Fresno County Employees'
Retirement Association

Demographic Assumptions Review

Analysis of Demographic Actuarial Experience During the Period July 1, 2018 through June 30, 2021

Segal

Segal

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

April 12, 2022

Board of Retirement
Fresno County Employees' Retirement Association
7772 N Palm Ave
Fresno, CA 93711

Re: Review of Demographic Actuarial Assumptions for the June 30, 2022 Actuarial Valuation

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience for the Fresno County Employees' Retirement Association (FCERA). This study utilizes the census data for the period July 1, 2018 to June 30, 2021 and provides the proposed demographic actuarial assumptions to be used in the June 30, 2022 valuation.

Please note that in this report, we have only reviewed the demographic assumptions. It has been the general practice of the Board of Retirement to review both the economic and demographic actuarial assumptions every three years. In early 2021, the Board requested that Segal perform an out-of-cycle review of the economic assumptions for use in the June 30, 2021 valuation. The recommended economic assumptions adopted by the Board for use in the June 30, 2021 valuation would be used again for the June 30, 2022 valuation before the next review of the economic assumptions scheduled by the Board before the June 30, 2023 valuation.

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

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

Sincerely,

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

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

OH/jl

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1. Introduction, Summary, and Recommendations

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

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

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

This study was undertaken in order to review the 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, 2018 through June 30, 2021. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 35 "Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations." These Standards of Practice provide guidance for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected future experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for merit and promotion salary increases, retirement from active employment, retirement age for deferred vested members, percent of members assumed to go on to work for a reciprocal system, percent married at retirement, pre-retirement mortality, post-retirement healthy and disabled life mortality, termination (refunds and deferred vested retirements), disability (non-service connected and service connected) and annual leave conversion.

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

Our recommendations for the demographic actuarial assumption categories for the June 30, 2022 actuarial valuation are as follows:

Pg #	Actuarial Assumption Categories	Recommendation
10	**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	We recommend adjusting the merit and promotion rates of salary increase as developed in Section (3)(A) to reflect past experience. Future merit and promotion salary increases are higher overall for General members and remain unchanged overall for Safety members under the proposed assumptions. The recommended rates of salary increase anticipate slightly higher increases overall than the current assumptions for General and the same increases overall for Safety.
14	**Retirement Rates:** The probability of retirement at each age at which participants are eligible to retire. **Other Retirement Related Assumptions including:** • Percent married and spousal age differences for members not yet retired • Retirement age for deferred vested members • Future reciprocal members and reciprocal salary increases	For active members, adjust the current retirement rates to those developed in Section (3)(B). For deferred vested members that work for a reciprocal employer, increase the assumed retirement age from 59 to 60 for General members and from 54 to 56 for Safety members. For deferred vested members that do not work for a reciprocal employer, decrease the assumed retirement age from 59 to 56 for General members and from 54 to 52 for Safety members. Maintain the current assumed proportion of future deferred vested members terminated with less than five years of service and five or more years of service expected to be covered by a reciprocal system at 20% and 30%, respectively, for General members. Reduce the assumed proportion of future deferred vested members terminated with less than five years of service and five or more years of service expected to be covered by a reciprocal system from 30% to 25% and 50% to 45%, respectively, for Safety members. In addition, maintain the reciprocal salary increase assumption at 4.10% for General members and 4.50% for Safety members (based on the expected salary increase assumptions for active members with 10 or more years of service). For active and deferred vested members, reduce the percent married at retirement assumption from 70% to 65% for males and increase the percent married at retirement assumption from 50% to 55% for females. Maintain the spouse age difference assumption for male retirees of three years older than their spouses and maintain the assumption that female retirees are two years younger than their spouses.

Pg #	Actuarial Assumption Categories	Recommendation
28	**Mortality Rates:** The probability of dying at each age. Mortality rates are used to project life expectancies.	**Healthy Retirees:** Current base table for General Members: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 10%. Current base table for Safety Members: Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table. Recommended base table for General Members: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 5% for males and 10% for females. Recommended base table for Safety Members: Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 5% for males. **All Beneficiaries:** Current base table: Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table with rates increased by 10%. Recommended base table: Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table with rates increased by 10%. For the purposes of the actuarial valuations (for funding and financial reporting), when calculating the liability for the continuance to a beneficiary of a surviving member we recommend that the General Healthy Retiree mortality tables be used for beneficiary mortality both before and after the expected death of the General or Safety member. 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:** Current & Recommended base table for General Members: Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table. Current & Recommended base table for Safety Members: Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table. **Disabled Retirees:** Current base table for General Members: Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table. Current base table for Safety Members: Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table. Recommended base table for General Members: Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table with rates increased by 5% for males and decreased 5% for females. Recommended base table for Safety Members: Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table with rates increased by 10% for females. **All current tables** are projected generationally with the two-dimensional mortality improvement scale MP-2018. **All recommended tables** are projected generationally with the two-dimensional mortality improvement scale MP-2021. **For member contribution rates and optional forms:** change the mortality rates to those developed in Section (3)(C).

Pg #	Actuarial Assumption Categories	Recommendation
41	**Termination Rates:** The probability of leaving employment at each age and receiving either a refund of member contributions or a deferred vested retirement benefit.	Adjust the current termination rates to those developed in Section (3)(E). The recommended assumptions will anticipate slightly more terminations for General members and maintain about the same number of terminations for Safety members. In addition, a lower proportion of members is expected to elect a refund of member contributions with a higher proportion receiving a deferred vested benefit under the recommended assumptions.
45	**Disability Incidence Rates:** The probability of becoming disabled at each age.	We recommend adjusting the disability rates to those developed in Section (3)(F) to reflect a slightly lower incidence of disability overall for General and reflect a slightly higher incidence of disability for Safety members.
49	**Annual Leave Conversion:** Additional service that is expected to be received when the member retires due to conversion of unused annual leave.	Adjust the current annual leave conversion assumptions for each annual leave plan to those developed in Section (3)(G).

We have estimated the impact of all the recommended demographic assumptions as if they were applied to the June 30, 2021 actuarial valuation. The table below shows the changes in the employer and member contribution rates as well as the change in the Unfunded Actuarial Accrued Liability (UAAL) due to the recommended demographic assumption changes (as recommended in Section 3 of this report).

Cost Impact of the Recommended Assumptions Based on June 30, 2021 Actuarial Valuation

	Impact on Average Employer Contribution Rates
Increase in Normal Cost rate	0.16%
Decrease in UAAL rate	(0.65%)
Total decrease in average employer rate	(0.49%)
Estimated decrease in annual dollar amount ($000s)[1]	$(2,188)

	Impact on Weighted Average Member Contribution Rates
Increase in average member rate	0.05%
Estimated increase in annual dollar amount ($000s)[2]	$288

	Impact on UAAL and Funded Percentage
Decrease in UAAL ($000s)	$(33,612)
Change in Funded Percentage	85.9% to 86.3%

[1] Based on June 30, 2021 projected annual payroll as determined under each set of assumptions.

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

2. Background and Methodology

In this report, we analyzed the demographic ("non-economic") assumptions. 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 assumptions reviewed in this study include merit and promotion salary increases, the percentage of members with an eligible spouse or domestic partner, spousal age difference, percent of members assumed to go on to work for a reciprocal system, reciprocal salary increases, and annual leave conversion.

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. Demographic Assumptions

A. 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:** The current 2.50% inflation assumptions was reviewed in the Review of Economic Actuarial Assumptions report dated June 8, 2021 and later adopted by the Board. This inflation component is used as part of the salary increase assumption.
2. **Real "Across the Board" Pay Increases:** The current 0.50% real "across the board" salary increase assumption was reviewed in the Review of Economic Actuarial Assumptions report dated June 8, 2021 and later adopted by the Board. This means that the combined inflation and "across the board" salary increase assumption is 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 FCERA, 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. Increases are measured separately for General and Safety members. This is accomplished by:

   a. Measuring each continuing member's actual salary increase over each year of the experience period 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 20% 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.

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

The following table shows the General members' actual average merit and promotion increases by years of service over the three-year period from July 1, 2018 through June 30, 2021 along with the actual average increases based on combining the current three-year period with the six-year period from the prior experience study. 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 (2.95% on average for the most recent three-year period).

General

Rate (%)

Years of Service	Current Assumption	Actual Average Increase from Current Study (Last 3 Years)	Actual Average Increase from Current and Prior Studies (Last 9 Years)	Proposed Assumption
Less than 1	8.50	10.37	10.55	9.00
1 – 2	7.50	9.24	9.68	8.00
2 – 3	6.50	7.46	7.94	7.00
3 – 4	5.25	5.51	5.94	5.25
4 – 5	4.75	4.66	5.13	4.75
5 – 6	3.75	4.61	4.32	3.75
6 – 7	3.00	3.66	3.44	3.25
7 – 8	2.00	3.45	3.01	2.25
8 – 9	1.50	2.75	2.98	1.50
9 – 10	1.25	1.71	2.04	1.25
10 & Over	1.10	0.33	1.20	1.10

Based on this experience, overall we recommend increasing the merit and promotion salary increase assumptions for General members.

Chart 1 that follows later in the section compares the actual merit and promotion increase experience with the current and proposed assumptions for General members. Also shown are the actual merit and promotion increases based on an average of both the current and previous six-year experience periods combined.

The following table shows the Safety members' actual average merit and promotion increases by years of service over the three-year period from July 1, 2018 through June 30, 2021 along with the actual average increases based on combining the current three-year period with the six-year period from the prior experience study. 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 (2.70% on average for the most recent three-year period).

Safety

Rate (%)

Years of Service	Current Assumption	Actual Average Increase from Current Study (Last 3 Years)	Actual Average Increase from Current and Prior Studies (Last 9 Years)	Proposed Assumption
Less than 1	8.50	7.90	8.77	8.50
1 – 2	7.75	9.54	9.60	8.00
2 – 3	6.50	8.57	8.61	6.75
3 – 4	5.50	3.94	4.70	5.00
4 – 5	4.75	4.32	4.58	4.50
5 – 6	3.75	3.61	3.63	3.75
6 – 7	3.50	4.17	3.80	3.50
7 – 8	2.50	3.86	2.59	2.75
8 – 9	1.70	2.82	2.51	2.00
9 – 10	1.60	-0.36	2.38	1.60
10 & Over	1.50	0.96	1.57	1.50

Based on this experience, we recommend increasing the merit and promotion salary assumption for certain Safety service groups while decreasing the merit and promotion salary assumption for other Safety service groups.

Chart 2 compares the actual merit and promotion increase experience with the current and proposed assumptions for Safety members. Also shown are the actual merit and promotion increases based on an average of both the current and previous six-year experience periods combined.

Tier 5 (PEPRA) member's salary are subject to the PEPRA compensation limit caps that are adjusted generally using inflation under Section 7522.10. There may be a need to review the salary increase assumptions for the Tier 5 members separately in future experience studies especially if the proportion of those members reaching the PEPRA salary caps continue to increase.

Chart 1: Merit and Promotion Salary Increase Rates
General Members

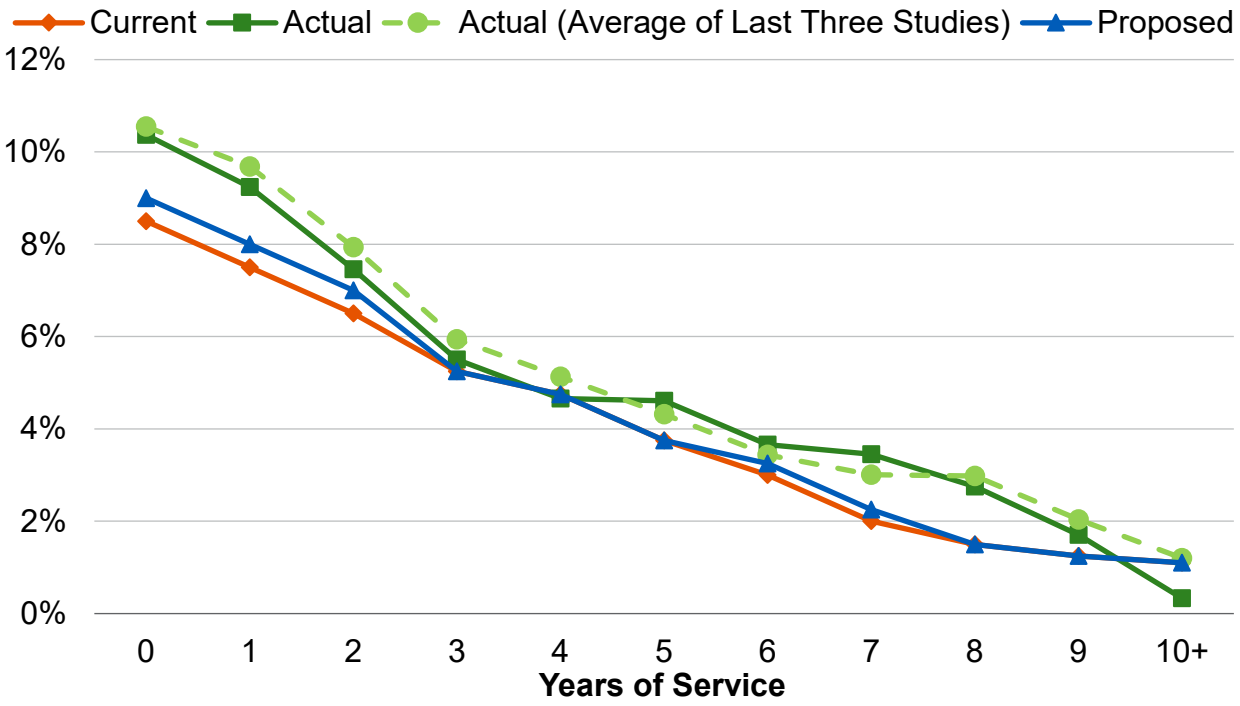
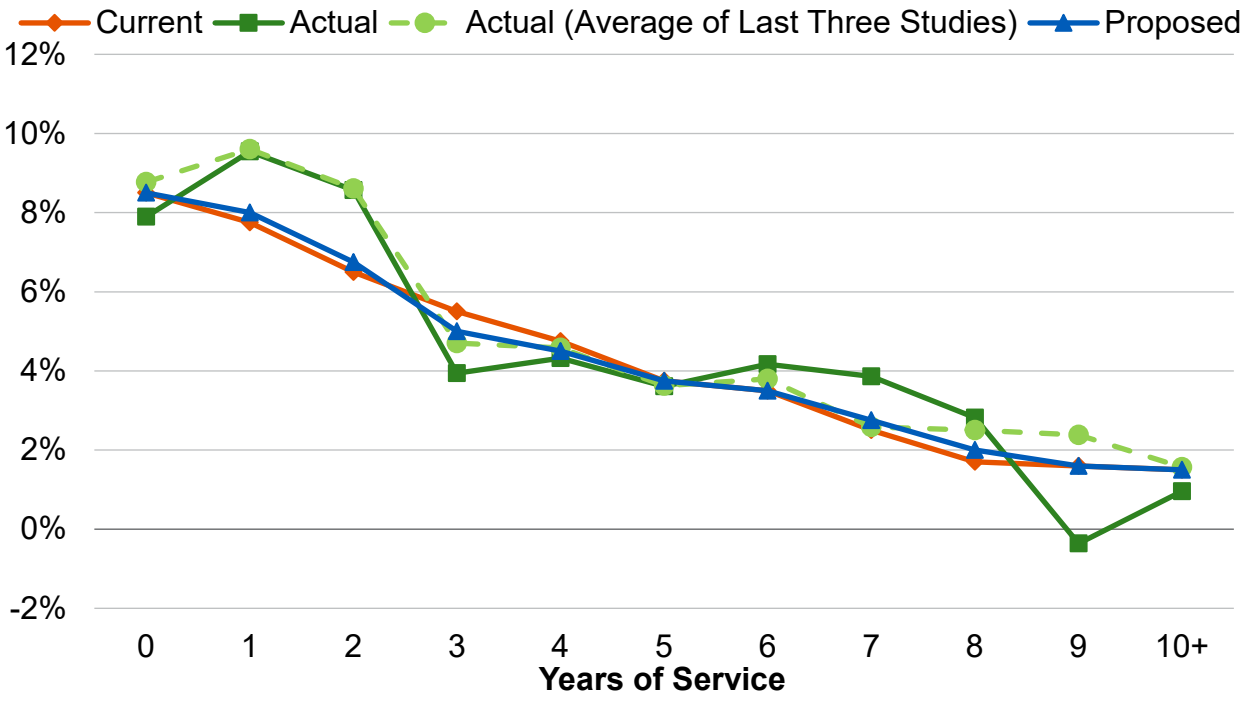


Chart 2: Merit and Promotion Salary Increase Rates
Safety Members



B. 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 following table shows the observed service retirement rates for General Tier 1 members based on the actual experience over the past three years, separately for those with less than 30 years of service and more than 30 years of service. The 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.

