Alameda County Employees'
Retirement Association

ACTUARIAL EXPERIENCE STUDY

Analysis of Actuarial Experience
During the Period
December 1, 2010 through November 30, 2013

100 Montgomery Street, Suite 500
San Francisco, CA 94104

Segal Consulting

100 Montgomery Street Suite 500 San Francisco, CA 94104-4308
T 415.263.8200 www.segalco.com

September 9, 2014

Board of Retirement
Alameda County Employees' Retirement Association
475 14th Street, Suite 1000
Oakland, California 94612-1900

Re: Review of Actuarial Assumptions for the December 31, 2014 Actuarial Valuation

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience of the Alameda County Employees' Retirement Association. This study utilizes the census data of the last three actuarial valuations and includes the proposed actuarial assumptions to be used in future actuarial valuations.

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

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

Sincerely,

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

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

DNA/gxk

5296632v3/05579.116

TABLE OF CONTENTS

Page

I. INTRODUCTION, SUMMARY, AND RECOMMENDATIONS 1

II. BACKGROUND AND METHODOLOGY 6

III. ECONOMIC ASSUMPTIONS

A. INFLATION 8

B. INVESTMENT RETURN 10

C. SALARY INCREASE 28

IV. DEMOGRAPHIC ASSUMPTIONS

A. RETIREMENT RATES 32

B. MORTALITY RATES - HEALTHY 45

C. MORTALITY RATES - DISABLED 52

D. TERMINATION RATES 57

E. DISABILITY INCIDENCE RATES 65

F. MERIT AND PROMOTIONAL SALARY INCREASES 70

G. TERMINAL PAY 75

H. OTHER ASSUMPTIONS 78

APPENDIX A CURRENT ACTUARIAL ASSUMPTIONS 79

APPENDIX B PROPOSED ACTUARIAL ASSUMPTIONS 85

I. INTRODUCTION, SUMMARY, AND RECOMMENDATIONS

To project the cost and liabilities of the Pension Fund, 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 changed, 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 in effect assumes that experience was temporary and that, over the long run, experience will return to what was originally assumed. Changing assumptions reflects a basic change in thinking about the future, and it has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

The use of realistic actuarial assumptions is important to maintain adequate funding, while fulfilling benefit commitments 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 compare the actual experience during one three-year study period with that expected under the current assumptions. 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* and ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*. These Standards of Practice put forth guidelines for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected near-term experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for inflation, investment return, individual salary increases, retirement from active employment, pre-retirement mortality, healthy life mortality, disabled

life mortality, turnover (vested and withdrawal of contributions), and disability (service connected and non-service connected).

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

Inflation – Future increases in the cost-of-living index, which drives investment returns and active member salary increases, as well as COLA increases to retired employees.

Recommendation: Reduce the rate from 3.50% to 3.25%.

Investment Return – The estimated average net rate of return on current and future assets of the Association as of the valuation date. This rate is used to discount liabilities.

Recommendation: Segal is recommending that the Board develop the investment return assumption on a net of investment expenses but not net of administrative expenses basis. Not only is this more consistent with the new practice required by GASB for financial reporting, it will also provide for the funding of administrative expenses in a more transparent manner. On that basis, Segal's recommendation would be to reduce the investment return assumption from 7.80% net of administrative expenses to 7.75% gross of such expenses, and add an explicit administrative expense loading of 1.6% of payroll. (This is referred to as "Option A" in this report.) This recommendation would result in the costs associated with the explicit assumption for administrative expenses being allocated to the pension plan only, to be collected from the employer and the employees, and no administrative expenses will be allocated to the SRBR plan. However, the Board should review and concur with this result, as this allocation would represent a change from the practice currently used by the Board to calculate the amount available to credit interest to both the pension plan and to the SRBR on a net of administrative expenses basis.

If the Board wishes to continue to develop the investment return assumption net of both investment and administrative expenses (which is consistent with the current practice for funding), Segal's recommendation would be to reduce the investment return assumption used for funding from 7.80% to 7.50%. Under this alternative, setting the investment return assumption at 7.50% for funding and using that same 7.50% for financial disclosure purposes under GASB means that even though the same rate is used, it would be considered net of administrative expenses for funding but gross of administrative expenses for financial disclosures. (This is referred to as "Option B" in this report.)

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 promotional increases.

Recommendation: Reduce the current inflationary salary increase from 3.50% to 3.25% and maintain the real "across the board" salary increase assumption at 0.50%, therefore reducing the total current inflationary and real "across the board" salary increases from 4.00% to 3.75%. In addition to the combined inflationary and real "across the board" salary increases of 3.75%, change the current merit and promotional increases to those developed in Section IV.F. The net impact of these changes is to project slightly lower salary increases.

Retirement Rates - The probability of retirement at each age at which participants are eligible to retire.

Recommendation: General Tier 1 rates have been increased to reflect earlier retirements. General Tier 2 rates have been lowered at the younger ages and increased at the older ages to more closely reflect recent actual experience. General Tier 3 rates remain unchanged since actual experience was close to expected experience. Safety Tier 1 rates have been increased to reflect earlier retirements, as the actual number of retirements before age 60 was more than expected. The rates for Safety Tier 2 (also used for Safety Tier 2D members) have been increased at the lower ages and decreased at the higher ages to more closely reflect recent actual experience. No adjustments have been made to the General Tier 4, Safety Tier 2C, and Safety Tier 4 rates because no data is available for these tiers.

Mortality Rates - The probability of dying at each age. Mortality rates are used to project life expectancies.

Recommendation: For General healthy retirees, we recommend changing the assumption from the RP-2000 Combined Healthy Mortality Tables set back two years for males and set back one year for females to the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set back one year for males and females. For Safety healthy retirees, we recommend changing the assumption from the RP-2000 Combined Healthy Mortality Tables set back two years for males and set back one year for females to the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, with no setback for males and set back two years for females. The pre-retirement mortality assumption

is set to be consistent with the table used for post-service retirement mortality. All pre-retirement deaths are assumed to be non-service connected.

For General disabled retirees, we recommend changing the assumption from the RP-2000 Combined Healthy Mortality Tables set forward four years for males and females to the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set forward seven years for males and set forward four years for females. For Safety disabled retirees, we recommend changing the assumption from the RP-2000 Combined Healthy Mortality Tables set forward two years for males and females to the RP-2000 Combined Healthy Mortality Tables projected with Scale BB to 2020, set forward six years for males and set forward three years for females.

These changes for healthy and disabled retirees generally reflect longer life expectancies.

Termination Rates - The probability of leaving employment at each age and receiving either a refund of contributions or a deferred vested retirement benefit.

Recommendation: The termination rates for members with less than five years of service have generally been decreased for General and Safety members. For General members with five or more years of service, the termination rates have been decreased at the younger ages and increased at the older ages. For Safety members with five or more years of service, the termination rates have been maintained in most cases. For members with less than five years of service, the assumption is changed to anticipate that only 60% of the members would withdraw and receive a refund (current assumption is 70%).

Disability Incidence Rates - The probability of becoming disabled at each age.

Recommendation: The rates have been decreased for General members and adjusted at most ages for Safety members to more closely reflect actual experience.

Terminal Pay – Additional earnings that are expected to be received when the member retires.

Recommendation: While actual experience from the last three years may support increasing the terminal pay assumptions, the action taken by the Board to implement AB 197 (which was subsequently challenged in a lawsuit) should have a dampening effect on terminal pay. We recommend no change in these assumptions until more information becomes available.

Section II provides some background on basic principles and the methodology used for the experience study. A detailed discussion of the experience and reasons for the proposed changes are found in Section III for the economic assumptions and Section IV for the demographic assumptions.

II. BACKGROUND AND METHODOLOGY

In this report, we analyzed both economic and demographic (non-economic) assumptions. The primary economic assumptions reviewed are inflation, investment return, and salary increases. Demographic assumptions include the probabilities of certain events occurring in the population of members, referred to as "decrements," e.g., termination from service, disability retirement, service retirement, and death before and after retirement.

Economic Assumptions

Economic assumptions consist of:

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

Investment Return – Expected long-term rate of return on the Association's investments after expenses. This assumption has a significant impact on contribution rates.

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

The setting of these assumptions is described in Section III.

Demographic Assumptions

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

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

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

III. ECONOMIC ASSUMPTIONS

A. INFLATION

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

The inflation assumption is long term in nature, so it is set using primarily historical information. Following is an analysis of 15-year and 30-year moving averages of historical inflation rates:

Historical Consumer Price Index – 1930 to 2013
(U.S. City Average - All Urban Consumers)

	25th Percentile	Median	75th Percentile
15-year moving averages	2.6%	3.4%	4.7%
30-year moving averages	3.2%	4.2%	4.9%

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

In the 2013 public fund survey published by the National Association of State Retirement Administrators, the median inflation assumption used by 126 large public retirement funds in their 2012 valuations has decreased to 3.00% from the 3.25% assumption used in the 2011 valuations. In California, CalPERS and LACERA have recently reduced their inflation assumptions to 2.75% and 3.00%, respectively.

ACERA's investment consultant, Strategic Investment Solutions, Inc. (SIS), anticipates an annual inflation rate of 2.30%. Note that, in general, investment consultants use a time horizon for this assumption that is shorter than the time horizon we use for the actuarial valuation. We also note that the average inflation rate used by SIS and eight other investment advisory firms for their public sector clients in California is 2.54%.

To find a forecast of inflation based on a longer time horizon, we referred to the 2013 report on the financial status of the Social Security program. The projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.80%. We also compared the yields on the thirty-year inflation indexed U. S. Treasury bonds to comparable

traditional U. S. Treasury bonds. As of June 2014, the difference in yields is 2.28%, which provides a measure of market expectations of inflation.

Based on all of this information, we recommend that the current 3.50% annual inflation assumption be reduced to 3.25% for the December 31, 2014 actuarial valuation.

Retiree Cost-of-Living Increases

In our last review of the economic assumptions as of December 31, 2011, consistent with the 3.50% annual inflation assumption adopted by the Board for that valuation, the Board maintained the 3.00% retiree cost-of-living adjustment for Tiers 1 and 3, and the 2.00% retiree cost-of-living adjustment for Tier 2 (and subsequently for Tier 4, after its adoption effective January 1, 2013).

We are recommending that the current retiree cost-of-living assumptions (i.e., 3.00% per year for Tiers 1 and 3, and 2.00% per year for Tiers 2 and 4) be continued in the December 31, 2014 valuation.

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

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

- Using a lower long-term COLA assumption based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption of 3.25% is met in a year. We question the reasonableness of this result.

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

B. INVESTMENT RETURN

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

Real Rate of Investment Return

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

The following is the Association's current target asset allocation and assumed real rate of return assumptions by asset class. The first column of real rate of return assumptions are determined by netting SIS' total return assumptions by their assumed 2.30% inflation rate. The second column of returns (except for Absolute Return, Real Return, and Private Equity) represents the average of a sample of real rate of return expectations. The sample includes the expected annual real rates of return provided to us by SIS and eight other investment advisory firms retained by Segal's California public sector retirement system clients. We believe these averages are a reasonable forecast of long-term future market returns[1].

