience	4 years younger	2 years older
Proposed Assumption	**4 years younger**	**2 years older**

Based on the above, we recommend maintaining the current assumption.

5. Cost Impact

We have estimated the impact of all the recommended demographic and economic assumptions (including the refinement in the method used to allocate total present value of future benefits for actives between normal cost and actuarial accrued liability) as if they were applied to the June 30, 2022 actuarial valuations.

Retirement Plan

The table below shows the changes in the total normal cost and actuarial accrued liability for the Retirement Plan due to the proposed assumption changes, as if they were applied in the June 30, 2022 valuation. If all of the proposed assumption changes (both economic, as recommended in Section 3 of this report, and demographic, as recommended in Section 4 of this report), were implemented, the total normal cost for the Retirement Plan would have increased by about $11.7 million and the actuarial accrued liability would have decreased by about $142.7 million. The funded ratio would have increased from 73.3% to 73.7%, on a valuation value of assets basis.

Change in Plan Liabilities
Based on June 30, 2022 Actuarial Valuation

	Current Assumptions	Proposed Assumptions	Increase / (Decrease)
Total Normal Cost	$412,247,235	$423,981,661	$11,734,426
Actuarial Accrued Liability	$24,078,751,303	$23,936,079,207	$(142,672,096)

If all of the proposed assumption changes (both economic and demographic) were implemented, the aggregate beginning-of-the-year employer contribution rate would have increased by 0.09% of payroll.

Employer Contribution Rate Impact
Based on June 30, 2022 Actuarial Valuation
(% of Payroll at Beginning of the Year)

Contributions	Increase / (Decrease)
Normal Cost	0.34%
UAAL	(0.25)%
Total	**0.09%**

Health Plan

The table below shows the changes in the total normal cost and actuarial accrued liability for the Health Plan due to the proposed assumption changes, as if they were applied in the June 30, 2022 valuation. If all of the proposed assumption changes (both economic, as recommended in Section 3 of this report, and demographic, as recommended in Section 4 of this report), were implemented, the total normal cost for the Health Plan would have increased by about $12.7 million and the actuarial accrued liability would have decreased by about $52.4 million. The funded ratio would have increased from 97.0% to 98.4%, on a valuation value of assets basis.

Change in Plan Liabilities
Based on June 30, 2022 Actuarial Valuation

	Current Assumptions	Proposed Assumptions	Increase / (Decrease)
Total Normal Cost	$81,027,749	$93,699,705	$12,671,956
Actuarial Accrued Liability	$3,580,696,288	$3,528,279,417	($52,416,871)

If all of the proposed assumption changes (both economic and demographic) were implemented, the aggregate beginning-of-the-year employer contribution rate would have increased by 0.36% of payroll.

Employer Contribution Rate Impact
Based on June 30, 2022 Actuarial Valuation
(% of Payroll at Beginning of the Year)

Contributions	Increase / (Decrease)
Normal Cost	0.52%
UAAL	(0.16)%
Total	**0.36%**

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 0.40% of the Actuarial Value of Assets.
Member Contribution Crediting Rate:	Based on average of 5-year Treasury note rate. An assumption of 2.75% is used to approximate that crediting rate.
Cost of Living Adjustment (COLA):	Retiree COLA increases of 2.75% per year for Tier 1 and 2.00% per year for Tier 3. For Tier 1 members with COLA banks, withdrawals from the bank are assumed to increase the retiree COLA to 3.00% per year until their COLA banks are exhausted.
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.
Salary Increases:	The annual rate of compensation increase includes: • Inflation at 2.75%, plus • "Across the board" salary increases of 0.50% per year, plus • The following merit and promotion increases:

Years of Service	Rate (%)
Less than 1	6.70
1 – 2	6.50
2 – 3	5.80
3 – 4	4.00
4 – 5	3.00
5 – 6	2.20
6 – 7	2.00
7 – 8	1.80
8 – 9	1.60
9 – 10	1.50
10 & Over	1.00

Demographic Assumptions

Post-Retirement Mortality Rates:	*Healthy*
	• **For the Retirement Plan:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2019.
	• **For the Health Plan:** Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2019.
	Disabled
	• **For the Retirement Plan:** Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), with rates increased by 10% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2019.
	• **For the Health Plan:** Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Table (separate tables for males and females), with rates increased by 10% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2019.
	Beneficiary
	• **For the Retirement Plan:** Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2019.
	• **For the Health Plan:** Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2019.
	The Pub-2010 mortality tables and adjustments as shown above reasonably reflect the mortality experience as of the measurement date. These mortality tables were adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

| | Pre-Retirement Mortality Rates: | • **For the Retirement Plan:** Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2019. |

		Rate (%)	
Age	Male	Female
20	0.04	0.01
25	0.03	0.01
30	0.03	0.01
35	0.05	0.02
40	0.06	0.04
45	0.09	0.06
50	0.14	0.08
55	0.21	0.12
60	0.30	0.19
65	0.45	0.30

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

For Tier 1 Enhanced, 100% of pre-retirement death benefits are assumed to be service-connected.