General Tier 1

Rate of Retirement (%)

	Less than 30 Years of Service			30 or More Years of Service		
Age	Current Rate	Actual Rate	Proposed Rate	Current Rate	Actual Rate	Proposed Rate
50	5.00	5.74	5.00	15.00	0.00	12.00
51	3.75	3.62	3.75	11.25	0.00	12.00
52	3.50	3.61	3.50	10.50	0.00	12.00
53	3.50	3.52	3.50	10.50	17.65	15.00
54	5.00	5.22	5.00	15.00	5.56	15.00
55	8.00	7.64	8.00	16.00	12.00	16.00
56	10.00	6.37	9.00	20.00	11.11	16.00
57	13.00	8.03	11.00	26.00	35.71	30.00
58	14.00	9.21	12.00	28.00	42.86	30.00
59	15.00	19.50	16.00	30.00	51.72	30.00
60	16.00	18.01	17.00	24.00	33.33	30.00
61	18.00	16.77	18.00	27.00	20.00	30.00
62	26.50	22.37	25.00	31.50	33.33	35.00
63	21.00	18.05	20.00	31.50	25.00	35.00
64	25.00	24.00	25.00	37.50	37.50	35.00
65	40.00	38.36	40.00	60.00	50.00	50.00
66	40.00	39.53	40.00	60.00	100.00	50.00
67	40.00	13.64	40.00	60.00	0.00	50.00
68	35.00	31.58	35.00	52.50	20.00	50.00
69	35.00	14.29	35.00	52.50	25.00	50.00
70	35.00	25.00	35.00	52.50	25.00	50.00
71	50.00	18.18	50.00	75.00	33.33	50.00
72	50.00	0.00	50.00	75.00	75.00	50.00
73	50.00	20.00	50.00	75.00	N/A	50.00
74	50.00	60.00	50.00	75.00	N/A	50.00
75 & Over	100.00	33.33	100.00	100.00	0.00	100.00

Based on this experience, we recommend decreasing the retirement rate assumption at certain ages while increasing the retirement rate assumption at other ages. Overall, the proposed rates represent a decrease from the current rates for General Tier 1 members.

Chart 3 that follows later in this section compares the actual retirement experience with the current and proposed assumptions for General Tier 1 members with less than 30 years of service.

Chart 4 compares the actual retirement experience with the current and proposed assumptions for General Tier 1 members with 30 or more years of service.

The following tables show the observed service retirement rates for General Tiers 2, 3, 4 and 5 members based on the actual experience over the past three years. Due to the limited actual experience for General Tiers 2, 3, 4 and 5 members, we have continued to structure this assumption on a function of age only. Also shown are the current assumed rates and the rates we propose.

General Tier 2 and 3

Rate of Retirement (%)

Age	General Tier 2			General Tier 3		
	Current Rate	Actual Rate	Proposed Rate	Current Rate	Actual Rate	Proposed Rate
50	3.00	0.00	3.00	3.60	20.00	3.60
51	3.00	0.00	3.00	3.60	0.00	3.60
52	3.60	0.00	3.60	4.20	0.00	4.20
53	3.60	0.00	3.60	4.20	0.00	4.20
54	4.20	0.00	4.20	5.00	0.00	5.00
55	8.40	0.00	8.40	10.00	12.50	10.00
56	10.00	0.00	10.00	12.00	0.00	12.00
57	10.00	0.00	10.00	12.00	12.50	12.00
58	10.00	0.00	10.00	12.00	0.00	12.00
59	10.00	0.00	10.00	14.00	14.29	14.00
60	15.00	0.00	15.00	16.00	8.33	16.00
61	15.00	33.33	15.00	16.00	0.00	16.00
62	25.00	20.00	25.00	30.00	18.18	30.00
63	24.00	33.33	24.00	22.00	40.00	22.00
64	24.00	100.00	24.00	22.00	22.22	22.00
65	35.00	N/A	35.00	35.00	28.57	35.00
66	34.00	N/A	34.00	30.00	80.00	30.00
67	34.00	N/A	34.00	30.00	100.00	30.00
68	35.00	N/A	35.00	35.00	N/A	35.00
69	35.00	N/A	35.00	40.00	N/A	35.00
70	70.00	0.00	35.00	60.00	50.00	35.00
71	70.00	0.00	50.00	60.00	0.00	50.00
72	70.00	0.00	50.00	60.00	0.00	50.00
73	70.00	100.00	50.00	60.00	N/A	50.00
74	70.00	N/A	50.00	60.00	N/A	50.00
75 & Over	100.00	0.00	100.00	100.00	33.33	100.00

Based on this experience, we recommend decreasing the retirement rate assumption at certain ages for General Tier 2 and Tier 3 members.

General Tier 4 and 5

Rate of Retirement (%)

Age	General Tier 4			General Tier 5		
	Current Rate	Actual Rate	Proposed Rate	Current Rate	Actual Rate	Proposed Rate
50	2.00	100.00	3.00	0.00	N/A	0.00
51	2.00	N/A	3.00	0.00	N/A	0.00
52	2.50	N/A	3.50	4.50	0.00	4.50
53	2.50	0.00	3.50	2.00	0.00	2.00
54	3.00	N/A	4.00	2.50	0.00	2.50
55	4.00	N/A	5.00	3.50	0.00	3.50
56	5.00	N/A	6.00	4.50	0.00	4.50
57	6.00	N/A	7.00	5.50	0.00	5.50
58	7.00	N/A	8.00	6.50	0.00	6.50
59	8.00	N/A	9.00	7.50	0.00	7.50
60	9.00	N/A	10.00	8.50	0.00	8.50
61	10.00	100.00	11.00	9.50	16.67	9.50
62	16.00	N/A	16.00	15.00	18.75	15.00
63	16.00	N/A	16.00	15.00	18.18	15.00
64	19.00	100.00	19.00	18.00	11.11	18.00
65	23.00	100.00	23.00	22.00	0.00	22.00
66	20.00	N/A	20.00	20.00	20.00	20.00
67	20.00	N/A	20.00	20.00	0.00	20.00
68	25.00	N/A	25.00	25.00	33.33	25.00
69	30.00	100.00	30.00	30.00	N/A	30.00
70	60.00	0.00	35.00	60.00	0.00	35.00
71	60.00	N/A	50.00	60.00	0.00	50.00
72	60.00	N/A	50.00	60.00	0.00	50.00
73	60.00	N/A	50.00	60.00	0.00	50.00
74	60.00	N/A	50.00	60.00	0.00	50.00
75 & Over	100.00	N/A	100.00	100.00	33.33	100.00

Based on this experience, we recommend increases in retirement rates at certain ages and decreases in retirement rates at certain ages the retirement rate assumption for General Tier 4 members and decreasing the retirement rate assumption for General Tier 5 members.

Chart 5 compares the actual retirement experience with the current and proposed assumptions for General Tier 2 members.

Chart 6 compares the actual retirement experience with the current and proposed assumptions for General Tier 3 members.

Chart 7 compares the actual retirement experience with the current and proposed assumptions for General Tier 4 members.

Chart 8 compares the actual retirement experience with the current and proposed assumptions for General Tier 5 members.

The following table shows the observed service retirement rates for Safety Tiers 1 and 2 members based on the actual experience over the past three years. Also shown are the current assumed rates and the rates we propose.

Safety Tier 1 and Tier 2

Rate of Retirement (%)

	Less than 30 Years of Service		
Age	Current Rate	Actual Rate	Proposed Rate
45	10.00	7.69	8.00
46	2.00	5.41	3.00
47	2.00	5.00	3.00
48	2.00	7.32	3.00
49	3.00	5.26	4.00
50	5.00	13.75	8.00
51	6.00	2.74	6.00
52	10.00	11.43	10.00
53	12.00	7.41	12.00
54	30.00	40.00	30.00
55	40.00	34.78	40.00
56	25.00	11.76	25.00
57	25.00	23.53	25.00
58	20.00	22.22	25.00
59	20.00	37.50	25.00
60	30.00	0.00	35.00
61	30.00	42.86	35.00
62	35.00	50.00	40.00
63	35.00	33.33	40.00
64	35.00	0.00	40.00
65 & Over	100.00	87.50	100.00

As shown above, we are recommending increases in retirement rates at certain ages and decreases in retirement rates at certain ages for Safety Tiers 1 and 2 members. In addition, we recommend maintaining the current 100% retirement once a Safety Tiers 1 and 2 member accrues a benefit of 100% of final average earnings. This is based on 16 members actually accruing a benefit of 100% of final average earnings with 6 retiring in the same year and 4 members retiring in the following two years.

Chart 9 compares the actual retirement experience with the current and proposed assumptions for Safety Tiers 1 and 2 members with less than 30 years of service.

The following table shows the observed service retirement rates for Safety Tiers 4 and 5 members. Due to the limited actual experience[1] for Safety Tiers 4 and 5 members, we have continued to structure this assumption on a function of age only. Also shown are the current assumed rates and the rates we propose.

Safety Tier 4 and Tier 5

Rate of Retirement (%)

	Safety Tier 4		Safety Tier 5	
Age	Current Rate	Proposed Rate	Current Rate	Proposed Rate
45	1.00	1.00	0.00	0.00
46	1.00	1.00	0.00	0.00
47	1.00	1.00	0.00	0.00
48	1.00	1.00	0.00	0.00
49	2.00	2.00	0.00	0.00
50	4.00	4.00	4.00	4.00
51	4.00	4.00	4.00	4.00
52	5.00	5.00	5.00	5.00
53	6.00	6.00	6.00	6.00
54	11.00	11.00	11.00	11.00
55	18.00	18.00	18.00	18.00
56	18.00	18.00	18.00	18.00
57	20.00	20.00	22.00	22.00
58	20.00	20.00	20.00	20.00
59	23.00	23.00	23.00	23.00
60	40.00	40.00	40.00	40.00
61	40.00	40.00	40.00	40.00
62	40.00	40.00	40.00	40.00
63	40.00	40.00	40.00	40.00
64	40.00	40.00	40.00	40.00
65 & Over	100.00	100.00	100.00	100.00

We recommend maintaining the retirement rate assumption for Safety Tier 4 and Tier 5 members.

Chart 10 compares the current and proposed assumptions for Safety Tier 4 members. There were only 2 actual retirements from Safety Tier 4.

Chart 11 compares the current and proposed assumptions for Safety Tier 5 members. There were no actual retirements from Safety Tier 5.

[1] There were 2 and 0 retirement experiences from Safety Tier 4 and Tier 5, respectively, for the last three-year period.

Deferred Vested Members

Under the current assumptions, deferred vested General and Safety members were assumed to retire at age 59 and 54, respectively, regardless of a member's reciprocity status. For this study, we examined the deferred vested retirement age separately for reciprocal and non-reciprocal members.

The following table shows the observed deferred vested retirement age for General members 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.

General Members' Deferred Vested Retirement Age

	Reciprocal Members	Non-Reciprocal Members
Current Assumption	59.0	59.0
Actual Average Age	59.9	56.1
Proposed Assumption	**60.0**	**56.0**

Based on this experience, we recommend increasing the deferred vested retirement age assumption for General reciprocal members from age 59 to 60 and decreasing the deferred vested retirement age assumption for General non-reciprocal members from age 59 to 56.

The following table shows the observed deferred vested retirement age for Safety members 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.

Safety Members' Deferred Vested Retirement Age

	Reciprocal Members	Non-Reciprocal Members
Current Assumption	54.0	54.0
Actual Average Age	56.0	52.0
Proposed Assumption	**56.0**	**52.0**

Based on this experience, we recommend increasing the deferred vested retirement age assumption for Safety reciprocal members from age 54 to 56 and decreasing the deferred vested retirement age assumption for Safety non-reciprocal members from age 54 to 52.

Reciprocity

Under the current assumptions, it was assumed that 20% of General deferred vested members with less than five years of service and 30% of General deferred vested members with five or more years of service would be covered under a reciprocal retirement system and receive 4.10% annual salary increases from termination until their date of retirement. It was also assumed that 30% of Safety deferred vested members with less than five years of service and 50% of Safety deferred vested members with five or more years of service would be covered

under a reciprocal retirement system and receive 4.50% annual salary increases from termination until their date of retirement.

The following table shows the observed percent of members covered under a reciprocal retirement system for General and Safety members as of June 30, 2021, separately for those with less than five years of service and with five or more years of service. Also shown are the current assumed percent of members covered under a reciprocal retirement system and the percent of members covered under a reciprocal retirement system we propose.

Percent Covered Under Reciprocal Retirement System

	General		Safety	
	Less Than Five Years of Service	**Five or More Years of Service**	**Less Than Five Years of Service**	**Five or More Years of Service**
Current Assumption	20.0%	30.0%	30.0%	50.0%
Actual Percentage	16.2%	29.4%	22.5%	43.2%
Proposed Assumption	**20.0%**	**30.0%**	**25.0%**	**45.0%**

Based on this experience, we recommend maintaining the reciprocity assumption for General members with less than five years of service and with five or more years of service. Additionally, we recommend decreasing the reciprocity assumption from 30% to 25% for Safety members with less than five years of service and decreasing the reciprocity assumption from 50% to 45% for Safety members with five or more years of service.

Based on the recommended ultimate 1.10% and 1.50% merit and promotion salary increase assumptions, for General and Safety members respectively, together with the current 2.50% inflation assumption and 0.50% real "across the board" salary increase assumption, we recommend maintaining the reciprocal salary increase assumption for General members at 4.10% and Safety members at 4.50%.

Survivor Continuance Under the Unmodified Option

Under current assumptions, it is assumed that 70% of all active and inactive male members and 50% 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 June 30	Male	Female
2019	63.0%	52.7%
2020	58.2%	52.5%
2021	64.3%	56.3%
Total	**61.8%**	**53.8%**
Current Assumption	**70.0%**	**50.0%**
Proposed Assumption	**65.0%**	**55.0%**

Based on this experience, we recommend decreasing the percent married assumption for male from 70% to 65% and increasing the percent married assumption for female members from 50% to 55%.

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

1. Since most of the 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	2.4 years older	1.9 years younger
Proposed Assumption	**3 years older**	**2 years younger**

Chart 3: Retirement Rates
General Tier 1 Members with less than 30 Years of Service

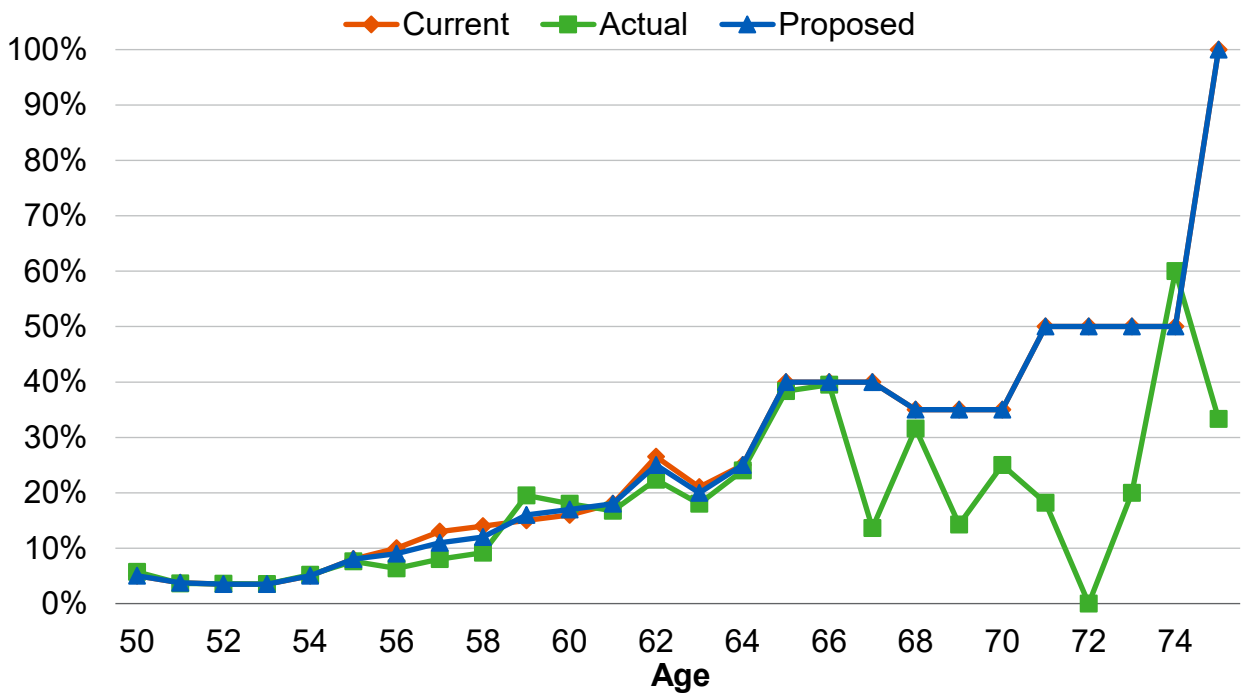


Chart 4: Retirement Rates
General Tier 1 Members with 30 or more Years of Service