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

ACERA's Target Asset Allocation as of January 2014 and Assumed Arithmetic Real Rate of Return Assumptions by Asset Class and for the Portfolio

Asset Class	Percentage of Portfolio	SIS' Assumed Real Rates of Return[1]	Average Real Rate of Return from a Sample of Consultants to Segal's California Public Sector Clients[2]
Domestic Large Cap Equity	25.60%	6.63%	5.91%
Domestic Small Cap Equity	6.40	7.32	6.47
Developed International Equity	20.25	7.31	6.88
Emerging Market Equity	6.75	10.61	8.24
U.S. Core Fixed Income	11.25	0.72	0.73
High Yield Bonds	1.50	3.28	2.67
International Bonds	2.25	0.99	0.42
Real Estate	6.00	5.43	4.95
Commodities	2.00	5.68	4.25
Absolute Return (Hedge Fund)	7.50	3.17	3.17[3]
Real Return	3.00	0.70	0.70[3]
Private Equity	7.50	11.94	11.94[3]
Total Portfolio	100.00%	6.11%	5.54%

[1] *Derived by reducing SIS' total rate of return assumptions by their assumed 2.30% inflation rate.*

[2] *These are based on the projected arithmetic returns provided by the investment advisory firms serving the county retirement systems of Alameda, Contra Costa, Imperial, Mendocino, Orange, Sonoma, the Los Angeles City Employees' Retirement System, the Los Angeles Department of Water and Power Retirement Plan, and the Los Angeles Fire & Police Pensions. These return assumptions are gross of any applicable investment expenses.*

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

Please note that the above are representative of "indexed" returns and do not include any additional returns ("alpha") from active management. This is consistent with the prior Actuarial Standard of Practice (ASOP) No. 27, Section 3.6.3.e, which states:

> "Investment Manager Performance - Anticipating superior (or inferior) investment manager performance may be unduly optimistic (pessimistic). Few investment managers consistently achieve significant above-market returns net of expenses over long periods."

In the revised ASOP, Section 3.8.3.d contains the relevant guidance:

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

The following are some observations about the returns provided above:

1. The investment consultants to our California public clients have each provided us with their expected real rates of return for each asset class, over various future periods of time. However, in general, the returns available from investment consultants are projected over time periods shorter than the duration of a retirement plan's liabilities.
2. Using a sample average of expected real rates of return allows the Association's investment return assumption to reflect a broader range of capital market information and should help reduce year to year volatility in the Association's investment return assumption.
3. Therefore, we recommend that the 5.54% portfolio real rate of return be used to determine the Association's investment return assumption. This is 0.19% lower than the real rate of return that was used three years ago to prepare the recommended investment return assumption for the December 31, 2011 valuation. This decrease is primarily caused by the less optimistic assumptions provided by the investment consultants for certain asset classes, offset somewhat by the higher anticipated rate of return under ACERA's new target asset mix.

Association Expenses

For funding purposes, the real rate of return assumption for the portfolio needs to be adjusted for investment expenses expected to be paid from investment income. As further discussed later in this report, current practice for ACERA also adjusts for non-investment expenses.

Based on information provided by the Association, we have shown in the following table the expenses in relation to the average market value of assets for the five years ending December 31, 2013.

Investment and Non-Investment Expenses
as a Percentage of Average Market Value of Assets

(dollars in 000's)

Year Ending December 31	Average Market Value of Assets	Investment Expenses[1]	Non-Investment Expenses[2]	Investment %	Non-Investment %	Total %
2009	$4,241,415	$28,899	$12,255	0.68	0.29	0.97
2010	4,950,688	30,625	13,001	0.62	0.26	0.88
2011	5,149,447	34,740	13,767	0.67	0.27	0.94
2012	5,371,301	37,310	14,098	0.69	0.26	0.95
2013	6,154,250	42,056	14,728	0.68	0.24	0.92
Average				0.67	0.26	0.93
Recommended Assumption				0.65	0.25	0.90

[1] *"Net fees & investment expenses, excluding interest expense from leverage on real estate."*

[2] *Includes administrative, legal, technology, actuarial, and business continuity expenses. It is our understanding that these amounts have been included by the Association in establishing its budget for administrative expenses.*

The average expenses percentage over this five-year period is 0.93%. In our last review as of December 31, 2011, the average expenses percentage over the five-year period from 2006-2010 was 0.89%. Based on this experience, we recommend that the Association's future expense assumption be maintained at 0.90%. We will continue to re-examine this assumption in future studies to determine if a higher expense assumption may be warranted as new data becomes available.

Note related to investment expenses paid to active managers – As cited above under Section 3.8.3.d of the 2014 revision to ASOP No. 27, the effect of an active investment management strategy should be considered "net of investment expenses". For ACERA, of the $42.1 million in net fees and investment expenses paid in 2013 (that excluded interest expense from leverage on real estate), about $37.5 million was associated with investment expenses, with the remaining $4.6 million associated with real estate related fees and expenses. Of the $37.5 million of investment expenses, about $1.3 million was paid for expenses associated with obtaining investment consulting and custodian services, and $0.1 million was associated with passively managed funds. That left $36.1 million (or 0.58% out of the total 0.68% in investment expenses in 2013) for expenses paid to active managers. While information could perhaps be compiled on an historical basis to compare those active management expenses to any additional returns ("alpha") earned by that active management, a comparison on a prospective basis would be more appropriate for setting the future investment return assumption. After discussion with ACERA's

investment staff, we understand that such comparison is not available. Even if this information were available, we do not believe that such review would necessarily have a significant impact on the recommended investment return assumption developed using the above expense assumption. This is because any alpha that may be identified could be made available to maintain the confidence level of achieving the recommended investment return assumption. For example, an alpha of 0.25% would increase the confidence level by about 3% (see discussions that follow for definitions of risk adjustment and confidence level), which would bring the confidence level associated with the recommended 7.50% investment return assumption closer to that associated with the current 7.80% investment return assumption.

Adjustment to Exclude Administrative Expenses in Developing Investment Return Assumption for use in GASB Financial Reporting

In 2012, GASB adopted Statements 67 and 68 that replace Statements 25 and 27 for financial reporting purposes. GASB Statements 67 and 68 are effective for calendar year ending December 31, 2014 for the Retirement Association and fiscal year ending June 30, 2015 for the employer.[2]

According to GASB, the investment return assumption for use in financial reporting purposes should be based on the long-term expected rate of return on a retirement system's investments and should be net of investment expenses but not of administrative expenses (i.e., without reduction for administrative expenses). As can be observed from the above development of the expense assumption, if the Board wishes to develop a single investment return assumption for both funding and financial reporting purposes, then it would be necessary to exclude the 0.25% administrative expense component from the above development and to develop a separate treatment of administrative expenses.

The issues associated with eliminating the consideration of administrative expenses when developing the investment return assumption used for funding, and the alternatives that may be available to the Board in developing the investment return assumption for use in GASB financial reporting purposes are provided at the end of this Section. While we do recommend that the Board adopt an investment return assumption for funding that is gross of administrative expenses, the preliminary discussion that follows has first been completed on a net of administrative expenses basis, to allow an "apples to apples" comparison with the current assumption.

[2] The new Statements (67 and 68) will require more rapid recognition for investment gains or losses and much shorter amortization for actuarial gains or losses. Because of the more rapid recognition of those changes, retirement systems that have generally utilized the previous Statements (25 and 27) as a guideline to establish the employer's contribution amounts for both funding and financial reporting purposes would now have to prepare two sets of cost results, one for contributions and one for financial expense reporting under the new Statements.

Risk Adjustment

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

The purpose of the risk adjustment (as measured by the corresponding confidence level) is to increase the likelihood of achieving the actuarial investment return assumption in the long term[3]. The 5.54% expected real rate of return developed earlier in this report was based on expected mean or average arithmetic returns. This means there is a 50% chance of the actual return in each year being at least as great as the average (assuming a symmetrical distribution of future returns). The risk adjustment is intended to increase that probability. This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not.

Three years ago, the Board adopted an investment return assumption of 7.80%. In combination with the inflation, real return, and expense components from three years ago, that return implied a risk adjustment of 0.53% reflecting a confidence level of 56% that the actual return over 15 years would not fall below the assumed return, assuming that the distribution of returns over that period follows the normal statistical distribution[4].

In our model, the confidence level associated with a particular risk adjustment represents the likelihood that the actual average return would equal or exceed the assumed value over a 15-year period. For example, if we set our real rate of return assumption using a risk adjustment that produces a confidence level of 60%, then there would be a 60% chance (6 out of 10) that the average return over 15 years will be equal to or greater than the assumed value. The 15-year time horizon represents an approximation of the "duration" of the fund's liabilities, where the duration of a liability represents the sensitivity of that liability to interest rate variations.

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

[4] Based on an annual portfolio standard deviation of 12.75% provided by SIS three years ago. Strictly speaking, future compound long-term investment returns will tend to follow a log-normal distribution. However, we believe the normal distribution assumption is reasonable for purposes of setting this type of risk adjustment.

If we use the same 56% confidence level from three years ago to set this year's risk adjustment, based on the current long-term portfolio return standard deviation of 14.40% provided by SIS, the result is a risk adjustment of 0.60%. Together with the other investment return components, this produces a net investment return assumption of 7.29%, which is substantially lower than the current assumption of 7.80%.[5]

Because this would be a substantial change in this long-term assumption, we evaluated the effect on the confidence level of an alternative investment return assumption. In particular, a net investment return assumption of 7.50%, together with the other investment return components, would produce a risk adjustment of 0.39%, which corresponds to a confidence level of 54%.

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

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

Year Ending December 31	Investment Return	Risk Adjustment	Corresponding Confidence Level
2005	7.90%	0.46%	56%
2006	8.00%	0.41%	56%
2007	8.00%	0.38%	56%
2008	8.00%	N/A	N/A
2009	7.90%	0.49%	56%
2010	7.90%	N/A	N/A
2011	7.80%	0.53%	56%
2014 (preliminary recommendation)	7.50%	0.39%	54%

As we have discussed in prior years, the risk adjustment model and associated confidence level is most useful as a means for comparing how the Association has positioned itself relative to risk over periods of time.[6] The use of a 54% confidence level should be considered in context with other factors, including:

1. As noted above, the confidence level is more of a relative measure than an absolute measure, and so can be reevaluated and reset for future comparisons.

[5] Maintaining the current investment return assumption of 7.80% would have resulted in a risk adjustment of 0.09%, resulting in a 51% confidence level.

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

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

3. A lower assumed level of inflation should reduce the overall risk of failing to meet the investment return assumption. Lowering the confidence level to some extent could be justified as consistent with the change in the inflation assumption.