• **For the Health Plan:** Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2019.

Disability Incidence:

Age	Rate (%)
25	0.01
30	0.02
35	0.04
40	0.06
45	0.12
50	0.16
55	0.18
60	0.18
65	0.22

For Tier 1 Enhanced, 90% of disability retirements are assumed to be service-connected with service-connected disability benefits based on years of service, as follows:

Years of Service	Benefit
Less than 20	55% of Final Average Monthly Compensation
20 - 30	65% of Final Average Monthly Compensation
More than 30	75% of Final Average Monthly Compensation

For Tier 1 Enhanced, 10% of disability retirements are assumed to be nonservice-connected with nonservice-connected disability benefits equal to 40% of Final Average Monthly Compensation.

Termination:

Less than Five Years of Service

Years of Service	Rate (%)
Less than 1	11.50
1 – 2	10.00
2 – 3	8.50
3 – 4	7.75
4 – 5	7.00

Five or More Years of Service

Age	Rate (%)
25	7.00
30	6.70
35	5.30
40	3.75
45	3.10
50	3.00
55	3.00
60	3.00

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

			Rate (%)				
		Tier 1		Tier 1 Enhanced		Tier 3	
Retirement Rates:	**Age**	**Non-55/30**	**55/30**	**Non-55/30**	**55/30**	**Non-55/30**	**55/30**
	50	5.0	0.0	7.0	0.0	5.0	0.0
	51	3.0	0.0	5.0	0.0	3.0	0.0
	52	3.0	0.0	5.0	0.0	3.0	0.0
	53	3.0	0.0	5.0	0.0	3.0	0.0
	54	18.0	0.0	20.0	0.0	17.0	0.0
	55	6.0	27.0	8.0	30.0	0.0[1]	26.0
	56	6.0	18.0	8.0	22.0	0.0[1]	17.0
	57	6.0	18.0	8.0	22.0	0.0[1]	17.0
	58	6.0	18.0	8.0	22.0	0.0[1]	17.0
	59	6.0	18.0	8.0	22.0	0.0[1]	17.0
	60	7.0	18.0	9.0	22.0	6.0	17.0
	61	7.0	18.0	9.0	22.0	6.0	17.0
	62	7.0	18.0	9.0	22.0	6.0	17.0
	63	7.0	18.0	9.0	22.0	6.0	17.0
	64	7.0	18.0	9.0	22.0	6.0	17.0
	65	14.0	21.0	16.0	26.0	13.0	20.0
	66	14.0	21.0	16.0	26.0	13.0	20.0
	67	14.0	21.0	16.0	26.0	13.0	20.0
	68	14.0	21.0	16.0	26.0	13.0	20.0
	69	14.0	21.0	16.0	26.0	13.0	20.0
	70 & Over	100.0	100.0	100.0	100.0	100.0	100.0

[1] Not eligible to retire under the provisions of the Tier 3 plan at these ages with less than 30 years of service. If a member has at least 30 years of service at these ages, they would be subject to the "55/30" rates.

Retirement Age and Benefit for Inactive Vested Members	Pension benefit paid at the later of age 59 or the current attained age. For reciprocals, 4.25% compensation increases per annum.
Other Reciprocal Service:	5% of future inactive vested members will work at a reciprocal system.
Service:	Employment service is used for eligibility determination purposes. Benefit service is used for benefit calculation purposes.
Future Benefit Accruals:	1.0 year of service credit per year.
Unknown Data for Members:	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Form of Payment:	All active and inactive Tier 1 and Tier 3 members who are assumed to be married or with domestic partners at retirement are assumed to elect the 50% Joint and Survivor Cash Refund Annuity. For Tier 1 Enhanced, the continuance percentage is 70% for service retirement and nonservice-connected disability, and 80% for service-connected disability. Those members who are assumed to be unmarried or without domestic partners are assumed to elect the Single Cash Refund Annuity.
Percent Married / Domestic Partner:	For all active and inactive members, 76% of male members and 52% of female members are assumed to be married or with domestic partner at pre-retirement death or retirement.
Age and Gender of Spouse:	For all active and inactive members, male members are assumed to have a female spouse who is 3 years younger than the member and female members are assumed to have a male spouse who is 2 years older than the member.