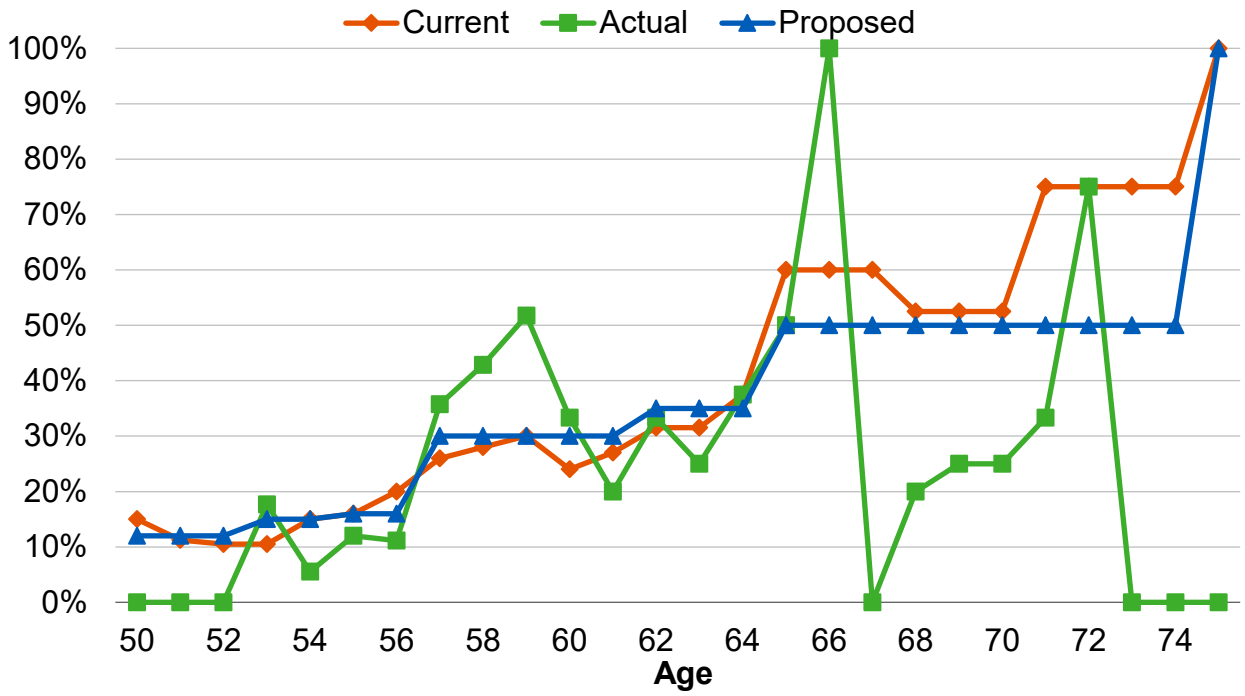


Chart 5: Retirement Rates
General Tier 2 Members

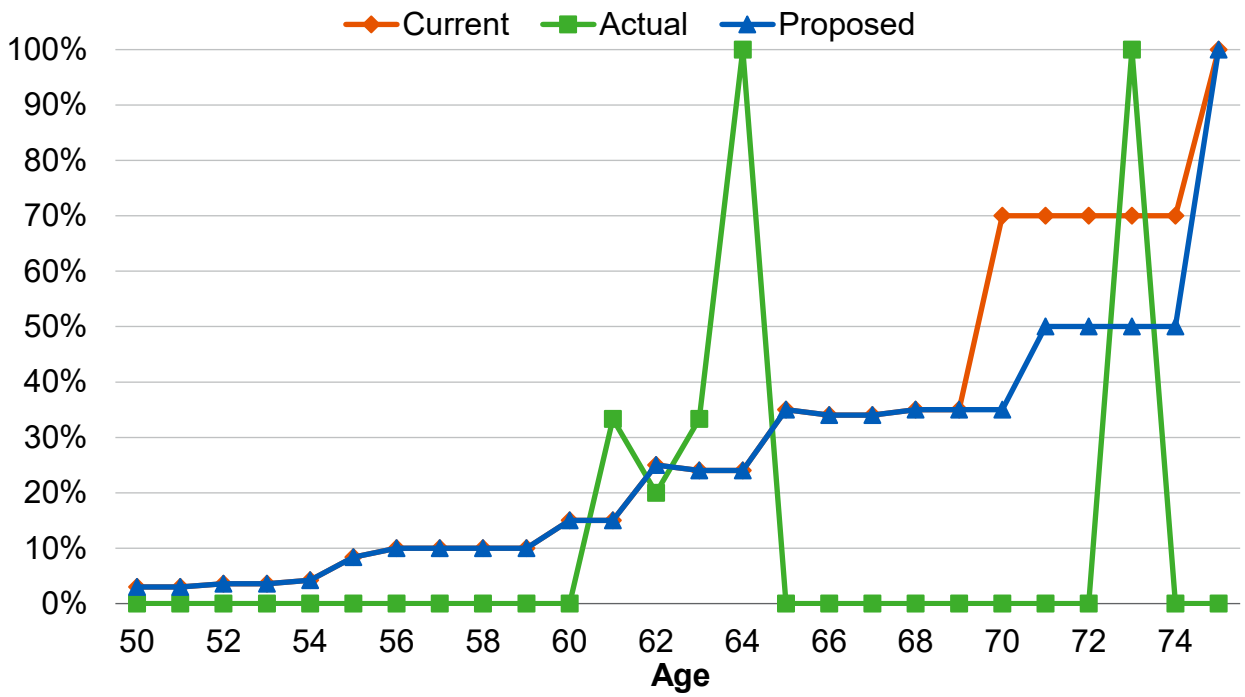


Chart 6: Retirement Rates
General Tier 3 Members

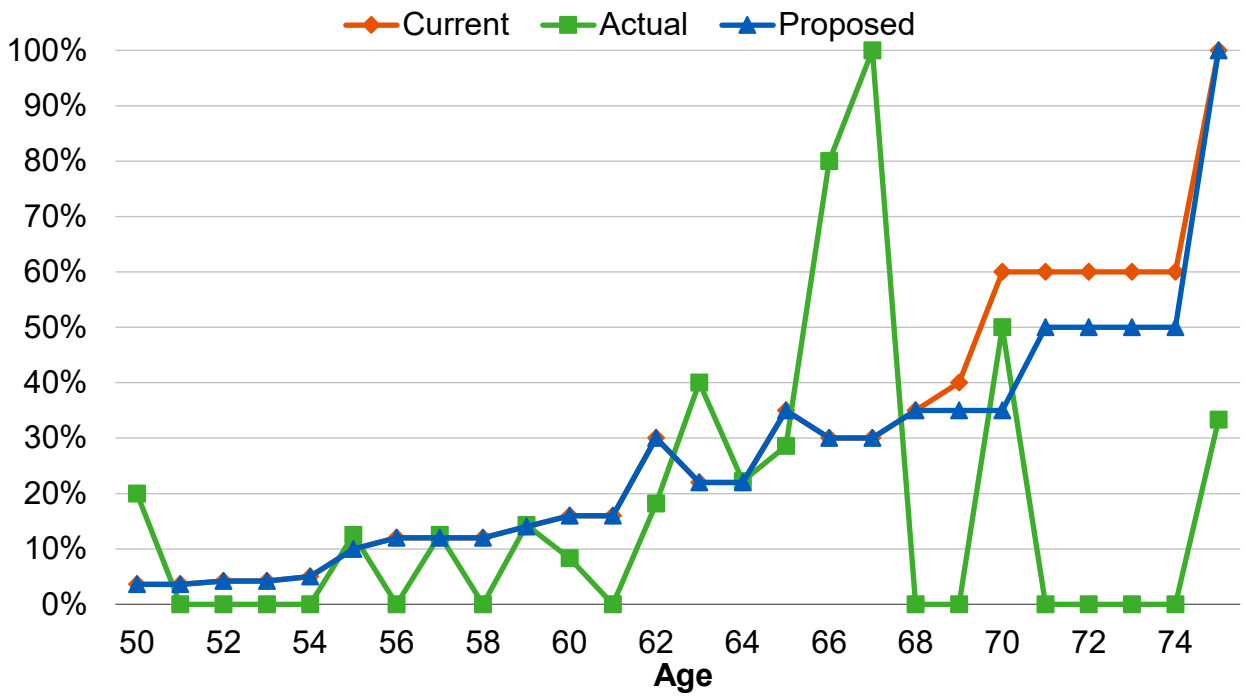


Chart 7: Retirement Rates
General Tier 4 Members

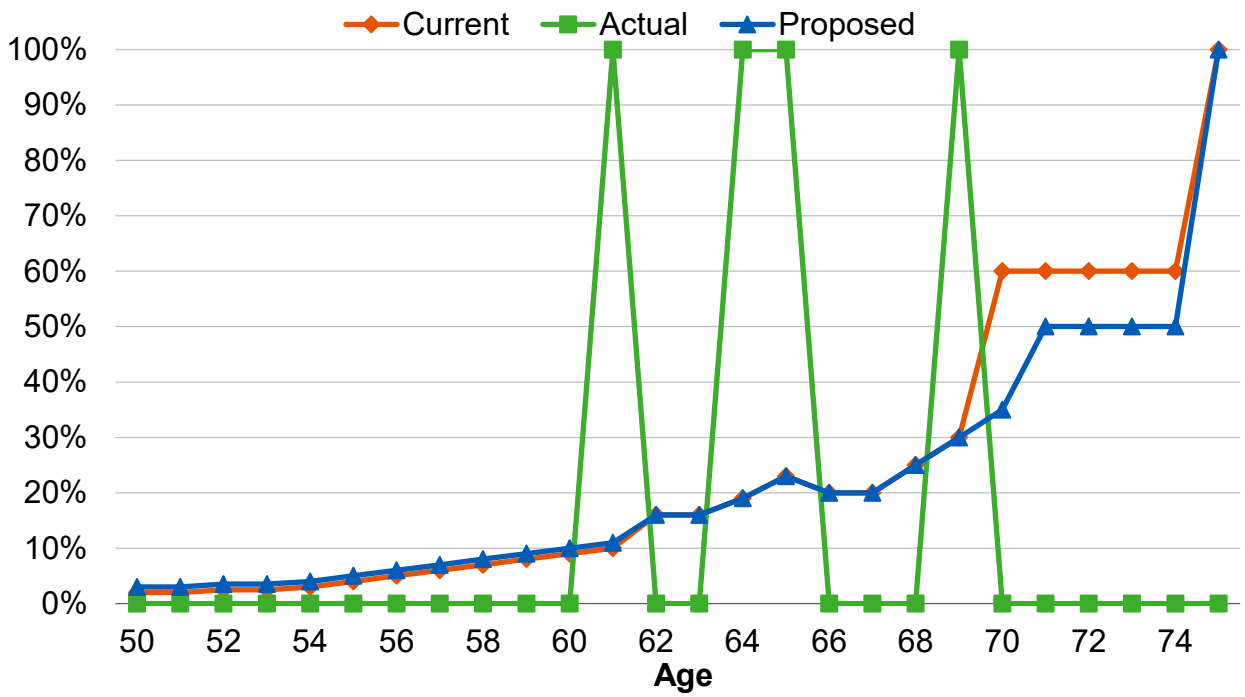


Chart 8: Retirement Rates
General Tier 5 Members

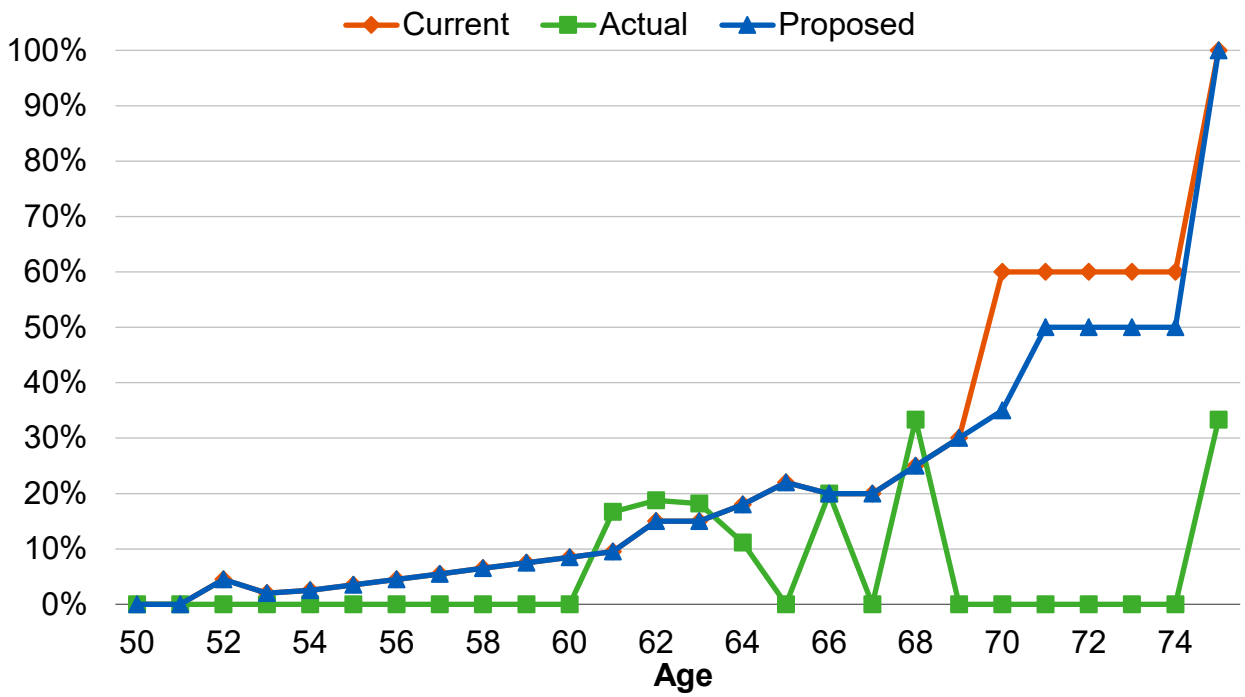


Chart 9: Retirement Rates
Safety Tiers 1 and Tier 2 Members with less than 30 Years of Service