4. As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the following sections, including (1) a discussion of the relationship between the inflation assumption and the risk adjustment and (2) a comparison with assumptions adopted by similarly situated public sector retirement systems.

5. A confidence level of 54% (which is associated with a 7.50% investment return assumption) is slightly below the midpoint of the range of about 50% to 60% that corresponds to the risk adjustments used by most of Segal's other California public retirement system clients. Most public retirement systems that have recently reviewed their investment return assumptions have considered adopting more conservative investment return assumptions for their valuations, mainly to maintain the likelihood that future actual market return will meet or exceed the investment return assumption. While this may provide argument for a confidence level greater than 54% (which is associated with a 7.50% investment return assumption), we would also note that a 0.30% reduction in the investment return assumption is already a significant reduction in a long-term assumption.

Taking into account the factors above, our preliminary recommendation is to reduce the investment return assumption from 7.80% to 7.50%, net of both investment and administrative expenses. As noted above, this return implies a risk adjustment of 0.39%, reflecting a confidence level of 54% that the actual average return over 15 years would not fall below the assumed return.

Preliminary Recommended Investment Return Assumption

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

Calculation of Net Investment Return Assumption

Assumption Component	December 31, 2014 Preliminary Recommended Value	December 31, 2011 Adopted Value
Inflation	3.25%	3.50%
Plus Portfolio Real Rate of Return	5.54%	5.73%
Minus Expense Adjustment[7]	(0.90%)	(0.90%)
Minus Risk Adjustment	(0.39%)	(0.53%)
Total	7.50%	7.80%
Confidence Level	54%	56%

Based on this analysis, our preliminary recommendation is that the net investment return assumption be reduced from 7.80% to 7.50% per annum. Our final recommendation follows later in this section after discussion regarding a change in how expected administration expenses are handled.

Impact of 50/50 Excess Earnings Allocation on Investment Return Assumption

Note that in developing the recommended investment return assumption in the past, we have disclosed in our economic assumptions report (and in our annual actuarial valuation report) that the impact of the 50/50 allocation between the retirement and SRBR asset pools of the Article 5.5 "excess earnings" benefits has not been considered. We believe that such disclosure complied with the requirements under the then current ASOP No. 4. However, as we previously informed the Board in our discussion of ACERA's funding policy, ASOP No. 4 was recently revised (and adopted in December 2013) and the revised ASOP states that some plan provisions, including gain sharing provisions, "may create pension obligations that are difficult to appropriately measure using traditional valuation procedures." ASOP No. 4 now states that "for such plan provisions, the actuary should consider using alternative valuation procedures, such as stochastic modeling" to determine the impact of such gain sharing provisions in the valuation.

In our PowerPoint document dated November 8, 2013 used in our SRBR funding policy review, we estimated the impact of the 50/50 allocation of excess earnings to the SRBR on the contribution requirements. Based on those results, we estimated that the increase in contributions was roughly equivalent to a 0.8% - 0.9% reduction in the investment return assumption[8], based on the stochastic

[7] Investment and administrative.

[8] Investment return assumptions are generally expressed in ¼% increments. As such, the estimated increase in the contribution requirements due to the impact of the 50/50 allocation of excess earnings to the SRBR would be roughly equivalent to a reduction in the investment return assumption of 0.75%, when rounded to the nearest ¼%.

modeling we performed for that funding policy review[9]. We note, however, that the 1937 Act may not allow for prefunding of the SRBR through an increase in employee and employer contributions, which would result from a reduction in the investment return assumption.

In order to comply with the revised ASOP No. 4, we would recommend that for the funding valuation, we continue to develop our recommended investment return assumption and the resultant employer and employee contribution rates without considering the 50/50 excess earnings allocation, and that we would disclose the additional SRBR liability by re-measuring the pension liabilities under a reduced investment return assumption. For funding disclosure purposes, we would recommend using the investment return assumption approved by the Board, reduced by 0.75% for this purpose. For GASB disclosure purposes, this same additional liability would also be reported in the GASB valuation report.

Test of Risk Adjustment

The original development of the risk adjustment component of our investment earnings assumption model arose from our experience with many retirement boards over many years. Quite simply, combining the boards' inflation assumption with the real return and expense components produced – and produces – a substantially higher assumed return than what the boards actually adopt, regardless of the consulting actuary or the methods involved in the process.

In addition to the generally risk adverse attitude of retirement boards noted above, we believe another reason for this involves the inflation assumption. As noted earlier, the inflation assumption for actuarial valuations is generally longer term than that used by investment consultants. For many years, that has led to higher actuarial valuation inflation assumptions. A higher inflation assumption has a conservative effect - higher current cost - on the wage increase and COLA assumption, but is less conservative as part of the investment earnings assumption. In effect, the risk adjustment compensates for this by offsetting the effect of the higher inflation assumption on assumed investment earnings.

One way to test the reasonableness of the risk adjustment incorporated in our recommendation is to compare our risk adjusted investment return against the expected net investment return that would result from using the average of all the capital market assumptions -- including the lower inflation assumption -- of the investment consultants in our sample.

[9] This was done by comparing the future impact on the employer's contribution rate over a 15-year period both with and without the 50/50 allocation of excess earnings between the retirement and SRBR asset pools.

Here is the comparison. It shows that the difference between our 7.50% preliminary recommended return and that derived using the average of all the capital market assumptions of the investment consultants in our sample comes from the difference in the inflation assumptions, partially offset by the risk adjustment.

Assumption Element	Risk Adjusted Method	Average of Investment Consultant Sample	Difference
Inflation	3.25%	2.54%	0.71%
Risk Adjustment	(0.39%)	0.00%	(0.39%)
Real Rate of Return	5.54%	5.54%	0.00%
Expenses	(0.90%)	(0.90%)	0.00%
Total	7.50%	7.18%	0.32%

The 0.32% (32 basis points) difference between the two calculations represents about a 3% higher confidence level under the lower inflation result without the risk adjustment, as compared to the higher inflation, risk adjusted method. This means that under the 7.50% assumption, the risk adjustment does not fully offset the use of a higher inflation scenario than that assumed by the investment consultants.

Comparison with Other Public Retirement Systems

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

We note that a 7.50% investment return assumption is emerging as the most common assumption among those California public sector retirement systems that have studied this assumption recently. In particular, two of the largest California systems, CalPERS and LACERA, recently adopted a 7.50% earnings assumption. Note that CalPERS uses a lower inflation rate of 2.75% while LACERA uses an inflation assumption of 3.00%. However, three county employees retirement systems (Orange, Fresno, and Contra Costa) have recently adopted a 7.25% earnings assumption; furthermore, all three of these county systems use a 3.25% inflation assumption.

The following table compares the Association's recommended net investment return assumption against those of the nationwide public retirement systems that participated in the National Association of State Retirement Administrators (NASRA) 2013 Public Fund Survey:

Assumption	ACERA	NASRA 2013 Public Fund Survey		
		Low	Median	High
Net Investment Return	7.50%	6.50%	7.90%	8.50%

The detailed survey results show that of the systems that have an investment return assumption in the range of 7.50% to 7.90%, almost half of those systems have used an assumption of 7.50%. The survey also notes that several plans have reduced their investment return assumption during the last year, and others are considering doing so. State systems outside of California tend to change their economic assumptions slowly and so may lag behind emerging practices in this area.

While the recommended assumption of 7.50% provides for a smaller margin for adverse deviation within the risk adjustment model, as compared to three years ago, it is consistent with the Association's current practice relative to other public systems.

Developing an Investment Return Assumption for use in Accounting and Financial Reporting under GASB Statements 67 and 68

The Governmental Accounting Standards Board (GASB) has adopted Statements 67 and 68 that replace Statements 25 and 27 for financial reporting purposes. Below we discuss the issues and policy alternatives available to ACERA in developing its investment return assumption that will allow the Association to maintain consistency in its liability measurements for funding and financial reporting purposes.

Background

GASB Statement 67 governs the Association's financial reporting and is effective for calendar year ending December 31, 2014, while GASB Statement 68 governs the employers' financial reporting and is effective for fiscal year ending June 30, 2015. The new Statements specify requirements for measuring both the pension liability and the annual pension expense incurred by the employers. The new GASB requirements are only for financial reporting and do not affect how the Association determines funding requirements for its employers. Nonetheless, it is important to understand how the new financial reporting results will compare with the funding requirement results. That comparison will differ dramatically depending on whether one is considering the two pension liability measures or the annual pension expense/contribution measures:

- When measuring pension liability, GASB will use the same actuarial cost method (Entry Age method) and the same type of discount rate (expected return on assets) as ACERA uses for funding. This means that the GASB "Total Pension Liability" measure for financial reporting will be determined on the same basis as ACERA's "Actuarial Accrued Liability" measure for funding. This is a generally favorable feature of the new GASB rules that should largely preclude the need to explain why ACERA has two different measures of pension liability. We note that the same is true for the "Normal Cost" component of the annual plan cost for both funding and financial reporting.

- When measuring annual pension expense, GASB will require more rapid recognition of investment gains or losses and much shorter amortization of changes in the pension liability (whether due to actuarial gains or losses, actuarial assumption changes or plan amendments). Because of GASB's more rapid recognition of those changes, retirement systems that have generally used the same "annual required contribution" amount for both funding (contributions) and financial reporting (pension expense) will now have to prepare and disclose two different annual cost results, one for contributions and one for financial reporting under the new GASB Statements.

This situation will facilitate the explanation of why the funding and financial reporting results are different: the liabilities and Normal Costs are generally the same, and the differences in annual costs are due to differences in how changes in liability are recognized. However, there is one other feature in the details of how the liabilities are currently measured that will make even the liability and Normal Cost measures different unless action is taken by ACERA.

Treatment of Expected Administrative Expenses when Measuring Liabilities

As noted above, according to GASB, the discount rate used for financial reporting purposes should be based on the long-term expected rate of return on a retirement system's investments, just as it is for funding. However, GASB requires that this assumption should be net of investment expenses but not net of administrative expenses (i.e., without reduction for administrative expenses). Currently, ACERA's investment return assumption used for the annual funding valuation is developed net of both investment and administrative expenses.

While ACERA could continue to develop its funding investment return assumption net of both investment and administrative expenses, that would mean that the Association would then have two slightly different investment return assumptions, one for funding and one for financial reporting. To avoid this apparent discrepancy, and to maintain the consistency of liability measures described above, we

believe that it would be preferable to use the same investment return assumption for both funding and financial reporting purposes. The direct way to achieve this would be to develop the investment return assumption for funding purposes on a basis that is gross of administrative expenses and net of only investment expenses. To review, using the same assumption for both purposes would be easier for ACERA's stakeholders to understand and should result in being able to report ACERA's Actuarial Accrued Liability (AAL) for funding purposes as the Total Pension Liability (TPL) for financial reporting purposes.

The table below is from page 14 of this report. It contains the information used to develop the expense assumption that was used in our preliminary recommendation for the investment return assumption.