Retiree Health Assumptions

Participation		

Service Range (Years)	Participation for Future Retirees Under 65
10–14	60%
15–19	80
20–24	90
25 and over	95

Age and Gender of Spouse/Domestic Partner:	For all non-retired members, male members are assumed to have a female spouse or domestic partner who is 4 years younger than the member and female members are assumed to have a male spouse or domestic partner who is 2 years older than the member.
Spousal/Domestic Partner Coverage	Of future retirees receiving a medical subsidy 60% of males and 35% of females are assumed to elect coverage for married and surviving spouses or domestic partners. For those retired on valuation date with a subsidy, spousal or domestic partner coverage is based on census data.

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 0.20% of the Actuarial Value of Assets.
Member Contribution Crediting Rate:	Based on average of 5-year Treasury note rate. An assumption of 2.50% is used to approximate that crediting rate.
Cost of Living Adjustment (COLA):	Retiree COLA increases of 2.75% per year for Tier 1 and 2.00% per year for Tier 3. For Tier 1 members with COLA banks, withdrawals from the bank are assumed to increase the retiree COLA to 3.00% per year until their COLA banks are exhausted.
Payroll Growth:	Inflation of 2.50% 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 2.50% per year from the valuation date.
Salary Increases:	The annual rate of compensation increase includes: • Inflation at 2.50%, plus • Real "across the board" salary increases of 0.50% per year, plus • The following merit and promotion increases:

Years of Service	Rate (%)
Less than 1	6.00
1 – 2	5.90
2 – 3	5.40
3 – 4	4.20
4 – 5	3.50
5 – 6	2.80
6 – 7	2.50
7 – 8	2.10
8 – 9	1.80
9 – 10	1.60
10 – 11	1.50
11 – 12	1.40
12 – 13	1.30
13 – 14	1.20
14 – 15	1.10
15 & Over	1.00

Demographic Assumptions

Post-Retirement Mortality Rates:	*Healthy* • **For the Retirement Plan:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021. • **For the Health Plan:** Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021. *Disabled* • **For the Retirement Plan:** Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), with rates increased by 5% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. • **For the Health Plan:** Pub-2010 Non-Safety Disabled Retiree Headcount-Weighted Mortality Table (separate tables for males and females), with rates increased by 5% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. *Beneficiaries not Currently in Pay Status* • **For the Retirement Plan:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021. • **For the Health Plan:** Pub-2010 General Healthy Retiree Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021. *Beneficiaries Currently in Pay Status* • **For the Retirement Plan:** Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 5% for males and increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. • **For the Health Plan:** Pub-2010 Contingent Survivor Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 5% for males and increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. The Pub-2010 mortality tables and adjustments as shown above reasonably reflect the mortality experience as of the measurement date. These mortality tables were adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

| **Pre-Retirement Mortality Rates:** | • **For the Retirement Plan:** Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021. |

| | **Rate (%)** | |
Age	Male	Female
20	0.04	0.01
25	0.03	0.01
30	0.03	0.01
35	0.05	0.02
40	0.06	0.04
45	0.09	0.06
50	0.14	0.08
55	0.21	0.12
60	0.30	0.19
65	0.45	0.30

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

For Tier 1 Enhanced, 100% of pre-retirement death benefits are assumed to be service-connected.

• **For the Health Plan:** Pub-2010 General Employee Headcount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10% for males and females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Disability Incidence:

Age	Rate (%)
25	0.01
30	0.02
35	0.03
40	0.05
45	0.10
50	0.14
55	0.15
60	0.16
65	0.20

For Tier 1 Enhanced, 90% of disability retirements are assumed to be service-connected with service-connected disability benefits based on years of service, as follows:

Years of Service	Benefit
Less than 20	55% of Final Average Monthly Compensation
20 - 30	65% of Final Average Monthly Compensation
More than 30	75% of Final Average Monthly Compensation

For Tier 1 Enhanced, 10% of disability retirements are assumed to be nonservice-connected with nonservice-connected disability benefits equal to 40% of Final Average Monthly Compensation.