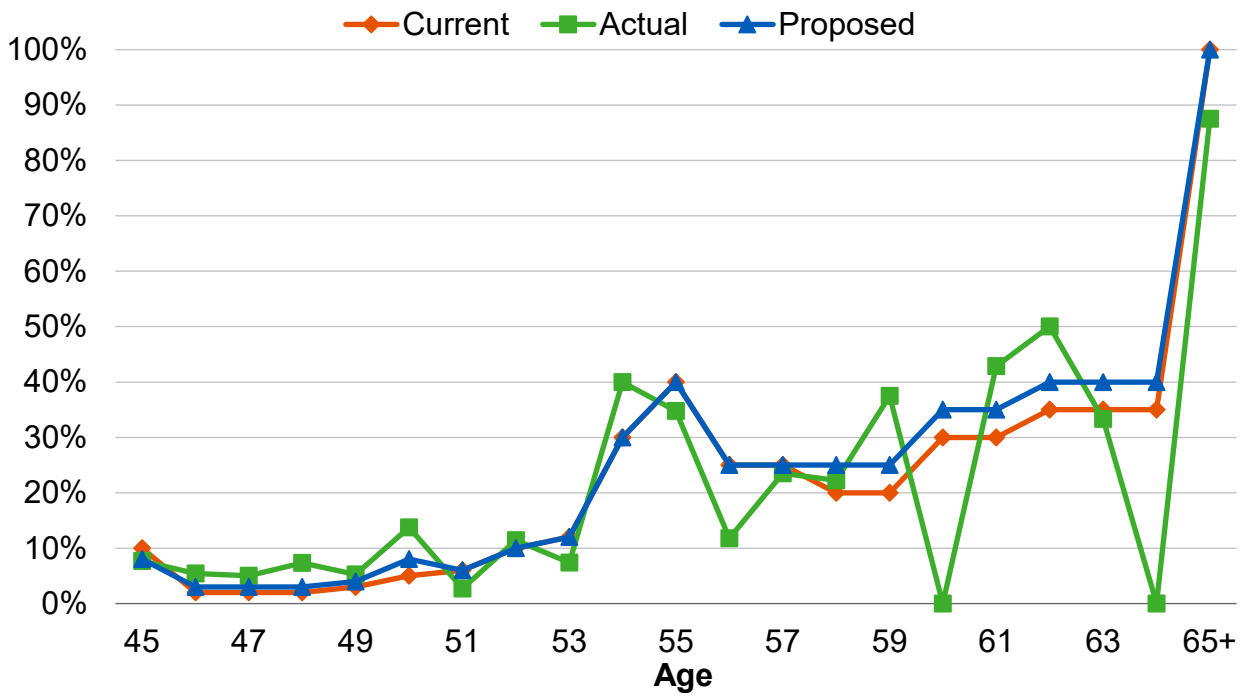


Chart 10: Retirement Rates
Safety Tier 4 Members

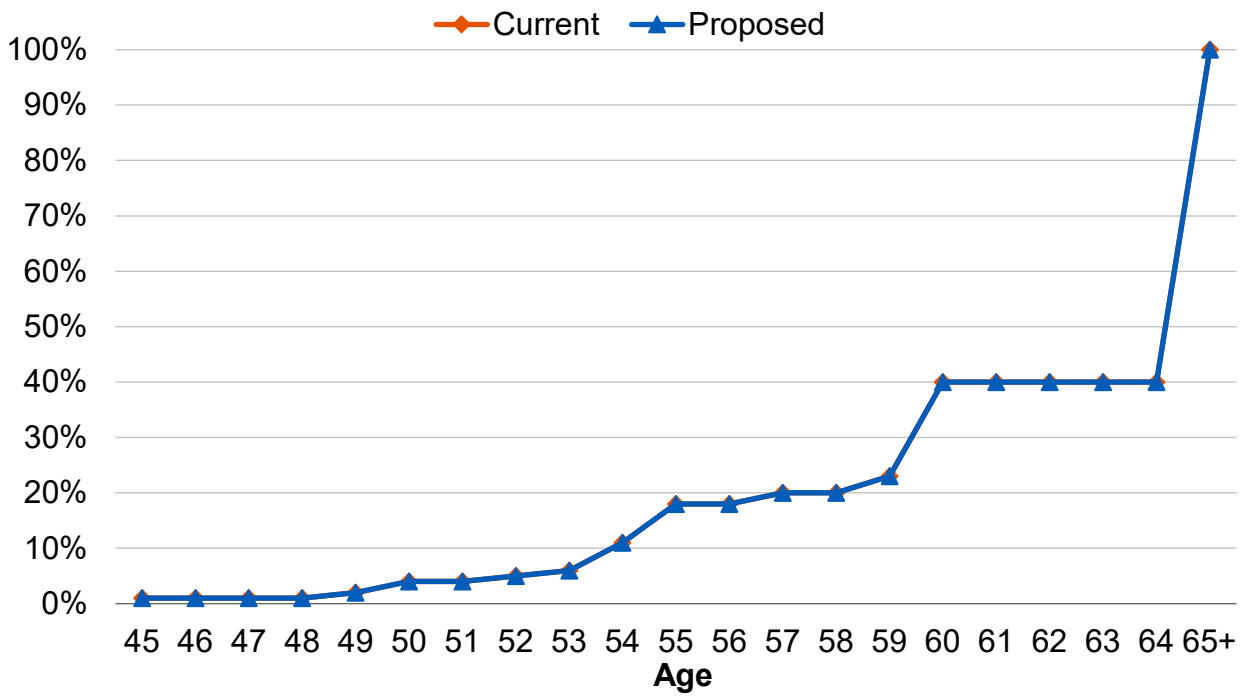
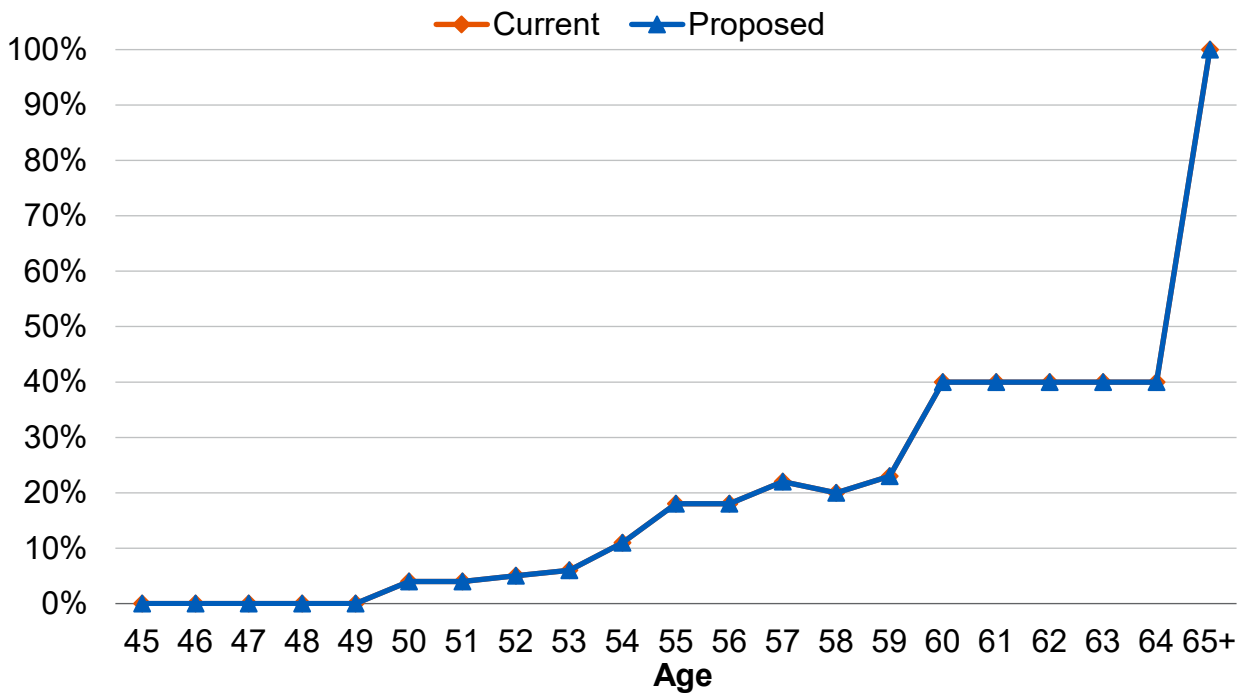


Chart 11: Retirement Rates
Safety Tier 5 Members



C. Mortality Rates - Healthy

The “healthy” mortality rates project the life expectancy of a member who retires from service (i.e., who did not retire on a disability pension). Also, the “healthy” pre-retirement mortality rates project what proportion of members will die before retirement. For General members, the table currently being used for post-service retirement mortality rates is the Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2018. For Safety members, the table currently being used for post-service retirement mortality rates is the Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018. For all beneficiaries, the table currently being used is the same as General members who have taken a service (non-disability) retirement.

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 FCERA experience as discussed herein).

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. We recommend that the Board adopt the Amount-Weighted Above-Median Pub-2010 mortality tables (adjusted for FCERA experience as discussed herein), and project the mortality improvement generationally using the MP-2021 mortality improvement scale.

In order to reflect more FCERA experience in our analysis, we have used experience for a twelve-year period by using data from the current (from July 1, 2018 through June 30, 2021) and the last three (from July 1, 2015 through June 30, 2018; from July 1, 2012 through June 30, 2015; and from July 1, 2009 through June 30, 2012) experience study periods in order to analyze this assumption.

Even with the use of twelve years of experience, based on standard statistical theory the data is only partially credible especially under the recommended amount-weighted basis when dispersion of retirees' benefit amounts is taken into account, particularly for the Safety cost groups. 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 FCERA's experience particularly for the Safety cost groups. In future experience studies, more data will be available which may further increase the credibility of the FCERA experience.

Post-Retirement Mortality (Service Retirements)

Among all retired members, the actual deaths weighted by benefit amounts under the current assumptions for the last twelve years are shown in the table below. We also show the deaths weighted by benefit amount under the proposed assumptions. We 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 FCERA, the volume of General member data makes it relatively credible. In contrast, there is much less Safety data, so it is given substantially less credibility. As shown in the table below, the proposed mortality tables have actual to expected ratios of 105% and 107% for General and Safety respectively, after an adjustment to the General male and female rates as well as the Safety male rates for partial credibility. In future years the ratios should remain around 105% and 107% for General and Safety, respectively, 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 last twelve years are as follows:

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

	General Members			Safety Members		
Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$20.98	$20.84	$20.05	$4.63	$5.28	$4.86
Female	$19.10	$20.12	$19.11	$0.38	$0.30	$0.38
Total	**$40.08**	**$40.96**	**$39.16**	**$5.00**	**$5.58**	**$5.24**
Actual / Expected	**102%**		**105%[1]**	**112%**		**107%[2]**

Notes:

1. Experience shown above is weighted by annual 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 General members, we recommend updating the post-retirement mortality to follow the Pub-2010 General Healthy Retiree 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 Safety members, we recommend updating the post-retirement mortality to follow the Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Chart 12 that follows later in this section compares the number of actual to expected deaths on a benefit-weighted basis over the past twelve years for the current and proposed assumptions for Service Retirement General members.

Chart 13 compares the number of actual to expected deaths on a benefit-weighted basis over the past twelve years for the current and proposed assumptions for Service Retirement Safety members.

Chart 14 shows the life expectancies (i.e., expected future lifetime) under the current and the proposed tables for General members on a benefit-weighted basis. Life expectancies under the proposed generational mortality rates are based on age as of 2022. In practice, assumed life expectancies will increase as a result of the mortality improvement scale.

Chart 15 shows the life expectancies (i.e., expected future lifetime) under the current and the proposed tables for Safety members on a benefit-weighted basis. Life expectancies under the

[1] If we use the benchmark Pub-2010 General table without any adjustment, the proposed actual to expected ratio would be 112%.
[2] If we use the benchmark Pub-2010 Safety table without any adjustment, the proposed actual to expected ratio would be 112%.

proposed generational mortality rates are based on age as of 2022. In practice, assumed life expectancies will increase as a result of the mortality improvement scale.

Beneficiary Mortality

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. 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 109%, after adjustments for partial credibility. In future years the ratio should remain around 109% 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 last twelve years are as follows:

Beneficiary Mortality Experience – Benefit Weighted
($ in millions)

Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$1.22	$1.72	$1.44
Female	$6.62	$7.33	$6.88
Total	$7.84	$9.05	$8.32
Actual / Expected	**115%**		**109%**[1]

Notes:

1. Experience shown above is weighted by annual 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, we recommend changing the beneficiary mortality from Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2018 to the Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, 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 after the death of the retirees (i.e., it does not reflect any contingent survivor data before the death of the retirees). According to analysis provided by RPEC, the mortality rates for the beneficiaries could be somewhat overstated before the death of the retirees as the

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

Contingent Survivor mortality tended to be higher than retiree mortality and the difference was statistically significant. Based on this 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 General Healthy Retiree mortality tables be used for beneficiary mortality both before and after the expected death of the General or Safety 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

For General members, the table currently being used for pre-retirement mortality rates is the Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional scale MP-2018. For Safety members, the table currently being used for pre-retirement mortality rates is the Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table (separate tables 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 124% and 159% for General and Safety respectively. In future years the ratio should remain around 124% and 159% for General and Safety, respectively, 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 last twelve years are as follows:

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

	General Members			Safety Members		
Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$1.87	$2.50	$1.88	$0.47	$0.81	$0.48
Female	$1.73	$2.00	$1.73	$0.07	$0.07	$0.07
Total	**$3.60**	**$4.50**	**$3.62**	**$0.54**	**$0.88**	**$0.55**
Actual / Expected	**125%**		**124%**	**162%**		**159%**

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 General members, we recommend updating the pre-retirement mortality to follow the Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

For Safety members, we recommend updating the pre-retirement mortality to follow the Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2021.

Currently, our assumption is that all General and Safety member pre-retirement deaths are non-service connected. **We recommend maintaining the current assumption for both General and Safety members.**[1]

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

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

For General members, we recommend that the mortality table used for determining contributions be updated to a blended table based on the Pub-2010 General Healthy Retiree 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 30 years (from 2010) with the two-dimensional mortality improvement scale MP-2021, weighted 35% male and 65% female.

For Safety members, we recommend that the mortality table used for determining contributions be updated to a blended table based on the Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), with rates increased by 5% for males, projected 30 years (from 2010) with the two-dimensional mortality improvement scale MP-2021, weighted 80% male and 20% female.

For optional forms of payment and reserves, we understand that FCERA is looking to upgrade its pension administration software maintained by its vendor at TEGRIT in the next few years and would explore the feasibility of applying a “fully” generational projection for optional forms of benefits in the pension administration system after the upgrade. We will provide a recommendation to FCERA for use in reflecting mortality improvement for determining optional forms of payment after we have a discussion with FCERA and its vendor regarding the progress of the upgrade.

[1] While it is possible that COVID-19 deaths for members in certain industries may be considered service connected, we do not recommend a change in our assumption to reflect this possible short-term increase in service connected deaths.

Furthermore, as there are complications associated with using different mortality tables for the beneficiaries before and after the death of the retiree, **we recommend that the General Healthy Retiree mortality tables be used for the beneficiaries in determining optional forms of payment and reserves for General and Safety retirees.**

Chart 12: Post-Retirement Benefit-Weighted Deaths ($ In Millions)
Service Retirement General Members
(July 1, 2009 through June 30, 2021)

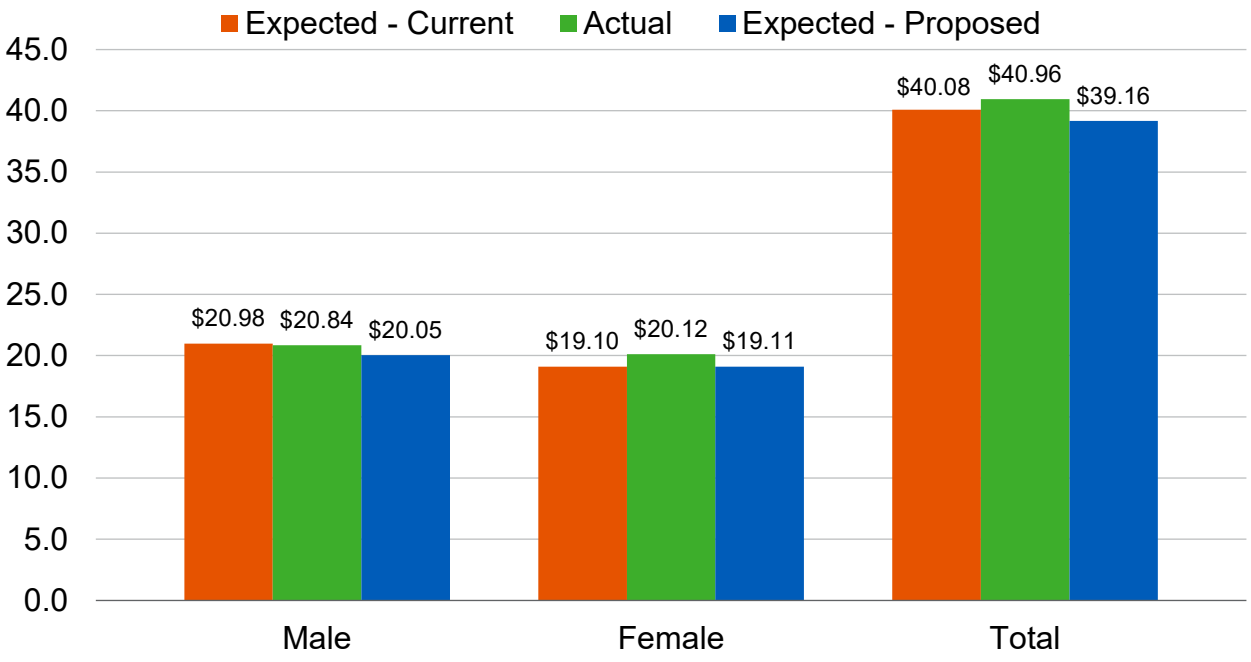


Chart 13: Post-Retirement Benefit-Weighted Deaths ($ In Millions)
Service Retirement Safety Members
(July 1, 2009 through June 30, 2021)