Investment and Non-Investment Expenses
as a Percentage of Average Market Value of Assets

(dollars in 000's)

Year Ending December 31	Average Market Value of Assets	Investment Expenses[1]	Non-Investment Expenses[2]	Investment %	Non-Investment %[2]	Total %
2009	$4,241,415	$28,899	$12,255	0.68	0.29	0.97
2010	4,950,688	30,625	13,001	0.62	0.26	0.88
2011	5,149,447	34,740	13,767	0.67	0.27	0.94
2012	5,371,301	37,310	14,098	0.69	0.26	0.95
2013	6,154,250	42,056	14,728	0.68	0.24	0.92
Average				0.67	0.26	0.93
Recommended Assumption				0.65	0.25	0.90

[1] *"Net fees & investment expenses, excluding interest expense from leverage on real estate."*

[2] *Includes administrative, legal, technology, actuarial, and business continuity expenses. It is our understanding that these amounts have been included by the Association in establishing its budget for administrative expenses.*

Development of Investment Return Assumption for Funding on a Gross of Administrative Expenses Basis so the Same Assumption Can Also Be Used for Financial Disclosure ("Option A")

If the Board wishes to develop a single investment return assumption for both funding and financial reporting purposes, then it would be necessary to exclude the administrative expense component of 0.25% from the preliminary 7.50% investment return recommended earlier in the body of this report. One way to do this would be to increase the investment return assumption by 0.25% to an assumption of 7.75%. Note that under this approach, the increase in the investment return assumption would be accompanied by an explicit loading for administrative expenses as summarized in the table below:

Calculation of Net Investment Return Assumption

Assumption Component	December 31, 2014 Recommended Values if used only for Funding (Net of Administrative Expenses)	December 31, 2014 Recommended Values for both Funding and Financial Reporting (Gross of Administrative Expenses)
Inflation	3.25%	3.25%
Plus Portfolio Real Rate of Return	5.54%	5.54%
Minus Expense Adjustment	(0.90%)	(0.65%)
Minus Risk Adjustment	(0.39%)	(0.39%)
Total	7.50%	7.75%
Confidence Level	54%	54%
Increase in Combined Employer and Employee Contributions Due to Change in Investment Return Assumption Only[10] (Cost as % of Payroll)	2.7%	0.4%
Increase in Employer and Employee Contributions Due to Explicit Load for Administrative Expenses (Cost as % of Payroll)	Not Applicable	1.6%

There is a substantive complication associated with eliminating the administrative expenses in developing the investment return assumption used for funding that relates to the allocation of administrative expenses between the employers and employees:

1. Even though GASB requires the exclusion of the administrative expenses from the investment return assumption, such expense would continue to accrue for a retirement system. For private sector retirement plans, where the investment return is developed using an approach similar to that required by GASB (i.e., without deducting administrative expenses), contribution requirements are increased explicitly by the anticipated annual administrative expense.

2. Under ACERA's current approach of subtracting the administrative expense in the development of the investment return assumption, such annual administrative expense is funded implicitly by effectively deducting it from future expected investment returns. Since an investment return

[10] This does not measure the contribution rate impact from the changes in the other economic assumptions (e.g., the decrease in the inflation assumption from 3.50% to 3.25%) and the non-economic assumptions (e.g., the improvement in life expectancy).

assumption net of investment and administrative expenses has been used historically to establish both the employer's and the employee's contribution requirements, these administrative expenses have been funded implicitly by both the employer and the employees.

3. A switch from the method described in (2) to the method described in (1) may require a new discussion on how to allocate administrative expenses between employers and employees, including possibly establishing a new method to allocate the anticipated annual administrative expense between them. Under current practice, part of the implicit funding of administrative expenses is in the Normal Cost and so is shared between the employer and the employees. However, the rest of the implicit expense funding is in the (Unfunded) Actuarial Accrued Liability, which is funded by the employers.

4. It will not be straightforward to quantify the current implicit sharing of administrative expenses between employers and employees. This means that reproducing that allocation on an explicit basis will be difficult to develop and to explain. This in turn means that ACERA would need to develop a new basis for sharing the cost of administrative expenses. Alternatively, ACERA could decide to treat administrative expenses as a loading applied only to the employer contribution rates, which is the practice followed by private plans, both single employer and multi-employer.

5. As the Board is aware, legislative changes under AB 340 imposed major modifications to both the level of benefits and the cost-sharing of the funding of those benefits for county employees' retirement systems. Included in such modifications is the requirement (for future hires) to fund the Normal Cost on a 50:50 basis between the employer and the employee. As noted in (3) above, under current practice, part of the implicit funding of administrative expenses is in the Normal Cost and so would be shared between the employer and the employees. This would not necessarily continue when the administrative expense loading is developed separate from the Normal Cost.

The above considerations would generally apply to all 1937 Act CERL retirement systems. However, because the financial provisions for ACERA are governed under Article 5.5 of the CERL, there is an additional consideration for the Board. Currently, before considering the 50/50 gain sharing, the "net earnings" available after deducting both investment and administrative expenses are used to determine the same interest crediting rate for both the pension and SRBR asset pools. If additional amounts are collected from the employer and the employees to defray the administrative expenses, there would be an increase in the amount of "net earnings" available to credit interest. The Board should review and concur as this is a change from the current interest crediting policy.

If the Board still wishes to develop a single investment return assumption for both funding and financial reporting purposes, it is our recommendation that the Board adopt a change in the funding of administrative expenses from the method described in (2) above with an implicit allocation of administrative expenses to the method described in (1) above with an explicit allocation of administrative expenses.

In addition, we recommend that a separate, explicit administrative expense load assumption be developed. There are various ways to set the explicit administrative expense load assumption, but ultimately the method should result in an assumption that is approximately equivalent to $14.7 million annually, or 1.6% of payroll.

The more significant issues mentioned in (3), (4) and (5) above concern whether or not the costs associated with the administrative expenses should continue to be allocated to both the employers and the employees. Unless the Board wishes to charge administrative expenses only to the employers, we propose a method whereby the costs associated with the explicit assumption for administrative expenses continue to be allocated to both employers and employees. A straightforward way to do that in a manner generally consistent with current practice would be to allocate expenses based on the components of the total contribution rate (before expenses) for employers and employees. These components would be employee Normal Cost contributions, employer Normal Cost contributions and employer UAAL contributions. **Of the total administrative expenses of about $14.7 million or 1.6% of payroll, this would result in about $10.8 million or 1.2% of payroll being allocated to the employers and $3.9 million or 0.4% of payroll being allocated to the employees in the aggregate. These illustrative allocation amounts are based on the 23.75% and 8.58% aggregate contribution rates paid by the employers and the employees, respectively, in the December 31, 2013 valuation.**

Development of Investment Return Assumption on a Net of Administrative Expenses Basis But use that Same Assumption for Financial Disclosure Development ("Option B")

There is a possible alternative approach which would be to leave the investment return assumption at 7.50% for funding (instead of increasing it by 0.25%) and then to use that same 7.50% for financial disclosure purposes under GASB. In effect, this means that even though the same rate is used, it would be considered net of administrative expenses for funding but gross of administrative expenses for financial disclosures. This would result in an increase in the margin for adverse deviation or "confidence level" associated with the use of the recommended 7.50% assumption from 54% when it is used for funding purposes to 57% when it is used for financial disclosure purposes.

The following table summarizes the components of the investment return assumption as recommended for funding (net of administrative expenses) and as proposed for financial disclosure purposes (gross of administrative expenses):

Calculation of Net Investment Return Assumption

Assumption Component	December 31, 2014 Recommended Values if used only for Funding (Net of Administrative Expenses)	December 31, 2014 Recommended Values for both Funding and Financial Reporting (Gross of Administrative Expenses)
Inflation	3.25%	3.25%
Plus Portfolio Real Rate of Return	5.54%	5.54%
Minus Expense Adjustment	(0.90%)	(0.65%)
Minus Risk Adjustment	(0.39%)	(0.64%)
Total	7.50%	7.50%
Confidence Level	54%	57%

C. SALARY INCREASE

Salary increases impact plan costs in two ways: (i) by increasing members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections; and (ii) by increasing total active member payroll which in turn generates lower UAAL contribution rates. These two impacts are discussed separately below.

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

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

   As discussed earlier in this report, we are recommending that the assumed rate of inflation be reduced from 3.50% per annum to 3.25% per annum. This inflation component will be used as part of the salary increase assumption.

2. Real "Across the Board" Pay Increases – These increases are sometimes termed productivity increases since they are considered to be derived from the ability of an organization or an economy to produce goods and services in a more efficient manner. As that occurs, at least some portion of the value of these improvements can provide a source for pay increases. These increases are typically assumed to extend to all employees "across the board." The State and Local Government Workers Employment Cost Index produced by the Department of Labor provides evidence that real "across the board" pay increases above inflation have averaged about 0.4% - 0.7% annually during the last ten to twenty years.

   We also referred to the annual report on the financial status of the Social Security program published in May 2013. In that report, real "across the board" pay increases are forecast to be 1.1% per year under the intermediate assumptions.

   The real pay increase assumption is generally considered a more "macroeconomic" assumption that is not necessarily based on individual plan experience. However, we note that for ACERA the most recent salary increase experience indicates that actual average salary increases were lower than the average change in CPI:

Valuation Date	Actual Average Increase[1]	Actual Change in CPI[2]
December 31, 2006	5.78%	3.44%
December 31, 2007	1.74%	3.84%
December 31, 2008	6.28%	0.02%
December 31, 2009	4.51%	2.61%
December 31, 2010	2.23%	1.52%
Five-Year Average as of December 31, 2010	4.11%	2.29%
December 31, 2011	0.78%	2.93%
December 31, 2012	0.85%	2.22%
December 31, 2013	0.42%	2.58%
Five-Year Average as of December 31, 2013	1.76%	2.37%

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

(2) *Based on the change in the December CPI for the San Francisco-Oakland-San Jose Area compared to the prior year.*

Even though the actual average salary increase was lower than the average change in the CPI over the last five-year period from 2009 to 2013, the average observed for the five-year period during the prior review of this assumption (prior to the December 31, 2011 valuation) was significantly higher than the actual change in CPI. We recommend that the real "across the board" assumption of 0.50% be maintained for the December 31, 2014 actuarial valuation. This means that the combined inflation and "across the board" salary increase assumption will decrease from 4.00% to 3.75%.

3. Merit and Promotional 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 ACERA, there are service-specific merit and promotional increases. The review of the merit and promotional increases is provided in Section IV, Subsection F of this report.

The recommended merit and promotional increases range from 3.70% to 0.40% for General members and 6.70% to 0.70% for Safety members.

All three of these factors are incorporated into a salary increase assumption which is applied in the actuarial valuation to project future benefits and future normal cost contribution collections.

Active Member Payroll

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

We recommend that the active member payroll increase assumption to be used in the December 31, 2014 valuation be reduced from 4.00% to 3.75% per annum, consistent with the combined inflation and "across the board" salary increase assumptions.