Termination:

Years of Service	Rate (%)
Less than 1	10.50%
1 – 2	10.00%
2 – 3	9.00%
3 – 4	7.75%
4 – 5	6.25%
5 – 6	5.25%
6 – 7	5.00%
7 – 8	4.75%
8 – 9	4.50%
9 – 10	4.25%
10 – 11	4.00%
11 – 12	3.75%
12 – 13	3.50%
13 – 14	3.00%
14 – 15	2.75%
15 and over	2.50%

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

Retirement Rates:		Rate (%)					
		Tier 1		Tier 1 Enhanced		Tier 3	
	Age	Non-55/30	55/30	Non-55/30	55/30	Non-55/30	55/30
	50	5.0	0.0	6.0	0.0	5.0	0.0
	51	3.0	0.0	5.0	0.0	3.0	0.0
	52	3.0	0.0	5.0	0.0	3.0	0.0
	53	3.0	0.0	5.0	0.0	3.0	0.0
	54	18.0	0.0	18.0	0.0	17.0	0.0
	55	6.0	27.0	10.0	30.0	0.0[1]	26.0
	56	6.0	18.0	10.0	22.0	0.0[1]	17.0
	57	6.0	18.0	10.0	22.0	0.0[1]	17.0
	58	6.0	18.0	10.0	22.0	0.0[1]	17.0
	59	6.0	18.0	10.0	22.0	0.0[1]	17.0
	60	9.0	18.0	11.0	22.0	8.0	17.0
	61	9.0	18.0	11.0	22.0	8.0	17.0
	62	9.0	18.0	11.0	22.0	8.0	17.0
	63	9.0	18.0	11.0	22.0	8.0	17.0
	64	9.0	18.0	11.0	22.0	8.0	17.0
	65	16.0	21.0	20.0	26.0	15.0	20.0
	66	16.0	21.0	20.0	26.0	15.0	20.0
	67	16.0	21.0	20.0	26.0	15.0	20.0
	68	16.0	21.0	20.0	26.0	15.0	20.0
	69	16.0	21.0	20.0	26.0	15.0	20.0
	70 & Over	100.0	100.0	100.0	100.0	100.0	100.0

[1] Not eligible to retire under the provisions of the Tier 3 plan at these ages with less than 30 years of service. If a member has at least 30 years of service at these ages, they would be subject to the "55/30" rates.

Retirement Age and Benefit for Inactive Vested Members
Pension benefit paid at the later of age 60 or the current attained age for members retiring from deferred status and at the later of age 59 or the current attained age for members retiring from reciprocal status. For reciprocals, 4.00% compensation increases per annum.

Other Reciprocal Service:
5% of future inactive vested members will work at a reciprocal system.

Service:
Employment service is used for eligibility determination purposes. Benefit service is used for benefit calculation purposes.

Future Benefit Accruals:
1.0 year of service credit per year.

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

Form of Payment:
All active and inactive Tier 1 and Tier 3 members who are assumed to be married or with domestic partners at retirement are assumed to elect the 50% Joint and Survivor Cash Refund Annuity. For Tier 1 Enhanced, the continuance percentage is 70% for service retirement and nonservice-connected disability, and 80% for service-connected disability. Those members who are assumed to be unmarried or without domestic partners are assumed to elect the Single Cash Refund Annuity.

Percent Married / Domestic Partner:
For all active and inactive members, 76% of male members and 52% of female members are assumed to be married or with domestic partner at pre-retirement death or retirement.

Age and Gender of Spouse:
For all active and inactive members, male members are assumed to have a female spouse who is 3 years younger than the member and female members are assumed to have a male spouse who is 2 years older than the member.

Retiree Health Assumptions

Participation		

Service Range (Years)	Participation for Future Retirees Under 65
10–14	60%
15–19	80
20–24	90
25 and over	95

Age and Gender of Spouse/Domestic Partner:	For all non-retired members, male members are assumed to have a female spouse or domestic partner who is 4 years younger than the member and female members are assumed to have a male spouse or domestic partner who is 2 years older than the member.
Spousal/Domestic Partner Coverage	Of future retirees receiving a medical subsidy 60% of males and 35% of females are assumed to elect coverage for married and surviving spouses or domestic partners. For those retired on valuation date with a subsidy, spousal or domestic partner coverage is based on census data.

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