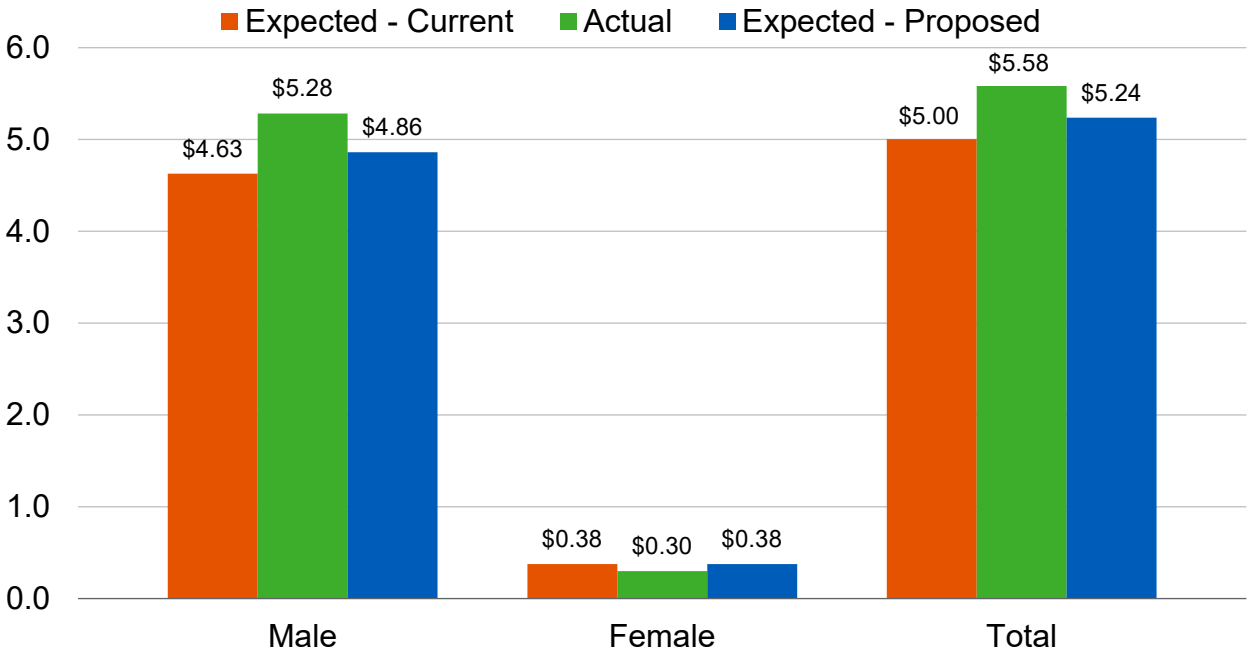


Chart 14: Benefit-Weighted Life Expectancies
Service Retirement General Members

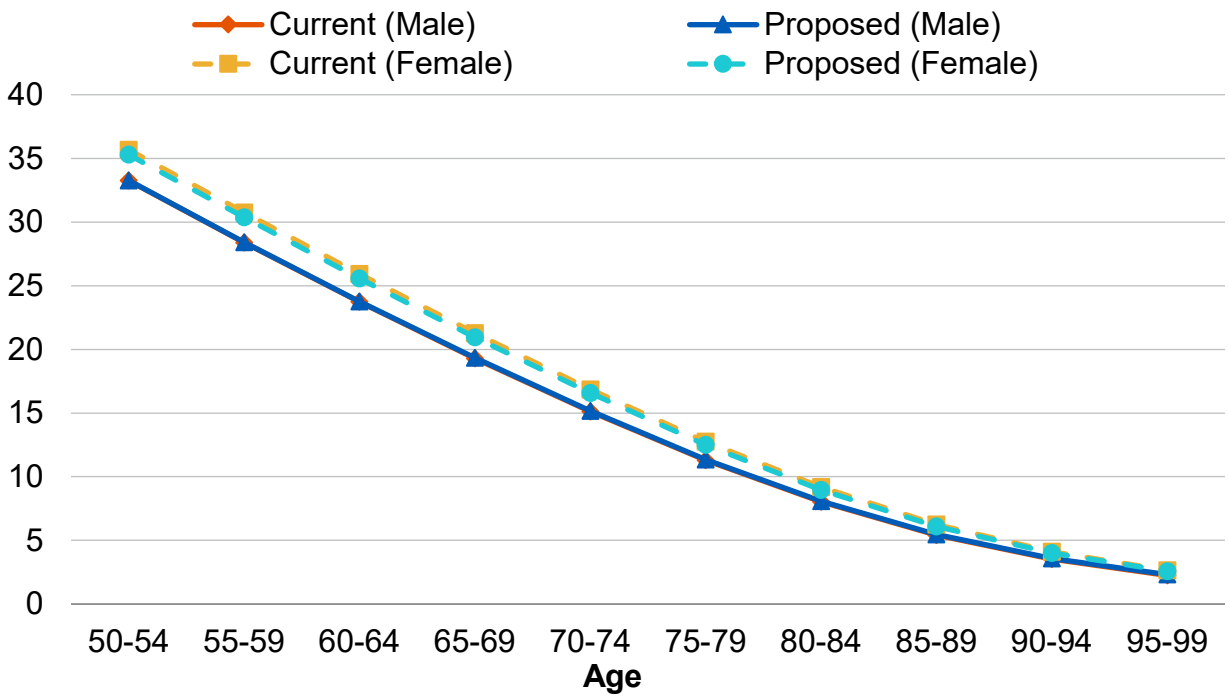
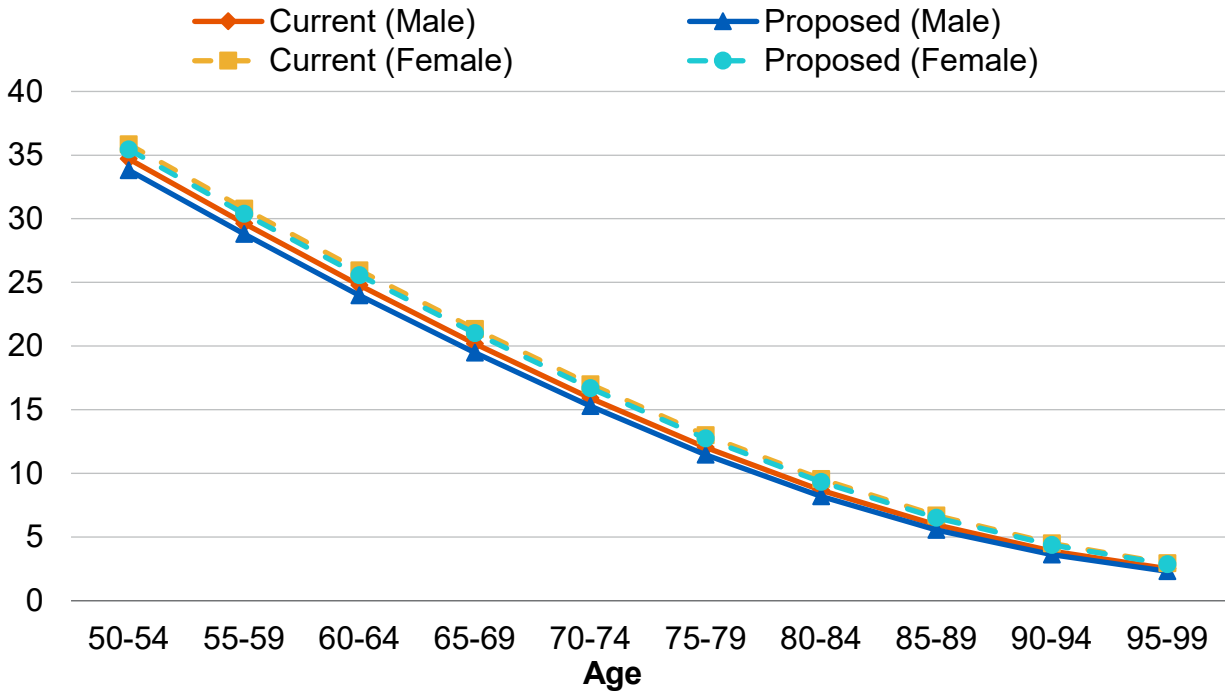


Chart 15: Benefit-Weighted Life Expectancies
Service Retirement Safety Members



D. Mortality Rates - Disabled

Since mortality rates for disabled members can vary from those of healthy members, a different mortality assumption is often used. For General members the table currently being used is the Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018. For Safety members, the table currently being used is the Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018.

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 FCERA, there is far less data for disabled retirees, so it is given little credibility. As shown in the table below, the proposed mortality tables have actual to expected ratios of 104% and 131% for General and Safety respectively, after adjustments for partial credibility. In future years the ratio should remain around 104% and 131% for General and Safety, respectively, 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 last twelve years are as follows:

Disabled Retiree Mortality Experience – Benefit Weighted

($ in millions)

	General Members			Safety Members		
Gender	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths	Current Expected Weighted Deaths	Actual Weighted Deaths	Proposed Expected Weighted Deaths
Male	$0.99	$1.29	$1.04	$0.69	$0.77	$0.69
Female	$0.99	$0.76	$0.94	$0.12	$0.29	$0.13
Total	**$1.98**	**$2.05**	**$1.98**	**$0.80**	**$1.06**	**$0.81**
Actual / Expected	**104%**		**104%[1]**	**133%**		**131%[2]**

Notes:

1. Experience shown above is weighted by annual 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 General disabled members, we recommend updating the disabled mortality to follow the 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%

[1] If we use the benchmark Pub-2010 Non-Safety Disabled table without any adjustment, the proposed actual to expected ratio would also be 104%.

[2] If we use the benchmark Pub-2010 Safety Disabled table without any adjustment, the proposed actual to expected ratio would be 133%.

for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

For Safety disabled members, we recommend updating the disabled mortality to follow the Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021.

Chart 16 compares the number of actual to expected deaths on a benefit-weighted basis over the past twelve years for the current and proposed assumptions for disabled General members.

Chart 17 compares the number of actual to expected deaths on a benefit-weighted basis over the past twelve years for the current and proposed assumptions for disabled Safety members.

Chart 18 shows the life expectancies (i.e., expected future lifetime) under the current and the proposed tables for disabled General members on a benefit-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age as of 2022. In practice, life expectancies will be assumed to increase based on applying the mortality improvement scale.

Chart 19 shows the life expectancies (i.e., expected future lifetime) under the current and the proposed tables for disabled Safety members on a benefit-weighted basis. Life expectancies under the current and proposed generational mortality rates are based on age as of 2022. In practice, life expectancies will be assumed to increase based on applying the mortality improvement scale.

Chart 16: Post-Retirement Benefit-Weighted Deaths ($ In Millions)
Disabled General Members
(July 1, 2009 through June 30, 2021)

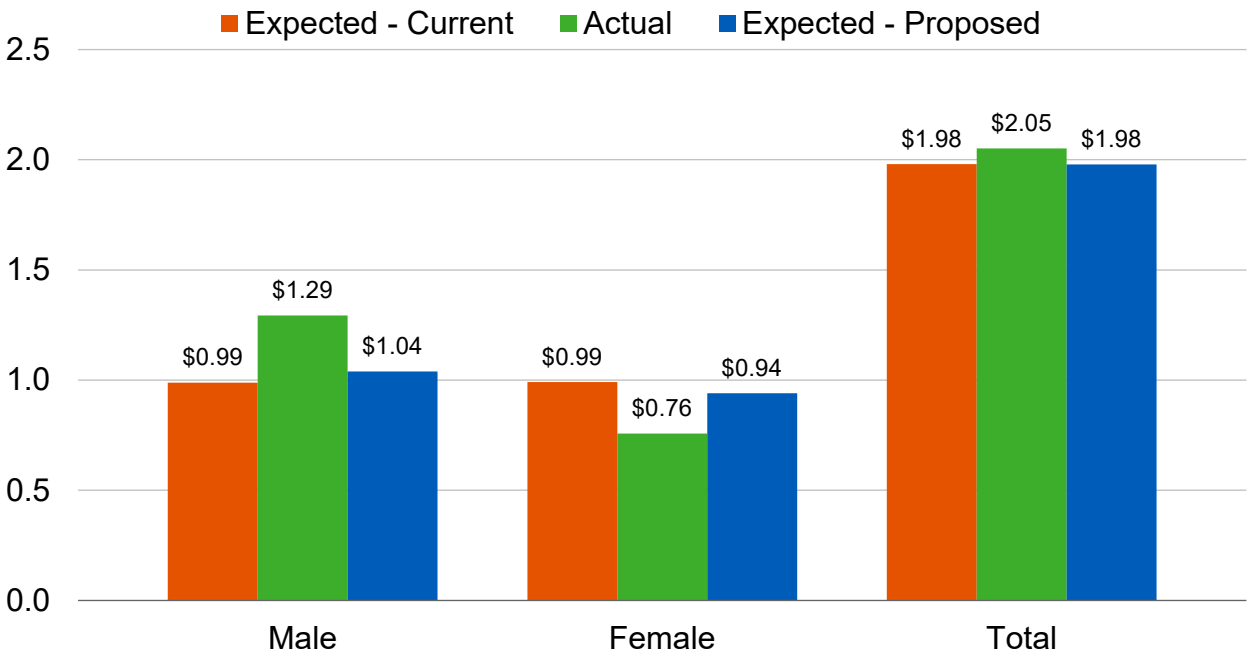


Chart 17: Post-Retirement Benefit-Weighted Deaths ($ In Millions)
Disabled Safety Members
(July 1, 2009 through June 30, 2021)