Terminal Pay

Under the Ventura Settlement, employers agreed to include several additional pay elements as Earnable Compensation for non-CalPEPRA. There are two categories within which these additional pay elements fall:

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

The first category is recognized in the actuarial calculations by virtue of being included in the current pay of active members. The second category requires an actuarial assumption to anticipate its impact on a member's retirement benefit.

Data has been collected since 1997 to estimate terminal pay for active members as a percentage of current pay. Because of the uncertainty associated with terminal pay (e.g., vacation accrual and sell off policies, maximum vacation carryover, vacation usage, etc.) a range of estimates was determined. An assumption was then recommended for terminal pay.

The review of the terminal pay assumption is provided in Section IV, Subsection G of this report.

IV. DEMOGRAPHIC ASSUMPTIONS

A. RETIREMENT RATES

The age at which a member retires 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.

General Tier 1 rates have been increased to reflect earlier retirements. General Tier 2 rates have been lowered at the younger ages and increased at the older ages to more closely reflect recent actual experience. General Tier 3 rates remain unchanged since actual experience was close to expected experience where data was available.

Safety Tier 1 rates have been increased to reflect earlier retirements, as the actual number of retirements before age 60 was more than expected. The rates for Safety Tier 2 (also used for Safety Tier 2D members) have been increased at the lower ages and decreased at the higher ages to more closely reflect recent actual experience.

No adjustments have been made to the General Tier 4, Safety Tier 2C, and Safety Tier 4 rates because no data is available for these tiers.

The service (non-disability) retirement experience for the active participants over the past three years (from December 1, 2010 to November 30, 2013) is provided on the following pages.

The rates of actual General Tier 1 retirements compared to both the rates expected for the last three years and the proposed rates are as follows:

Actual and Expected Rates of Retirement for General Tier 1 Members
(From December 1, 2010 to November 30, 2013)

Rate (%)

Age	Actual Retirements	Current Expected Retirements	Proposed Expected Retirements
50	3.85	3.00	4.00
51	0.00	3.00	4.00
52	3.77	3.00	4.00
53	4.92	3.00	4.00
54	7.84	3.00	4.00
55	6.78	6.00	7.00
56	10.42	8.00	9.00
57	12.05	10.00	12.00
58	15.63	10.00	12.00
59	19.88	13.00	16.00
60	24.81	20.00	24.00
61	32.31	20.00	24.00
62	47.12	35.00	40.00
63	35.14	30.00	35.00
64	44.64	30.00	35.00
65	30.30	35.00	35.00
66	44.00	30.00	35.00
67	38.46	25.00	30.00
68	36.36	20.00	25.00
69	0.00	40.00	35.00
70 and over	20.00	100.00	100.00

The rates of actual General Tier 2 retirements compared to both the rates expected for the last three years and the proposed rates are as follows:

Actual and Expected Rates of Retirement for General Tier 2 Members
(From December 1, 2010 to November 30, 2013)

Rate (%)

Age	Actual Retirements	Current Expected Retirements	Proposed Expected Retirements
50	0.59	2.00	2.00
51	1.28	2.00	2.00
52	1.45	2.00	2.00
53	2.03	2.00	2.00
54	2.84	2.00	2.00
55	0.80	3.00	2.00
56	3.13	3.00	3.00
57	3.05	4.00	4.00
58	3.44	5.00	4.00
59	5.57	5.00	5.00
60	8.30	5.00	6.00
61	10.60	8.00	9.00
62	16.58	20.00	18.00
63	17.99	16.00	18.00
64	22.57	18.00	20.00
65	27.36	22.00	25.00
66	38.67	20.00	25.00
67	23.48	20.00	25.00
68	27.72	30.00	30.00
69	34.21	35.00	35.00
70 and over	22.03	100.00	100.00

The rates of actual General Tier 3 retirements compared to both the rates expected for the last three years and the proposed rates are as follows:

Actual and Expected Rates of Retirement for General Tier 3 Members
(From December 1, 2010 to November 30, 2013)

Rate (%)

Age	Actual Retirements	Current Expected Retirements	Proposed Expected Retirements
50	0.00	6.00	6.00
51	0.00	3.00	3.00
52	0.00	5.00	5.00
53	0.00	6.00	6.00
54	0.00	6.00	6.00
55	25.00	12.00	12.00
56	0.00	13.00	13.00
57	16.67	13.00	13.00
58	16.67	14.00	14.00
59	16.67	16.00	16.00
60	50.00	21.00	21.00
61	0.00	20.00	20.00
62	0.00	30.00	30.00
63	0.00	25.00	25.00
64	0.00	25.00	25.00
65	0.00	30.00	30.00
66	0.00	25.00	25.00
67	0.00	25.00	25.00
68	0.00	25.00	25.00
69	0.00	50.00	50.00
70 and over	0.00	100.00	100.00

The rates of actual Safety Tier 1 retirements compared to both the rates expected for the last three years and the proposed rates are as follows:

Actual and Expected Rates of Retirement for Safety Tier 1 Members
(From December 1, 2010 to November 30, 2013)

Rate (%)

Age	Actual Retirements[1]	Current Expected Retirements[2]	Proposed Expected Retirements[2]
50	16.67	35.00	35.00
51	44.44	25.00	30.00
52	25.00	25.00	25.00
53	30.00	35.00	35.00
54	55.56	40.00	45.00
55	71.43	40.00	45.00
56	0.00	40.00	45.00
57	50.00	40.00	45.00
58	0.00	40.00	45.00
59	100.00	40.00	45.00
60 and over	41.67	100.00	100.00

(1) *Excluding members who have accrued a benefit of 100% of final average earnings.*

(2) *Retirement rate is 100% after a member accrues a benefit of 100% of final average earnings.*

The rates of actual Safety Tier 2 retirements compared to both the rates expected for the last three years and the proposed rates are as follows:

Actual and Expected Rates of Retirement for Safety Tier 2 Members
(From December 1, 2010 to November 30, 2013)

Rate (%)

Age	Actual Retirements	Current Expected Retirements[1]	Proposed Expected Retirements[1]
50	19.27	10.00	15.00
51	23.81	10.00	15.00
52	20.00	10.00	15.00
53	12.50	10.00	15.00
54	13.64	10.00	15.00
55	31.43	10.00	15.00
56	14.81	15.00	20.00
57	25.93	20.00	25.00
58	17.39	20.00	25.00
59	41.18	20.00	25.00
60	25.00	40.00	30.00
61	35.71	40.00	30.00
62	15.38	40.00	30.00
63	21.05	40.00	30.00
64 and over	32.86	100.00	100.00

[1] *Retirement rate is 100% after a member accrues a benefit of 100% of final average earnings.*

Currently the retirement rates for Safety Tier 2 members are also used for Safety Tier 2D. Note that we do not yet have any retirement experience for Safety Tier 2C and Tier 2D members, so we recommend maintaining the current retirement rates for Safety Tier 2C and utilizing the proposed Safety Tier 2 rates for Safety Tier 2D. We will monitor this assumption as experience develops for these two tiers. The current and proposed retirement rates for Safety Tier 2C and Tier 2D are as follows:

Expected Rates of Retirement for Safety Tier 2C and Tier 2D Members

Rate (%)

Age	Safety Tier 2C Current and Proposed Expected Retirements[1]	Safety Tier 2D Current Expected Retirements[1]	Safety Tier 2D Proposed Expected Retirements[1]
50	4.00	10.00	15.00
51	2.00	10.00	15.00
52	2.00	10.00	15.00
53	3.00	10.00	15.00
54	6.00	10.00	15.00
55	10.00	10.00	15.00
56	12.00	15.00	20.00
57	20.00	20.00	25.00
58	10.00	20.00	25.00
59	15.00	20.00	25.00
60	60.00	40.00	30.00
61	60.00	40.00	30.00
62	60.00	40.00	30.00
63	60.00	40.00	30.00
64 and over	100.00	100.00	100.00

(1) *Retirement rate is 100% after a member accrues a benefit of 100% of final average earnings.*

Chart 1 compares actual experience with the current and proposed rates of retirement for General Tier 1 members. Chart 2 displays the same data for General Tier 2 members; Chart 3 is for General Tier 3 members; Chart 4 is for Safety Tier 1 members; and Chart 5 is for Safety Tier 2 members.

In the prior valuation, deferred vested General and Safety members were assumed to retire at age 59 and 56, respectively. The average age at retirement over the three-year study period was 61 for General and 56 for Safety. We recommend increasing the General assumption to age 60 and maintaining the Safety assumption at age 56.

Please note that for members who terminate with less than five years of service and are not vested, we assume that they will retire at age 70 for both General and Safety if they decide to leave their contributions on deposit as permitted by §31629.5.