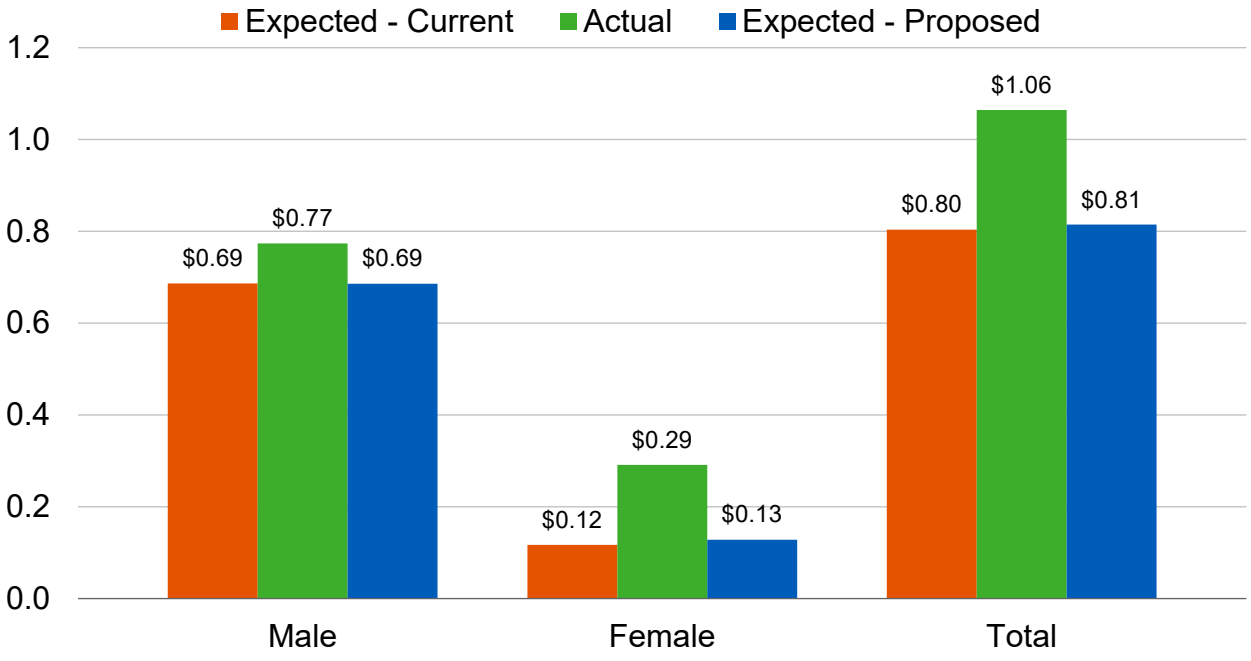


Chart 18: Benefit-Weighted Life Expectancies
Disabled General Members

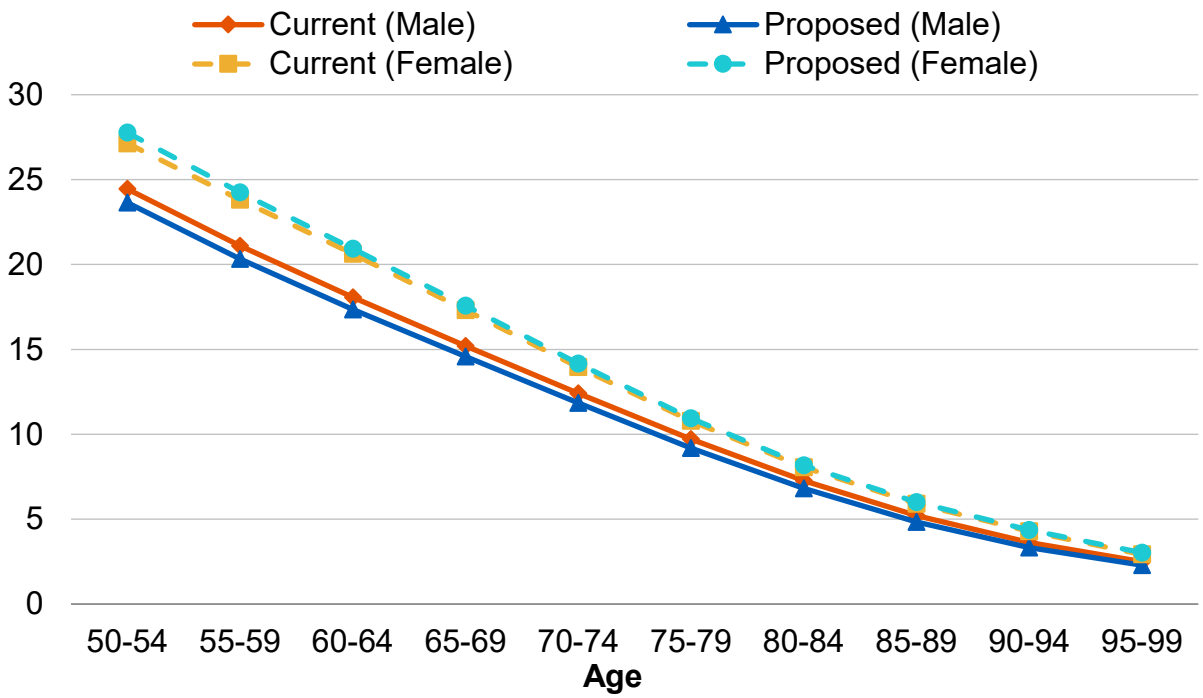
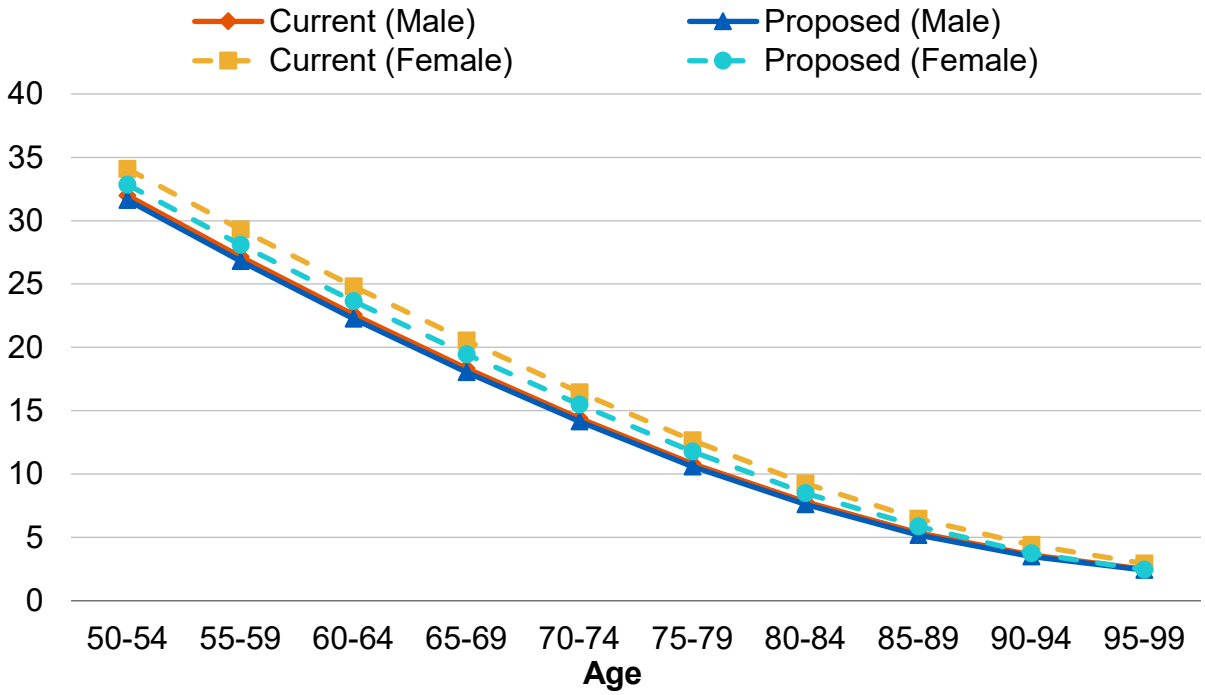


Chart 19: Benefit-Weighted Life Expectancies
Disabled Safety Members



E. Termination Rates

Termination rates include all terminations for reasons other than death, disability, or retirement. Under the current assumptions there is an overall incidence of termination assumed, combined with an assumption that a member will choose between a refund of member contributions and a deferred vested benefit based on which option is more valuable, measured by its present value at the date of the member's termination. Furthermore, the termination rates are based on a function of the member's years of service.

The following table shows the observed termination rates for General and Safety members 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 (%)

	General			Safety		
Years of Service	Current Rate	Actual Rate	Proposed Rate	Current Rate	Actual Rate	Proposed Rate
Less than 1	18.00	17.84	18.00	13.00	12.29	13.00
1 – 2	11.00	11.75	11.25	8.00	6.48	7.50
2 – 3	9.00	10.25	9.25	7.00	3.70	6.50
3 – 4	8.00	8.61	8.00	4.00	5.88	4.50
4 – 5	7.50	6.26	7.50	3.50	10.92	4.00
5 – 6	6.00	7.75	6.50	3.25	2.21	3.25
6 – 7	5.50	4.26	5.50	3.00	6.78	3.00
7 – 8	5.00	6.32	5.00	2.75	2.38	2.75
8 – 9	4.75	5.19	4.75	2.50	3.03	2.50
9 – 10	4.00	5.30	4.50	2.25	14.29	2.50
10 – 11	4.00	4.24	4.25	2.00	0.00	2.25
11 – 12	4.00	3.64	4.00	1.90	2.94	2.25
12 – 13	3.75	3.38	3.75	1.80	5.00	2.00
13 – 14	3.75	4.06	3.75	1.70	2.27	2.00
14 – 15	3.75	3.96	3.75	1.60	0.00	1.75
15 – 16	3.50	1.33	3.00	1.50	0.00	1.50
16 – 17	2.75	0.93	2.50	1.40	1.20	1.40
17 – 18	2.75	2.08	2.50	1.30	0.00	1.30
18 – 19	2.75	2.01	2.50	1.20	1.06	1.20
19 – 20	2.50	1.78	2.00	1.10	0.00	1.10
20 & Over	2.25	1.40	1.75	1.00	N/A	1.00

It is important to note that not every service category has enough exposures and/or decrements such that the results in that category are statistically credible even if we look at six years' worth of experience. This is mainly the case for those members with twenty or more years of service

since most members with that much service are eligible to retire and have been excluded from our review of this termination experience as mentioned above.

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 remain unchanged from the current rates for Safety members and are slightly higher than the current rates for General members.

We also continue to recommend that no termination is assumed after a member is first assumed to retire.

The next table show the currently assumed, actual and proposed assumed percentages for members who would elect a refund of contributions. The assumed percentages for members who leave their contributions on deposit and receive a deferred vested benefit is equal to 100% minus the percentage of those assumed to elect a refund of contributions.

In addition, we recommend the following assumptions for the percent of members who would elect a refund of contributions versus those who would leave their contributions on deposit and receive a deferred vested benefit.

Proportion of Total Terminations Assumed to Receive Refunds of Contributions (%)

Years of Service	Current Rate	Actual Rate	Proposed Rate
0 – 4	50.00	27.33	40.00
5 – 9	30.00	23.63	30.00
10 – 14	25.00	10.59	20.00
15 – 19	15.00	9.68	15.00
20 or more	10.00	22.22	10.00

The overall actual rates for electing a refund of contributions are lower than the current assumptions for the past three years. **We recommend decreasing the rates of electing a refund of contributions for members terminated with less than 5 years of service and for members terminated with service between 10 and 15 years, as shown above.**

Chart 20 compares the number of actual to expected terminations over the past three years for the current and proposed assumptions for General members.

Chart 21 compares the number of actual to expected terminations over the past three years for the current and proposed assumptions for Safety members.

Chart 22 compares the actual termination experience with the current and proposed assumptions for General members.

Chart 23 compares the actual termination experience with the current and proposed assumptions for Safety members.

Chart 20: Actual Number of Terminations Compared to Expected – General Members

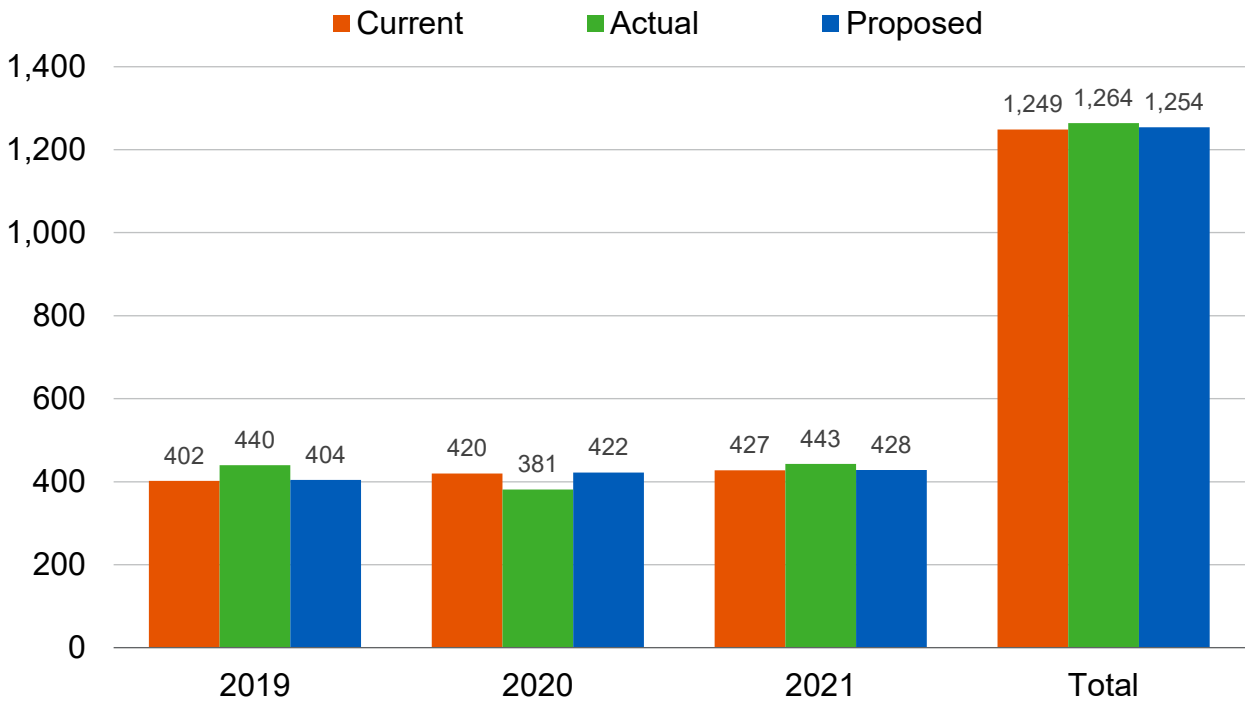


Chart 21: Actual Number of Terminations Compared to Expected – Safety Members

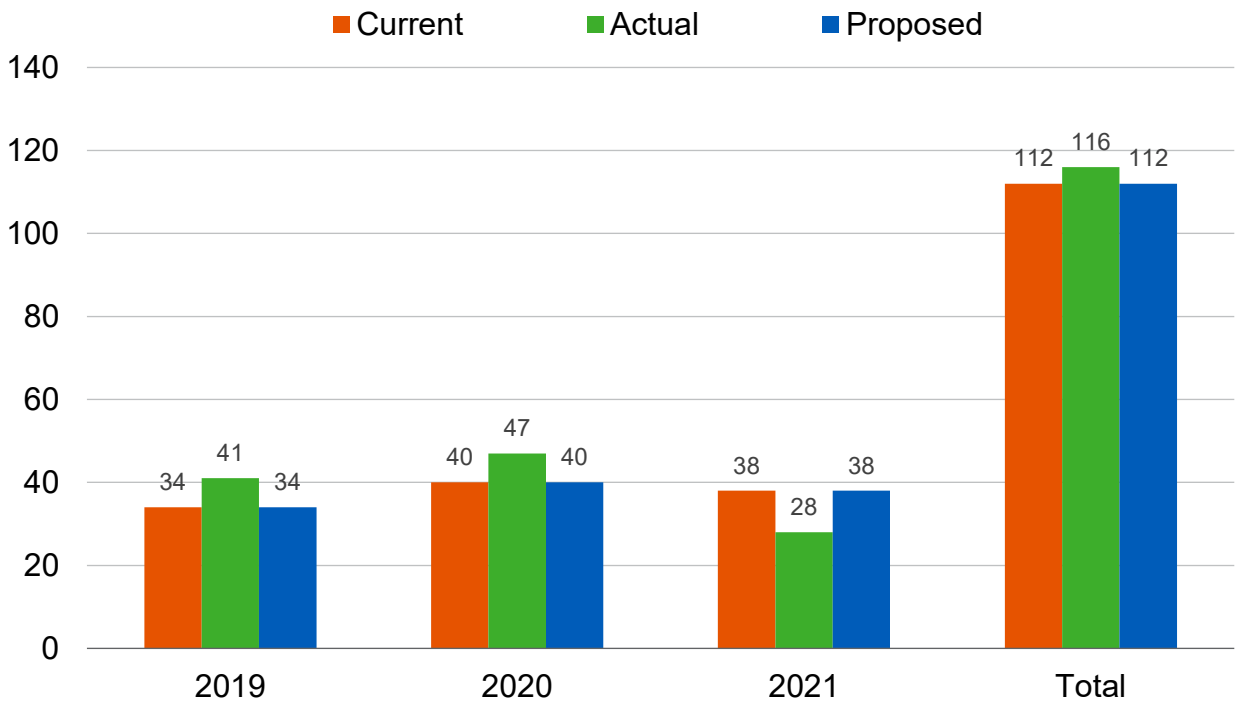


Chart 22: Termination Rates – General Members

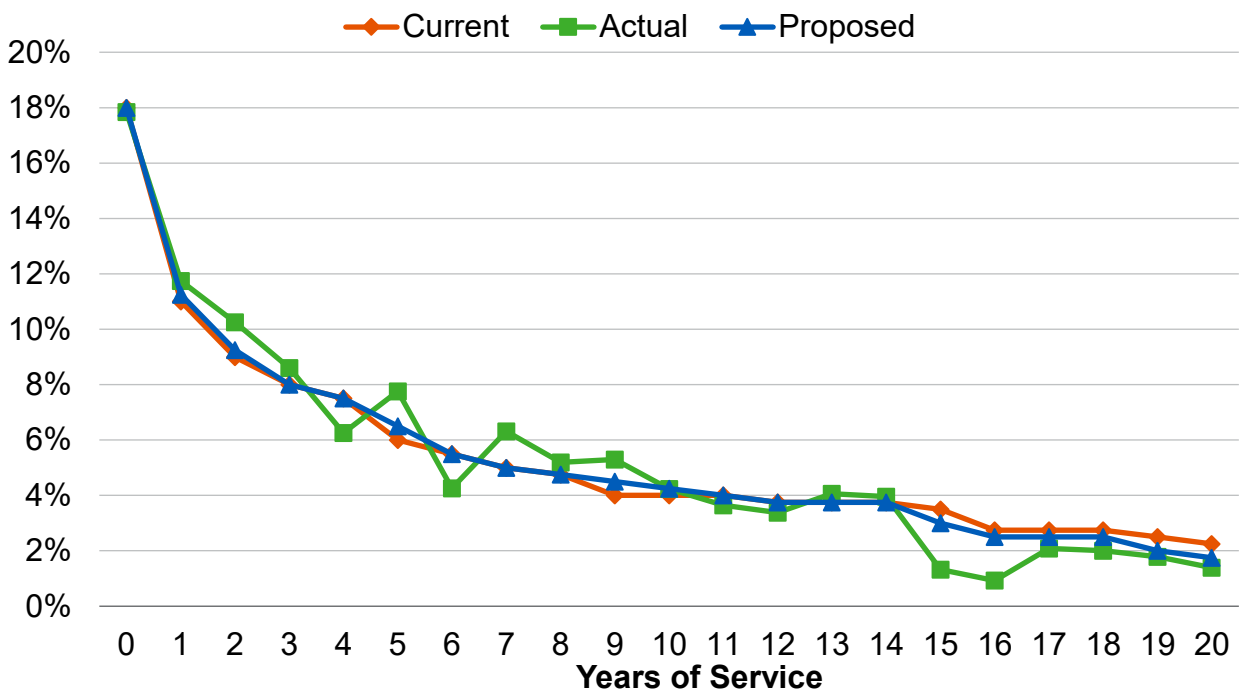
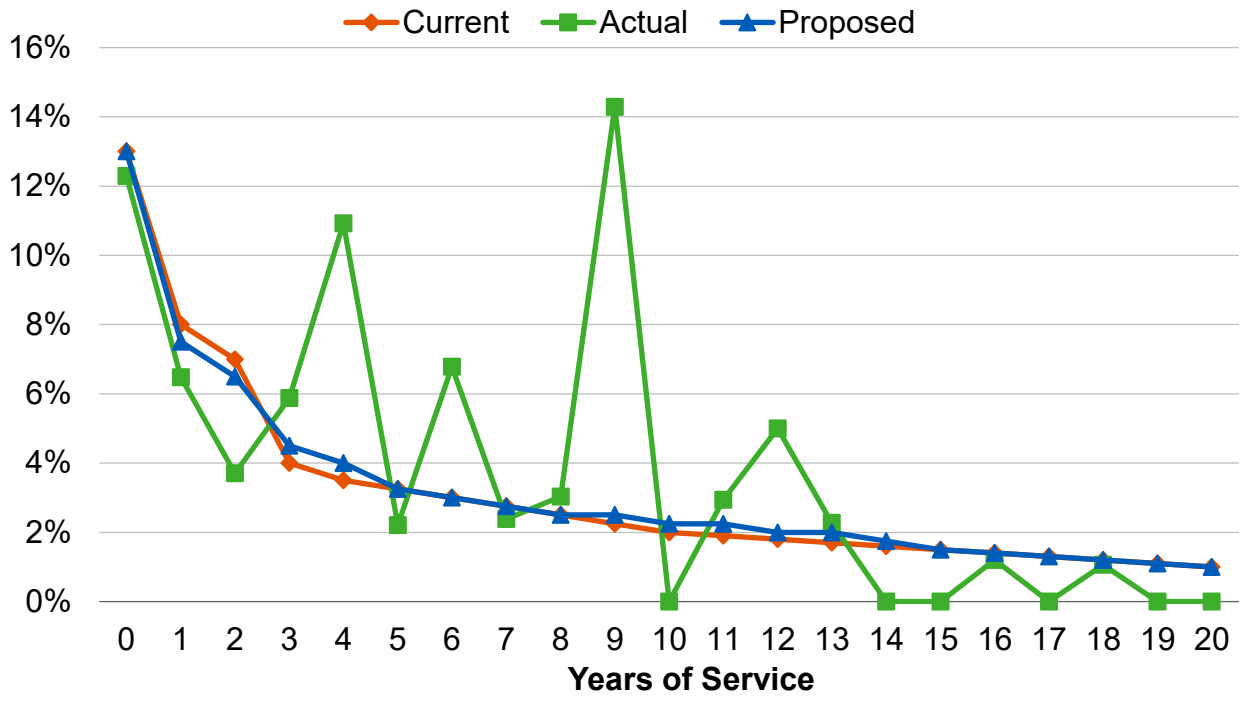


Chart 23: Termination Rates – Safety Members



F. Disability Incidence Rates

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

The following table summarizes the actual incidence of combined service connected (duty) and non-service connected (non-duty) disabilities over the past three years compared to the current and proposed assumptions for both service connected and non-service connected disability incidence.

Disability Incidence[1]

Rates (%)

	General			Safety		
Age	Current Rate	Actual Rate	Proposed Rate	Current Rate	Actual Rate	Proposed Rate
20 – 24	0.01	0.00	0.01	0.05	0.00	0.05
25 – 29	0.01	0.00	0.01	0.15	0.00	0.15
30 – 34	0.03	0.00	0.02	0.30	0.63	0.45
35 – 39	0.05	0.03	0.04	0.50	0.70	0.60
40 – 44	0.15	0.07	0.12	0.75	0.69	0.75
45 – 49	0.25	0.23	0.24	1.00	1.13	1.10
50 – 54	0.30	0.26	0.28	1.50	1.42	1.50
55 – 59	0.35	0.29	0.32	2.00	4.85	2.50
60 – 64	0.50	0.25	0.40	3.00	3.03	3.00
65 – 69	0.75	0.00	0.65	3.00	0.00	3.00
70 – 74	0.75	0.00	0.65	3.00	0.00	3.00

Based on this experience, we recommend decreasing the disability incidence rate assumption at certain ages for General members and increasing the disability incidence rate assumption at certain ages for Safety members.

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

[1] Total rate for service connected (duty) and non-service connected (non-duty) disabilities.

Service Connected vs. Non-Service Connected Disability

	Disablements Receiving Service Connected Disability			Disablements Receiving Non-Service Connected Disability
	Current Assumption	Actual Percentage	Proposed Assumption	Proposed Assumption
General	50%	71%	65%	35%
Safety	100%	100%	100%	0%

Based on this experience, we recommend increasing the assumed percentage for service connected disability for General members and maintaining the assumed percentage for Safety members.

Chart 24 compares the number of actual to expected disabilities for General members over the past three years for the current and proposed assumptions.

Chart 25 compares the number of actual to expected disabilities for Safety members over the past three years for the current and proposed assumptions.

Chart 26 compares the actual disability incidence experience with the current and proposed assumptions for General members.

Chart 27 compares the actual disability incidence experience with the current and proposed assumptions for Safety members.

Chart 24: Actual Number of Service and Non-Service Disability Retirements Compared to Expected General Members

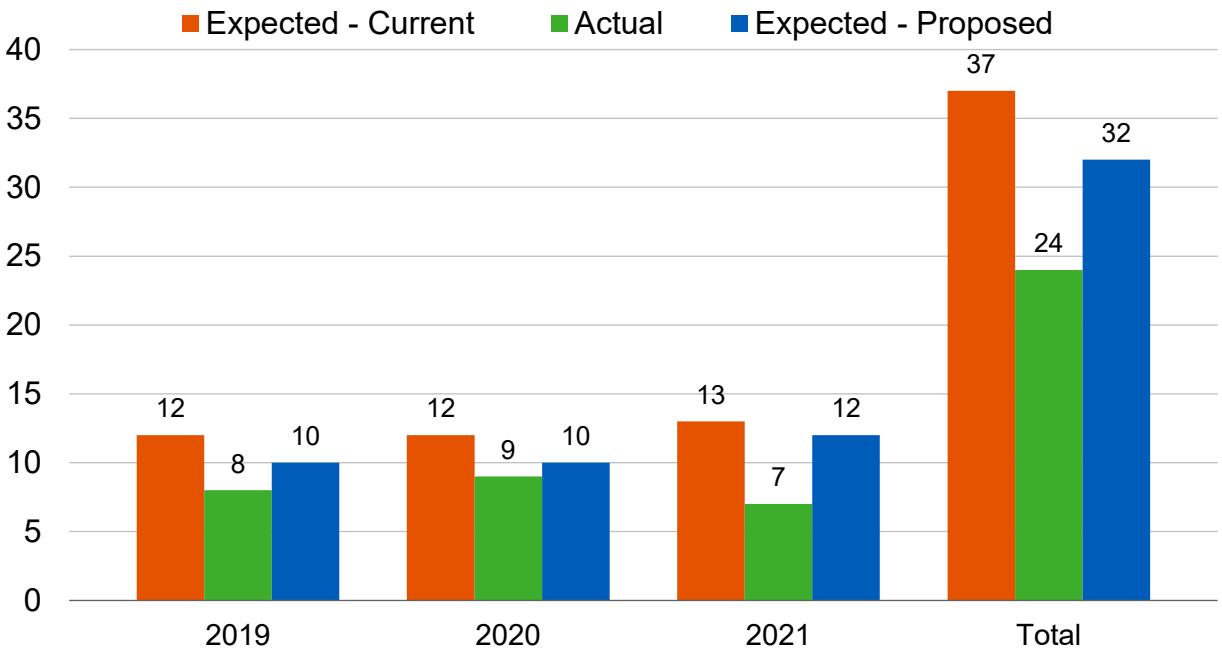


Chart 25: Actual Number of Service and Non-Service Disability Retirements Compared to Expected Safety Members

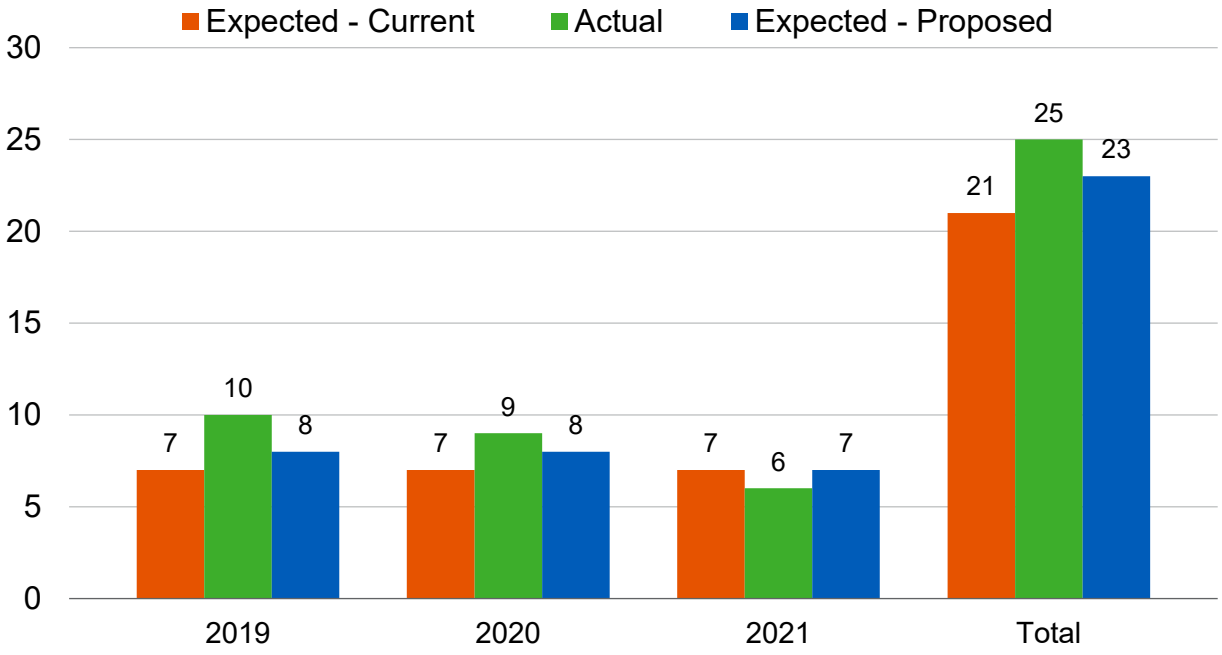


Chart 26: Disability Incidence Rates
General Members

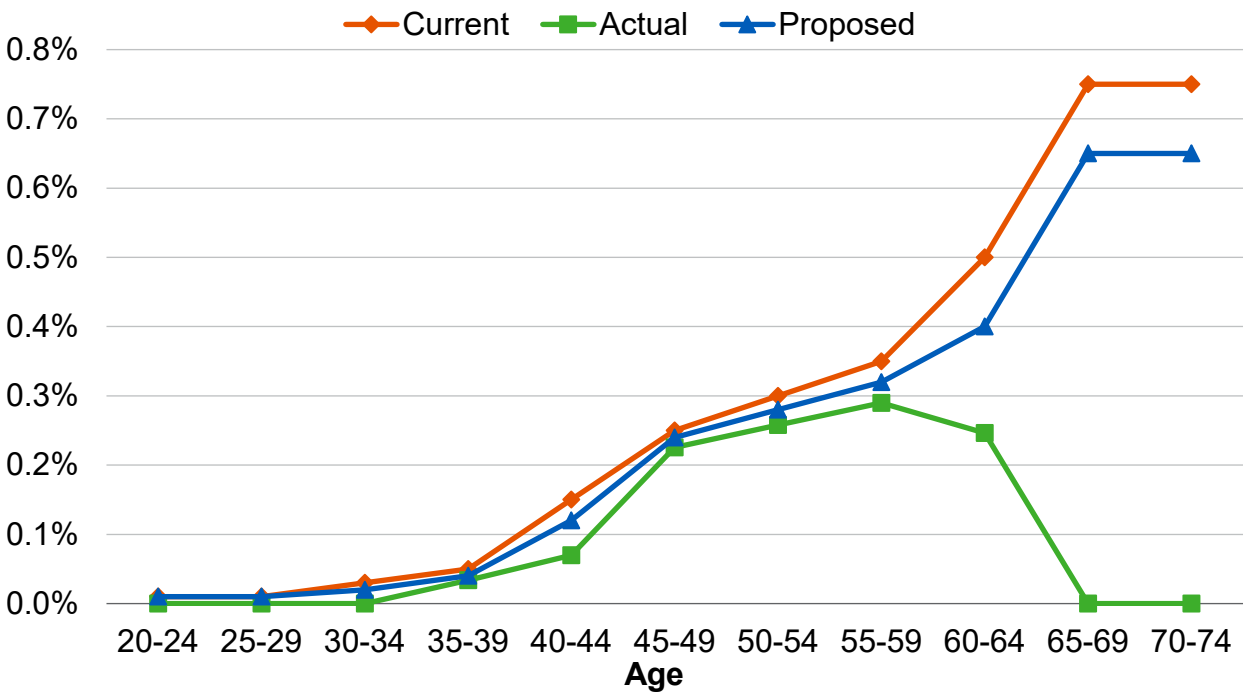
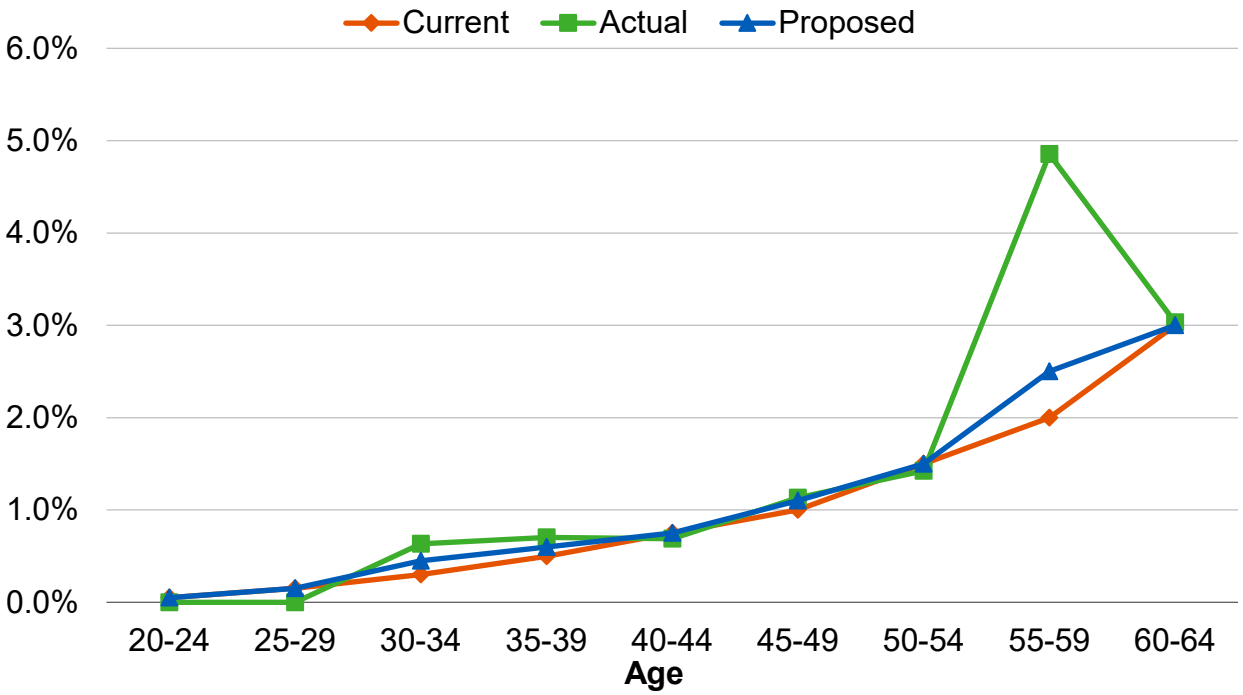


Chart 27: Disability Incidence Rates
Safety Members



G. Annual Leave Conversion

At retirement, members can convert their unused annual leave to increase the service credit used in the calculation of their retirement benefit. The actuarial valuation anticipates this additional benefit using an assumption to estimate the number of hours of annual leave that will be converted at retirement.

We collected information on the actual amount of annual leave balance for actives as of June 30, 2021. Consistent with the structure of the current assumption, the actual annual leave balance was expressed as a number of hours per year of service.

The tables below show the actual hours of accumulated annual leave available at retirement and the number of active members currently eligible for each plan.

Annual Leave Conversion

	Number of Members Reported	Current Assumption	Actual	Proposed Assumption
New Annual Leave Plan (5Y)	4	40.00	46.38	45.00[1]
Annual Leave Plan II (5Y)	185	25.00	15.33	20.00
Vacation/Sick Leave Plan (General: 5Q, 5S and 5W)	75	35.00	28.51	30.00
Vacation/Sick Leave Plan (Safety: 5Q, 5S and 5W)	340	45.00	47.54	45.00

Ordinary Annual Leave Programs

We understand that members in the Annual Leave Plan IV (5P) and Annual Leave Plan V (5N) are allowed to transfer hours to their Time Off Bank (5O). Since the hours in the Time Off Bank are frozen, with the exception of some one-time adjustments, we will continue to assume no future addition to the Time Off Bank hours and a member will only convert his/her frozen Time Off hours to service credit.

Based on this experience, we recommend increasing the New Annual Leave Plan (5Y) assumption, decreasing the Annual Leave Plan II (5Y) assumption and Vacation/Sick Leave Plan assumption for General Members, and maintaining the Vacation/Sick Leave Plan assumption for Safety Members.

[1] Note the proposed hours of New Annual Leave Plan (5Y) only applies to 4 members.

4. Cost Impact

We have estimated the impact of all the recommended demographic and economic assumptions as if they were applied to the June 30, 2021 actuarial valuation. The table below shows the changes in the employer and member contribution rates as well as the change in the UAAL due to the proposed assumption changes for the recommended demographic assumption changes (as recommended in Section 3 of this report).