Chart 1
Retirement Rates - General Tier 1 Members

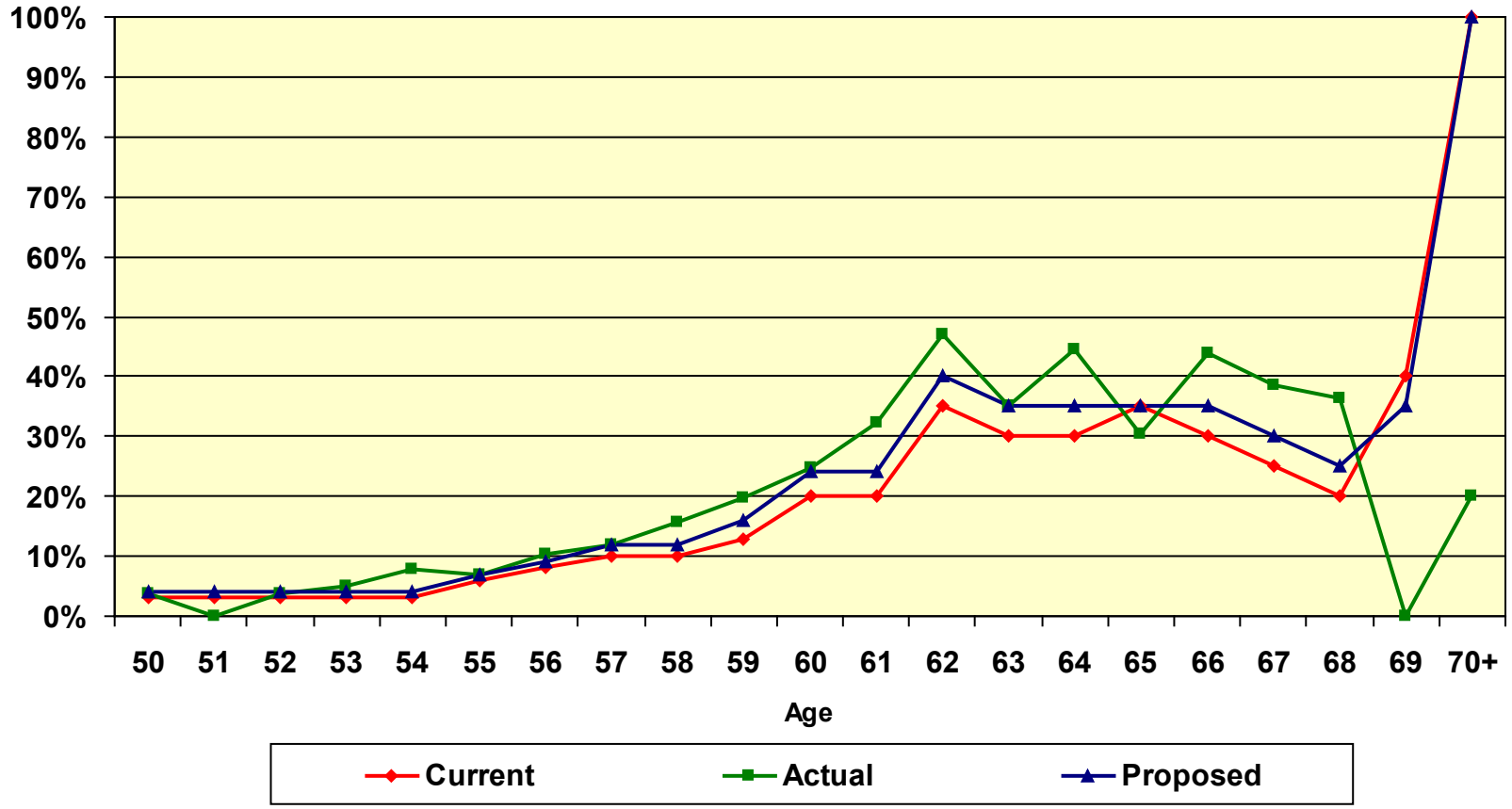


Chart 2
Retirement Rates - General Tier 2 Members

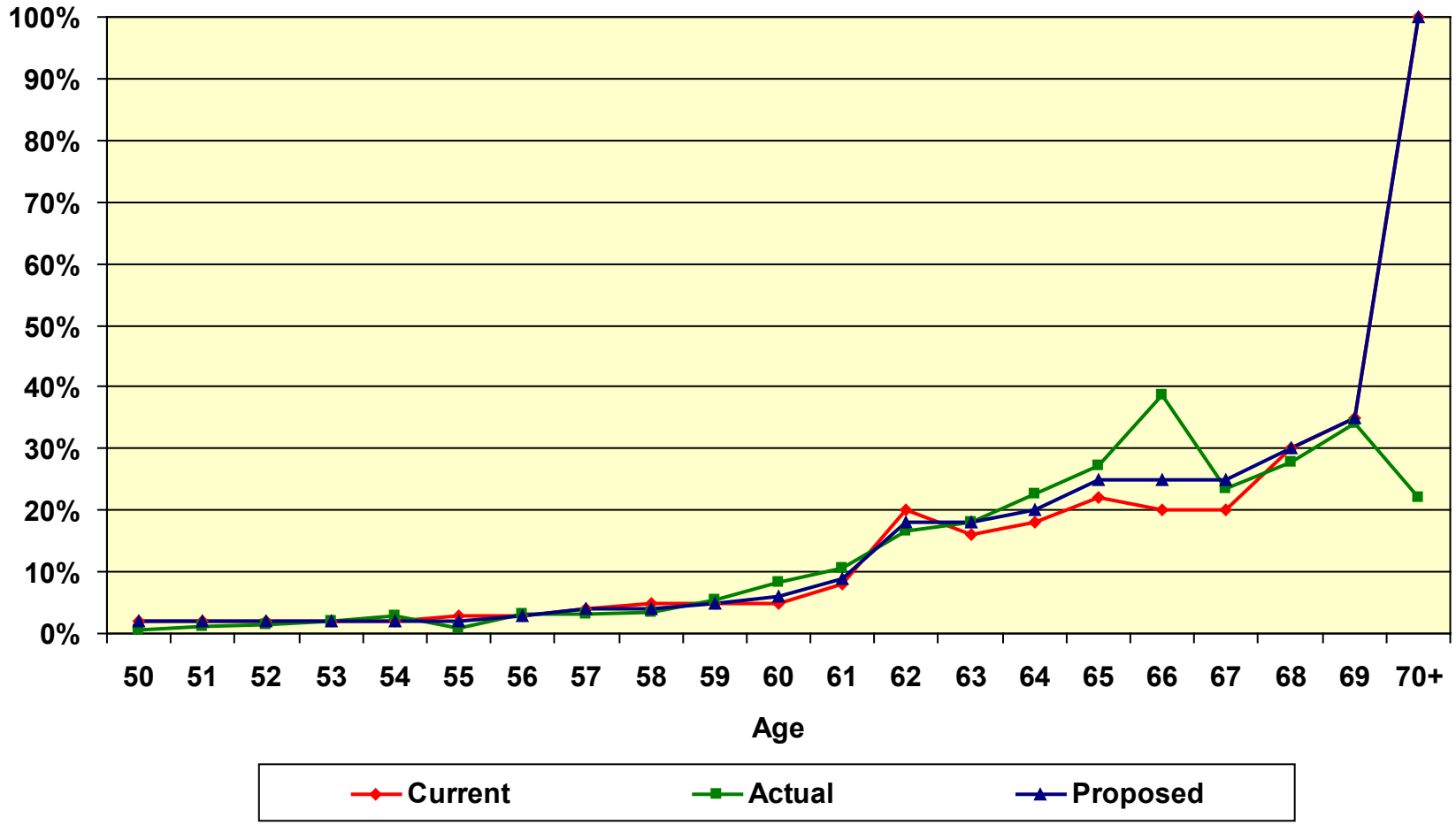


Chart 3
Retirement Rates - General Tier 3 Members

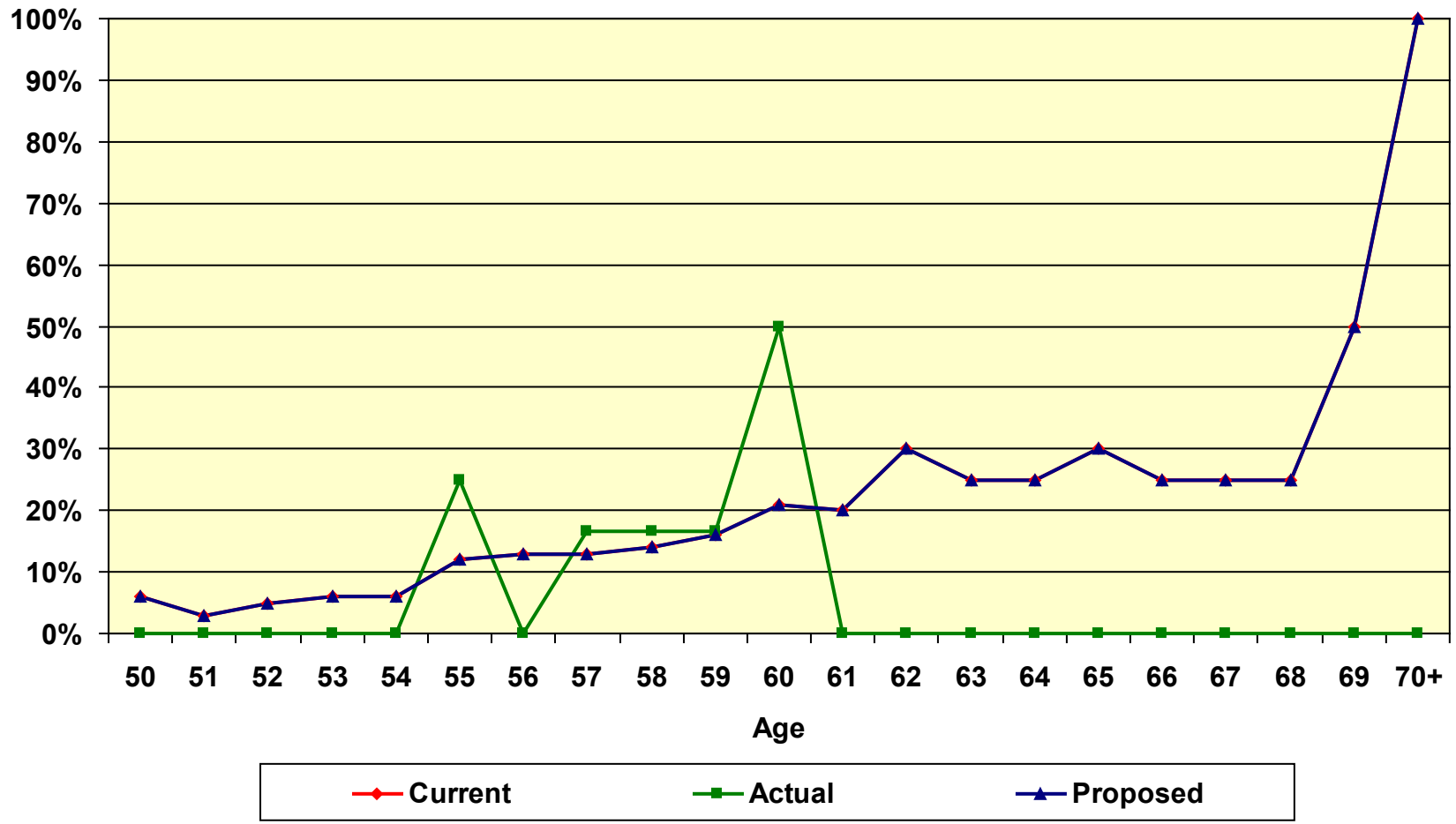


Chart 4
Retirement Rates - Safety Tier 1 Members

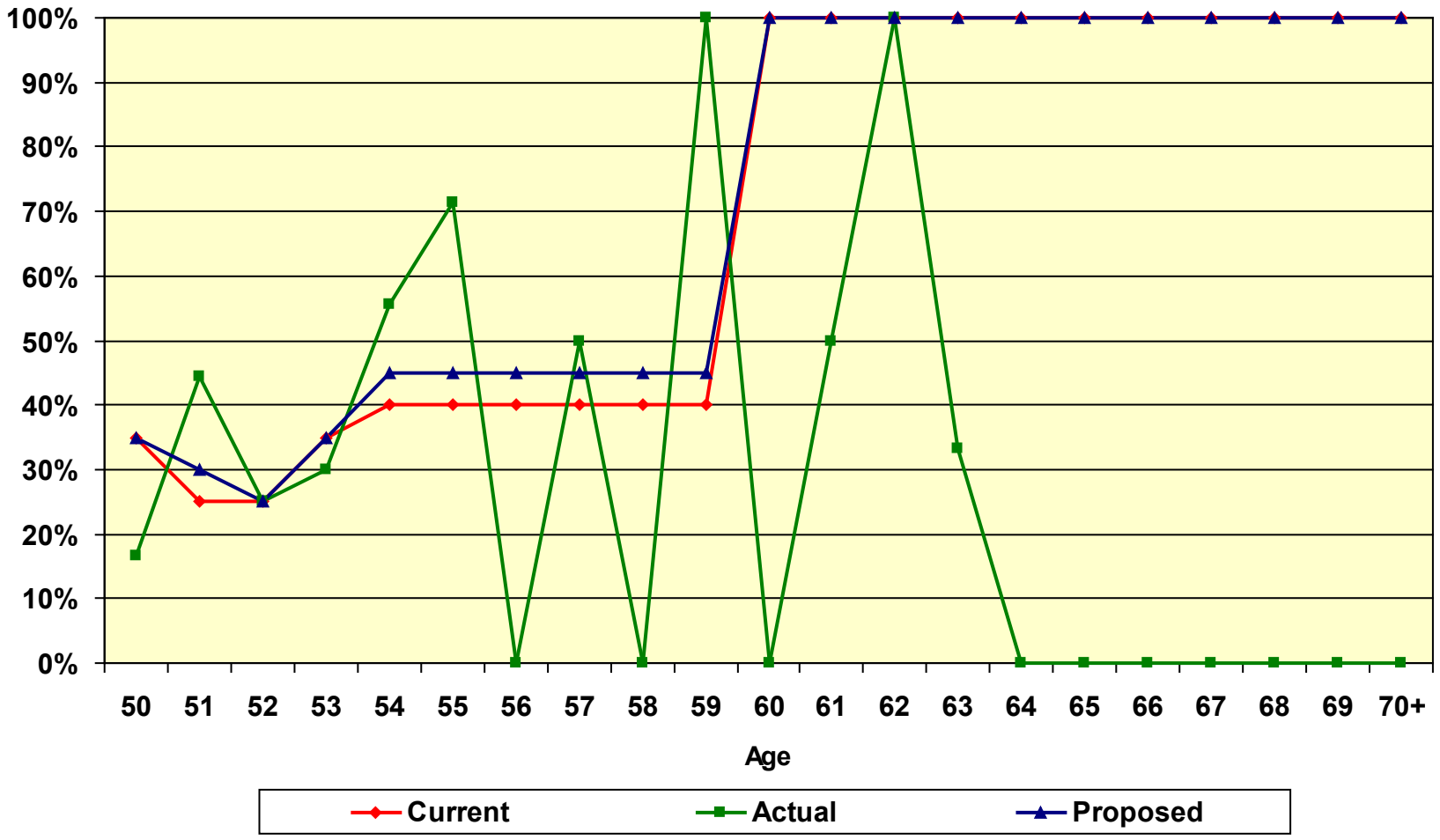
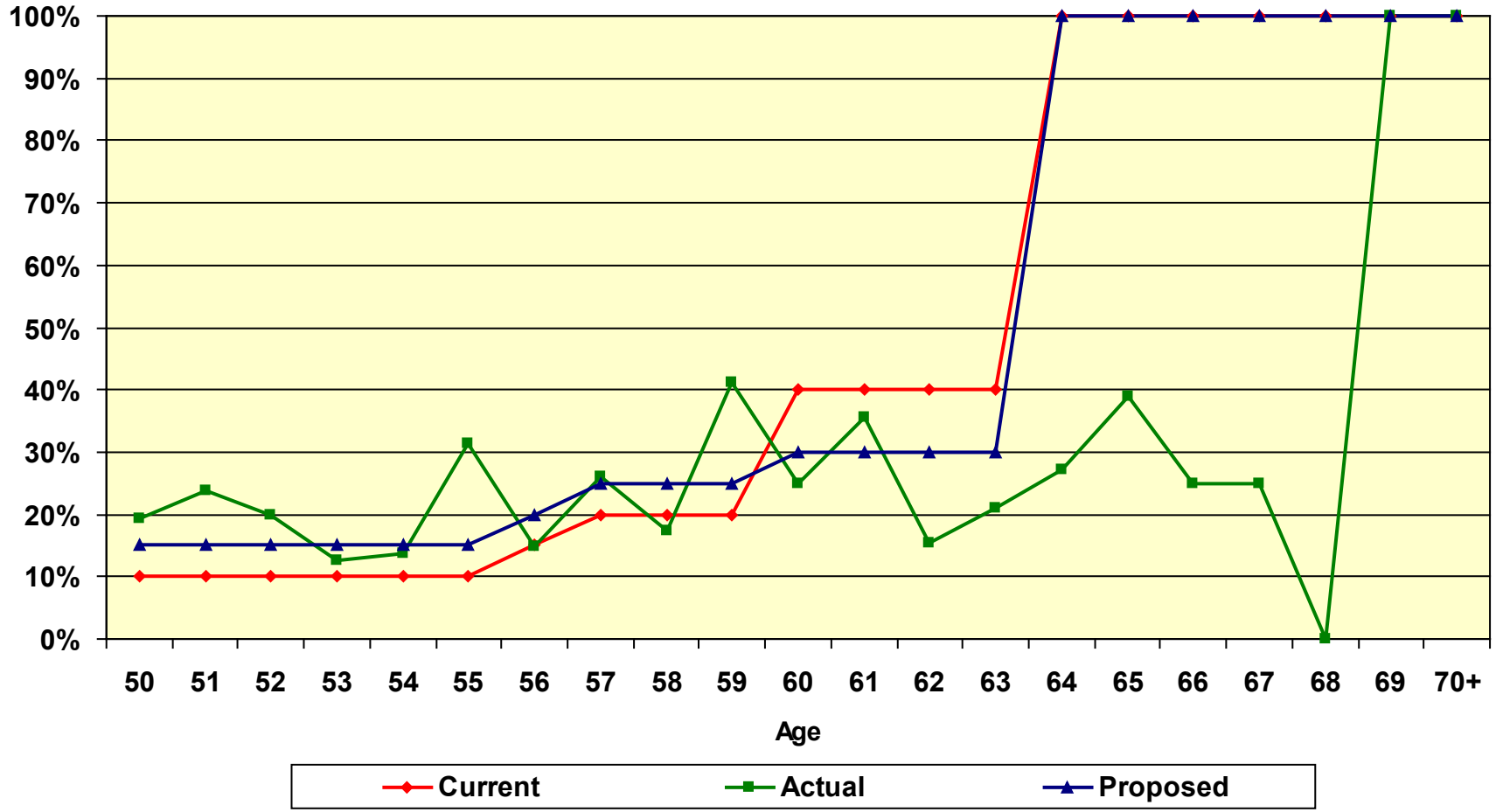


Chart 5
Retirement Rates - Safety Tier 2 Members



B. MORTALITY RATES - HEALTHY

The "healthy" mortality rates project what proportion of members will die before retirement as well as the life expectancy of a member who retires for service (i.e., who did not retire on a disability pension). The tables currently being used for both General and Safety post-service retirement mortality rates are the RP-2000 Combined Healthy Mortality Tables for Males and Females. The tables for both General and Safety are set back two years for all male members and beneficiaries, and set back one year for all female members and beneficiaries.

The table that we recommend for the General members and all General and Safety beneficiaries is the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, set back one year for males and females. For Safety members, we recommend the use of the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, with no setback for males and set back two years for females.

Pre-Retirement Mortality

The number of deaths among active members is not large enough to provide statistics credible enough to develop a unique table. Therefore, it is assumed that pre-retirement mortality and post-retirement mortality will follow the same tables. All pre-retirement deaths are assumed to be non-service connected.

Post-Retirement Mortality (Service Retirements)

Among service retired members, the actual deaths compared to the expected deaths under the current and proposed assumptions for the last three years are as follows:

	General – Healthy			Safety – Healthy		
Year Ending 11/30	Actual Deaths	Current Expected Deaths	Proposed Expected Deaths	Actual Deaths	Current Expected Deaths	Proposed Expected Deaths
2011	147	159	130	14	13	12
2012	154	165	135	12	14	13
2013	142	172	141	17	16	15
Total	443	496	406	43	43	40
Actual/Expected		89%	109%		100%	108%

Actuarial Standards of Practice strongly encourage that mortality assumptions reflect the expectation of continued mortality improvement in the future. To achieve this, we prefer to include a margin of at least 10% (i.e., an actual/expected ratio of at least 110%) in our proposed mortality assumptions.

If we include beneficiary mortality experience for the most recent 3-year period, then the combined actual and expected deaths for General members and all General and Safety beneficiaries are as follows:

	General Male Members and All Male Beneficiaries		General Female Members and All Female Beneficiaries		All General Members and All General and Safety Beneficiaries	
Group	Actual Deaths	Proposed Expected Deaths	Actual Deaths	Proposed Expected Deaths	Actual Deaths	Proposed Expected Deaths
Total	210	197	381	339	591	536
Actual/Expected		107%		112%		110%

As noted above, in order to reflect the expectation of continued mortality improvement in the future, we prefer to include a margin of at least 10% (i.e., an actual/expected ratio of at least 110%) in our proposed mortality assumptions. This preferred margin leads to our recommendation of the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, set back one year for males and females, for General members and all General and Safety beneficiaries, and the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, with no setback for males and set back two years for females, for Safety members. Note that when the results of our proposed assumptions for all General and Safety members and beneficiaries are viewed in combination, our preferred margin of 10% will be achieved.

Chart 6 compares actual to expected deaths for General members under the current and proposed assumptions for all pensioners over the last three years.

Chart 7 has the same comparison for Safety members.

Chart 8 shows the life expectancies under the current and the proposed tables for General Members.

Chart 9 has the same information for Safety members.

The proposed assumptions reflect recent experience and provide margin for future mortality improvements. We will continue to monitor this experience closely in future studies.

Mortality Table for Member Contributions

We recommend that the mortality table used for determining contributions for General members be changed from the RP-2000 Combined Healthy Mortality Table set back two years for males and set back one year for females, weighted 30% male and 70% female, to the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, set back one year for males and females, weighted 30% male and

70% female. This is based on the proposed mortality table for General members and the actual sex distribution for the current General members.

For Safety members, we recommend the mortality table be changed from the RP-2000 Combined Healthy Mortality Table set back two years for males and set back one year for females, weighted 75% male and 25% female, to the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, with no setback for males and set back two years for females, weighted 75% male and 25% female. This is based on the proposed mortality table for Safety members and the actual sex distribution for the current Safety members.