Cost Impact of the Recommended Assumptions Based on June 30, 2021 Actuarial Valuation

	Impact on Average Employer Contribution Rates
Increase in Normal Cost rate	0.16%
Decrease in UAAL rate	(0.65%)
Total Decrease in average employer rate	(0.49%)
Estimated decrease in annual dollar amount ($000s)[1]	$(2,188)

	Impact on Weighted Average Member Contribution Rates
Increase in average member rate	0.05%
Estimated increase in annual dollar amount ($000s)[1]	$288

	Impact on UAAL and Funded Percentage
Decrease in UAAL ($000s)	$(33,612)
Change in Funded Percentage	85.9% to 86.3%

Of the various assumption changes, the primary reason for the employer rate decrease is due to the changes mortality assumptions.

[1] Based on June 30, 2021 projected annual payroll as determined under each set of assumptions.

Assumption Change	Impact on Average Employer Contribution Rates	Impact on Weighted Average Member Contribution Rates	Impact on UAAL ($000s)
Decrease due to change in mortality	(0.84%)	(0.03%)	$(43,940)
Change due to changes in all other demographic assumptions	0.35%	0.08%	10,328
Total increase/(decrease) due to all assumption changes	**(0.49%)**	**0.05%**	**$(33,612)**

We have also analyzed in the tables below the average employer and member contribution rate impacts for each tier due to the recommended demographic assumption changes as if they were applied to the June 30, 2021 actuarial valuation.

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

	Normal Cost	UAAL	Total	Annual Amount[1] ($000s)
General				
Tier 1	0.35%	(0.35%)	0.00%	$2
Tier 2	0.22%	(0.35%)	(0.13%)	(10)
Tier 3	0.26%	(0.35%)	(0.09%)	(28)
Tier 4	0.05%	(0.35%)	(0.30%)	(39)
Tier 5	0.05%	(0.35%)	(0.30%)	(385)
Safety				
Tier 1	(0.10%)	(2.19%)	(2.29%)	(806)
Tier 2	(0.02%)	(2.19%)	(2.21%)	(93)
Tier 4	0.21%	(2.19%)	(1.98%)	(99)
Tier 5	0.08%	(2.19%)	(2.11%)	(730)
All Categories combined	**0.16%**	**(0.65%)**	**(0.49%)**	**$(2,188)**

[1] Based on June 30, 2021 projected annual payroll as determined under each set of assumptions.

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

	Rate	Annual Amount[1] ($000s)
General		
Tier 1	0.09%	$146
Tier 2	0.05%	4
Tier 3	0.05%	16
Tier 4	0.05%	9
Tier 5	0.05%	127
Safety		
Tier 1	(0.11%)	(39)
Tier 2	(0.11%)	(4)
Tier 4	(0.02%)	0
Tier 5	0.08%	29
All Categories combined	**0.05%**	**$288**

[1] Based on June 30, 2021 projected annual payroll as determined under each set of assumptions.

Appendix A: Current Actuarial Assumptions

Demographic Assumptions

Salary Increases:

The annual rate of compensation increase includes:

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

Years of Service	Rate (%)	
	General	Safety
Less than 1	8.50	8.50
1 – 2	7.50	7.75
2 – 3	6.50	6.50
3 – 4	5.25	5.50
4 – 5	4.75	4.75
5 – 6	3.75	3.75
6 – 7	3.00	3.50
7 – 8	2.00	2.50
8 – 9	1.50	1.70
9 – 10	1.25	1.60
10 & Over	1.10	1.50

Post-Retirement Mortality Rates:

Healthy

- **General Members and All Beneficiaries:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected generationally with the two-dimensional mortality improvement scale MP-2018.
- **Safety Members:** Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018.

Disabled

- **General Members:** Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018.
- **Safety Members:** Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018.

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:

- **General Members:** Pub-2010 General Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018.
- **Safety Members:** Pub-2010 Safety Employee Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected generationally with the two-dimensional mortality improvement scale MP-2018.

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

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

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

Mortality Rates for Member Contributions:

- **General Members:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, projected 30 years with the two-dimensional mortality improvement scale MP-2018, weighted 35% male and 65% female.
- **Safety Members:** Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females), projected 30 years with the two-dimensional mortality improvement scale MP-2018, weighted 80% male and 20% female.

Disability Incidence:

	Rate (%)	
Age	General	Safety
20	0.01	0.05
25	0.01	0.11
30	0.02	0.24
35	0.04	0.42
40	0.11	0.65
45	0.21	0.90
50	0.28	1.30
55	0.33	1.80
60	0.44	2.60
65	0.65	3.00
70	0.75	3.00

50% of General disabilities are assumed to be service connected (duty) disabilities. The other 50% are assumed to be non-service connected (non-duty) disabilities.

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

Termination:

Years of Service	Rate (%)	
	General	Safety
Less than 1	18.00	13.00
1 – 2	11.00	8.00
2 – 3	9.00	7.00
3 – 4	8.00	4.00
4 – 5	7.50	3.50
5 – 6	6.00	3.25
6 – 7	5.50	3.00
7 – 8	5.00	2.75
8 – 9	4.75	2.50
9 – 10	4.00	2.25
10 – 11	4.00	2.00
11 – 12	4.00	1.90
12 – 13	3.75	1.80
13 – 14	3.75	1.70
14 – 15	3.75	1.60
15 – 16	3.50	1.50
16 – 17	2.75	1.40
17 – 18	2.75	1.30
18 – 19	2.75	1.20
19 – 20	2.50	1.10
20 & Over	2.25	1.00

Proportion of Total Termination Assumed to Receive Refunds and Deferred Vested Benefits

Years of Service	Rate (%)	
	General	Safety
0 – 4	50.00	50.00
5 – 9	30.00	70.00
10 – 14	25.00	75.00
15 – 19	15.00	85.00
20 & Over	10.00	90.00

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

Retirement Rates – General:

	Rate (%)					
	Tier 1					
Age	Less Than 30 Years of Service	Over 30 Years of Service	Tier 2	Tier 3	Tier 4	Tier 5
50	5.00	15.00	3.00	3.60	2.00	0.00
51	3.75	11.25	3.00	3.60	2.00	0.00
52	3.50	10.50	3.60	4.20	2.50	4.50
53	3.50	10.50	3.60	4.20	2.50	2.00
54	5.00	15.00	4.20	5.00	3.00	2.50
55	8.00	16.00	8.40	10.00	4.00	3.50
56	10.00	20.00	10.00	12.00	5.00	4.50
57	13.00	26.00	10.00	12.00	6.00	5.50
58	14.00	28.00	10.00	12.00	7.00	6.50
59	15.00	30.00	10.00	14.00	8.00	7.50
60	16.00	24.00	15.00	16.00	9.00	8.50
61	18.00	27.00	15.00	16.00	10.00	9.50
62	26.50	31.50	25.00	30.00	16.00	15.00
63	21.00	31.50	24.00	22.00	16.00	15.00
64	25.00	37.50	24.00	22.00	19.00	18.00
65	40.00	60.00	35.00	35.00	23.00	22.00
66	40.00	60.00	34.00	30.00	20.00	20.00
67	40.00	60.00	34.00	30.00	20.00	20.00
68	35.00	52.50	35.00	35.00	25.00	25.00
69	35.00	52.50	35.00	40.00	30.00	30.00
70	35.00	52.50	70.00	60.00	60.00	60.00
71	50.00	75.00	70.00	60.00	60.00	60.00
72	50.00	75.00	70.00	60.00	60.00	60.00
73	50.00	75.00	70.00	60.00	60.00	60.00
74	50.00	75.00	70.00	60.00	60.00	60.00
75	100.00	100.00	100.00	100.00	100.00	100.00

Retirement Rates – Safety:

Age	Rate (%) Tiers 1 & 2 Less Than 30 Years of Service	Tier 4	Tier 5
45	10.00	1.00	0.00
46	2.00	1.00	0.00
47	2.00	1.00	0.00
48	2.00	1.00	0.00
49	3.00	2.00	0.00
50	5.00	4.00	4.00
51	6.00	4.00	4.00
52	10.00	5.00	5.00
53	12.00	6.00	6.00
54	30.00	11.00	11.00
55	40.00	18.00	18.00
56	25.00	18.00	18.00
57	25.00	20.00	22.00
58	20.00	20.00	20.00
59	20.00	23.00	23.00
60	30.00	40.00	40.00
61	30.00	40.00	40.00
62	35.00	40.00	40.00
63	35.00	40.00	40.00
64	35.00	40.00	40.00
65	100.00	100.00	100.00

Retirement rate for Safety Tier 1 and Safety Tier 2 is 100% after a member accrues a benefit of 100% of final average earnings.

Retirement Age and Benefit for Deferred Vested Members:

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

General Retirement Age: 59

Safety Retirement Age: 54

20% of future General and 30% of future Safety deferred vested members terminated with less than five years of service will continue to work for a reciprocal employer. For those future deferred vested members terminated with five or more years of service, 30% of General and 50% of Safety will continue to work for a reciprocal employer.

For reciprocals, 4.10% and 4.50% compensation increases are assumed per annum for General and Safety, respectively.

Future Benefit Accruals:

1.0 year of service per year of employment.

Unknown Data for Members:

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

Definition of Active Member:

First day of pay period following employment.

Form of Payment:

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

Percent Married:	For all active and inactive members, 70% of male members and 50% of female members are assumed to be married 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.
Annual Leave Conversion:	Eligibility for annual leave plans is determined based on hire date along with other factors. The following assumptions for the amount of service converted from unused annual leave at retirement are used: *New Annual Leave Plan:* 40 hours per year of service. *Annual Leave Plan II:* 25 hours per year of service. *Vacation/Sick Leave Plans*: 35 hours per year of service for General and 45 hours per year of service for Safety. *Annual Leave IV Plan or the Old Annual Leave Plan:* Based on actual hours in a member's frozen time off bank

Appendix B: Proposed Actuarial Assumptions

Demographic Assumptions

Salary Increases:

The annual rate of compensation increase includes:

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

Years of Service	Rate (%)	
	General	Safety
Less than 1	9.00	8.50
1 – 2	8.00	8.00
2 – 3	7.00	6.75
3 – 4	5.25	5.00
4 – 5	4.75	4.50
5 – 6	3.75	3.75
6 – 7	3.25	3.50
7 – 8	2.25	2.75
8 – 9	1.50	2.00
9 – 10	1.25	1.60
10 & Over	1.10	1.50

Post-Retirement Mortality Rates:	*Healthy* • **General Members:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for males and increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. • **Safety Members:** Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for males, projected generationally with the two-dimensional mortality improvement scale MP-2021. *Disabled* • **General Members:** Pub-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5% for males and decreased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. • **Safety Members:** Pub-2010 Safety Disabled Retiree Amount-Weighted Mortality Table (separate tables for males and females) with rates increased by 5% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. *Beneficiary* • **Beneficiaries not currently in Pay Status:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for males and increased by 10% for females, projected generationally with the two-dimensional mortality improvement scale MP-2021. • **Beneficiaries in Pay Status:** Pub-2010 Contingent Survivor Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 10%, 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:

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

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

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

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

Mortality Rates for Member Contributions:

- **General Members:** Pub-2010 General Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for males and increased by 10% for females, projected 30 years with the two-dimensional mortality improvement scale MP-2021, weighted 35% male and 65% female.
- **Safety Members:** Pub-2010 Safety Healthy Retiree Amount-Weighted Above-Median Mortality Table (separate tables for males and females) with rates increased by 5% for males, projected 30 years with the two-dimensional mortality improvement scale MP-2021, weighted 80% male and 20% female.

Disability Incidence:

	Rate (%)	
Age	General	Safety
20	0.01	0.05
25	0.01	0.11
30	0.02	0.33
35	0.03	0.54
40	0.09	0.69
45	0.19	0.96
50	0.26	1.34
55	0.30	2.10
60	0.37	2.80
65	0.55	3.00
70	0.65	3.00

65% of General disabilities are assumed to be service connected (duty) disabilities. The other 35% are assumed to be non-service connected (non-duty) disabilities.

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

Termination:

Years of Service	Rate (%)	
	General	Safety
Less than 1	18.00	13.00
1 – 2	11.25	7.50
2 – 3	9.25	6.50
3 – 4	8.00	4.50
4 – 5	7.50	4.00
5 – 6	6.50	3.25
6 – 7	5.50	3.00
7 – 8	5.00	2.75
8 – 9	4.75	2.50
9 – 10	4.50	2.50
10 – 11	4.25	2.25
11 – 12	4.00	2.25
12 – 13	3.75	2.00
13 – 14	3.75	2.00
14 – 15	3.75	1.75
15 – 16	3.00	1.50
16 – 17	2.50	1.40
17 – 18	2.50	1.30
18 – 19	2.50	1.20
19 – 20	2.00	1.10
20 & Over	1.75	1.00

Proportion of Total Termination Assumed to Receive Refunds and Deferred Vested Benefits

Years of Service	Rate (%)	
	General	Safety
0 – 4	40.00	60.00
5 – 9	30.00	70.00
10 – 14	20.00	80.00
15 – 19	15.00	85.00
20 & Over	10.00	90.00

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

Retirement Rates – General:

	Rate (%)					
	Tier 1					
Age	Less Than 30 Years of Service	Over 30 Years of Service	Tier 2	Tier 3	Tier 4	Tier 5
50	5.00	12.00	3.00	3.60	3.00	0.00
51	3.75	12.00	3.00	3.60	3.00	0.00
52	3.50	12.00	3.60	4.20	3.50	4.50
53	3.50	15.00	3.60	4.20	3.50	2.00
54	5.00	15.00	4.20	5.00	4.00	2.50
55	8.00	16.00	8.40	10.00	5.00	3.50
56	9.00	16.00	10.00	12.00	6.00	4.50
57	11.00	30.00	10.00	12.00	7.00	5.50
58	12.00	30.00	10.00	12.00	8.00	6.50
59	16.00	30.00	10.00	14.00	9.00	7.50
60	17.00	30.00	15.00	16.00	10.00	8.50
61	18.00	30.00	15.00	16.00	11.00	9.50
62	25.00	35.00	25.00	30.00	16.00	15.00
63	20.00	35.00	24.00	22.00	16.00	15.00
64	25.00	35.00	24.00	22.00	19.00	18.00
65	40.00	50.00	35.00	35.00	23.00	22.00
66	40.00	50.00	34.00	30.00	20.00	20.00
67	40.00	50.00	34.00	30.00	20.00	20.00
68	35.00	50.00	35.00	35.00	25.00	25.00
69	35.00	50.00	35.00	35.00	30.00	30.00
70	35.00	50.00	35.00	35.00	35.00	35.00
71	50.00	50.00	50.00	50.00	50.00	50.00
72	50.00	50.00	50.00	50.00	50.00	50.00
73	50.00	50.00	50.00	50.00	50.00	50.00
74	50.00	50.00	50.00	50.00	50.00	50.00
75	100.00	100.00	100.00	100.00	100.00	100.00

Retirement Rates – Safety:

Age	Rate (%) Tiers 1 & 2 Less Than 30 Years of Service	Tier 4	Tier 5
45	8.00	1.00	0.00
46	3.00	1.00	0.00
47	3.00	1.00	0.00
48	3.00	1.00	0.00
49	4.00	2.00	0.00
50	8.00	4.00	4.00
51	6.00	4.00	4.00
52	10.00	5.00	5.00
53	12.00	6.00	6.00
54	30.00	11.00	11.00
55	40.00	18.00	18.00
56	25.00	18.00	18.00
57	25.00	20.00	22.00
58	25.00	20.00	20.00
59	25.00	23.00	23.00
60	35.00	40.00	40.00
61	35.00	40.00	40.00
62	40.00	40.00	40.00
63	40.00	40.00	40.00
64	40.00	40.00	40.00
65	100.00	100.00	100.00

Retirement rate for Safety Tier 1 and Safety Tier 2 is 100% after a member accrues a benefit of 100% of final average earnings.

Retirement Age and Benefit for Deferred Vested Members:

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

General with Reciprocity:	60
General without Reciprocity:	56
Safety with Reciprocity:	56
Safety without Reciprocity:	52

20% of future General and 25% of future Safety deferred vested members terminated with less than five years of service will continue to work for a reciprocal employer. For those future deferred vested members terminated with five or more years of service, 30% of General and 45% of Safety will continue to work for a reciprocal employer.

For reciprocals, 4.10% and 4.50% compensation increases are assumed per annum for General and Safety, respectively.

Future Benefit Accruals:

1.0 year of service per year of employment.

Unknown Data for Members:

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

Definition of Active Member:

First day of pay period following employment.

Form of Payment:

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

Percent Married:	For all active and inactive members, 65% of male members and 55% of female members are assumed to be married 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.
Annual Leave Conversion:	Eligibility for annual leave plans is determined based on hire date along with other factors. The following assumptions for the amount of service converted from unused annual leave at retirement are used: *New Annual Leave Plan:* 45 hours per year of service. *Annual Leave Plan II:* 20 hours per year of service. *Vacation/Sick Leave Plans*: 30 hours per year of service for General and 45 hours per year of service for Safety. *Annual Leave IV Plan or the Old Annual Leave Plan:* Based on actual hours in a member's frozen time off bank

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