Chart 6
Post - Retirement Deaths (General)
Non - Disabled Members

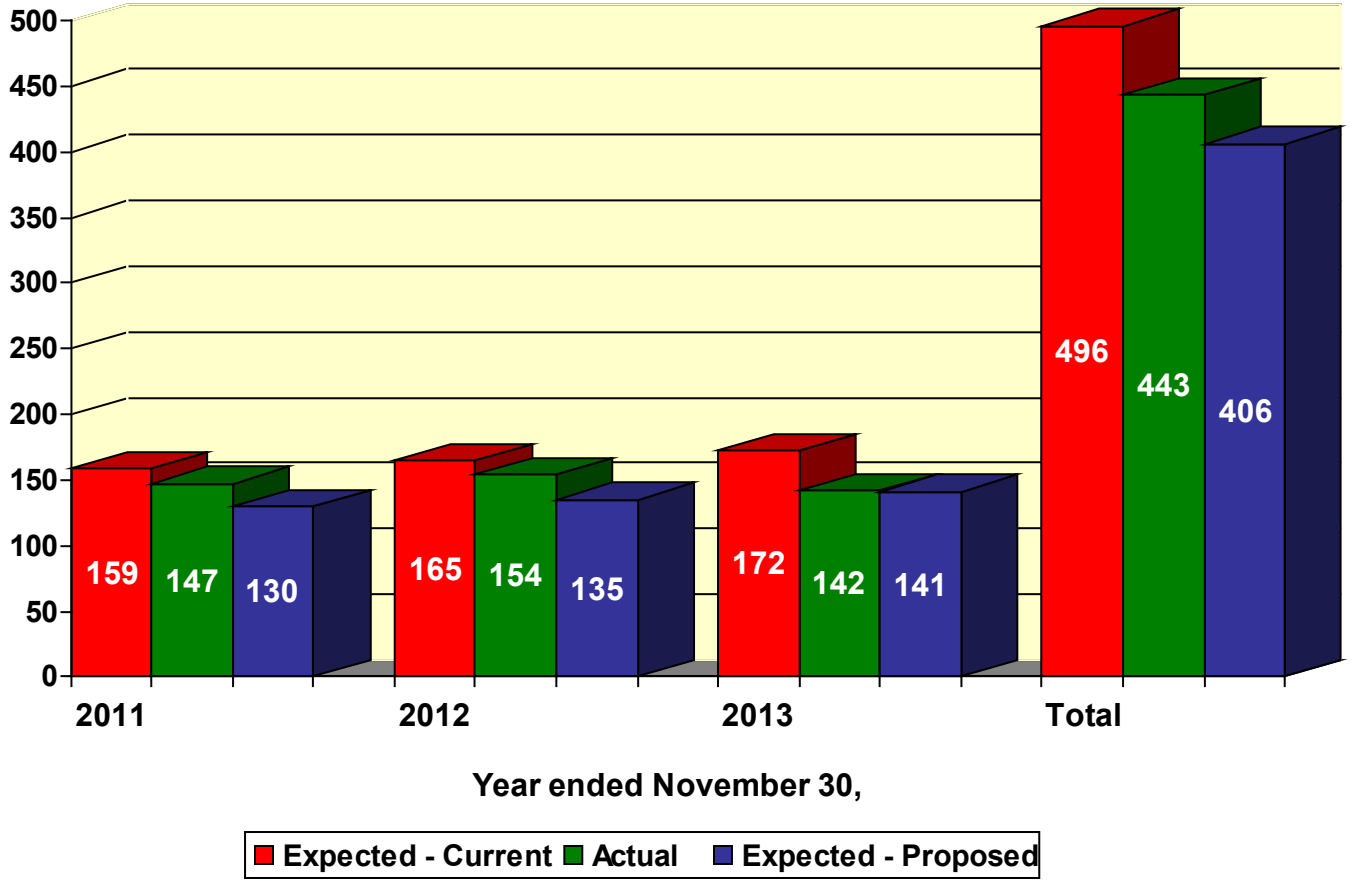


Chart 7
Post - Retirement Deaths (Safety)
Non - Disabled Members

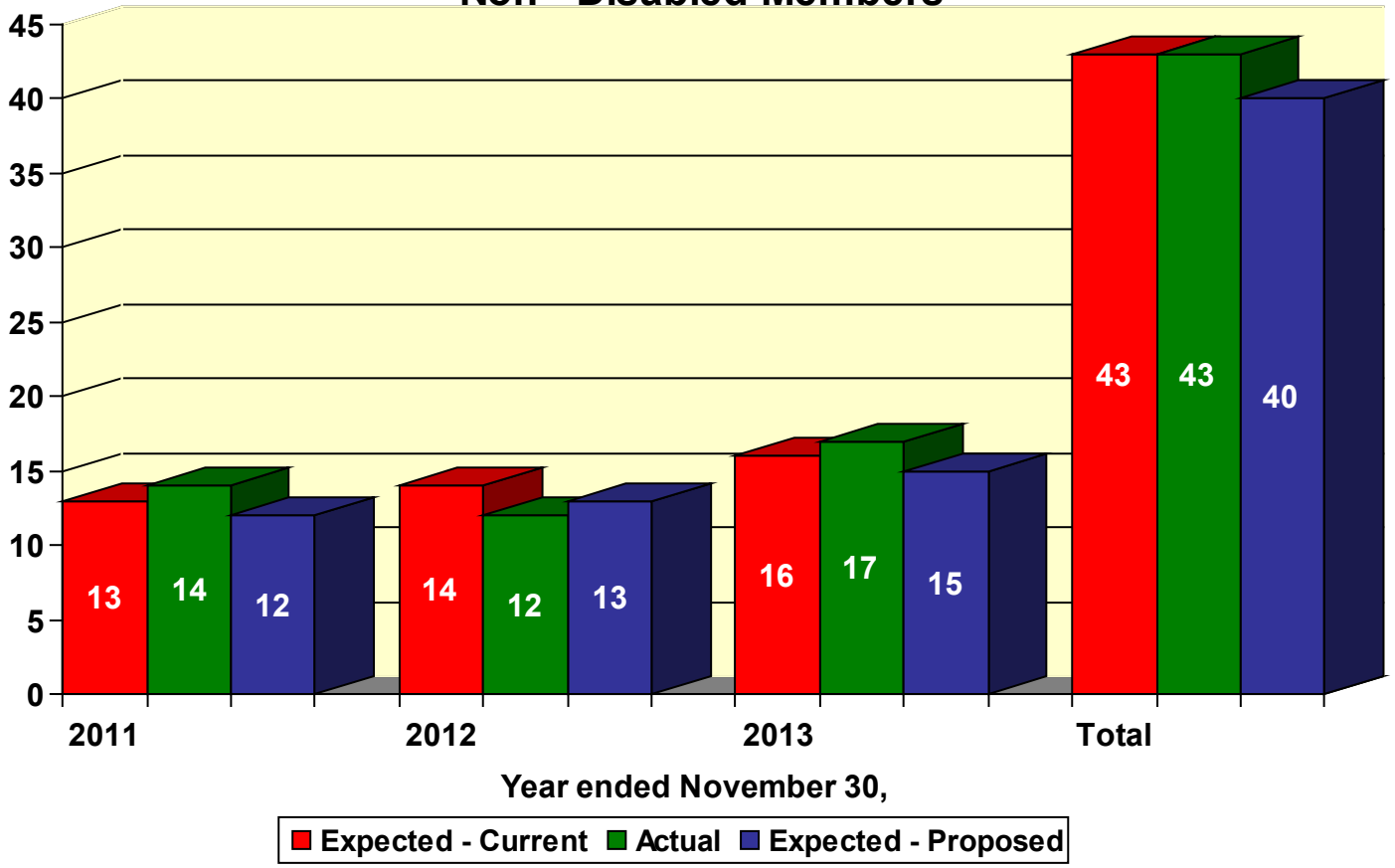


Chart 8
Life Expectancies (General)

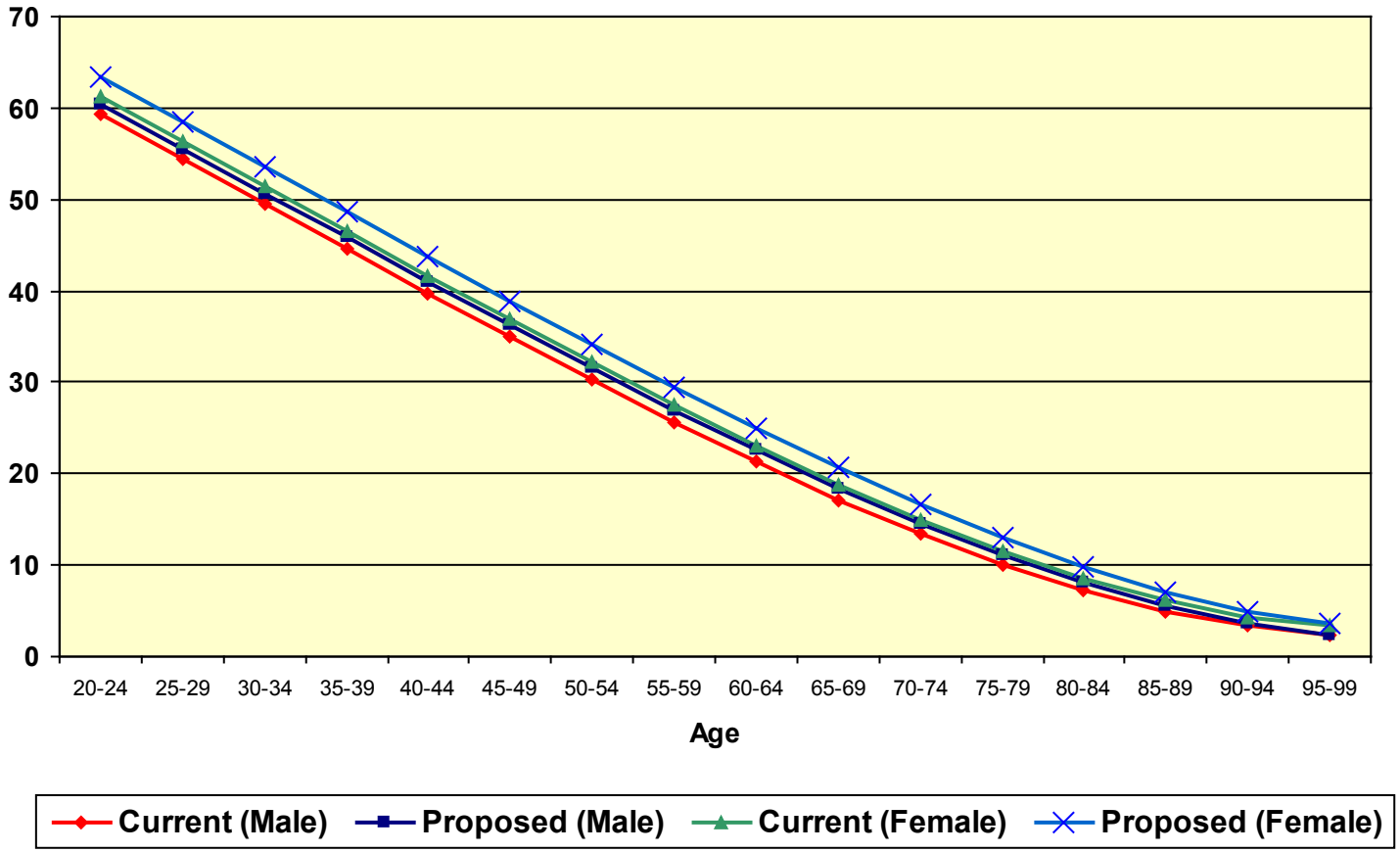
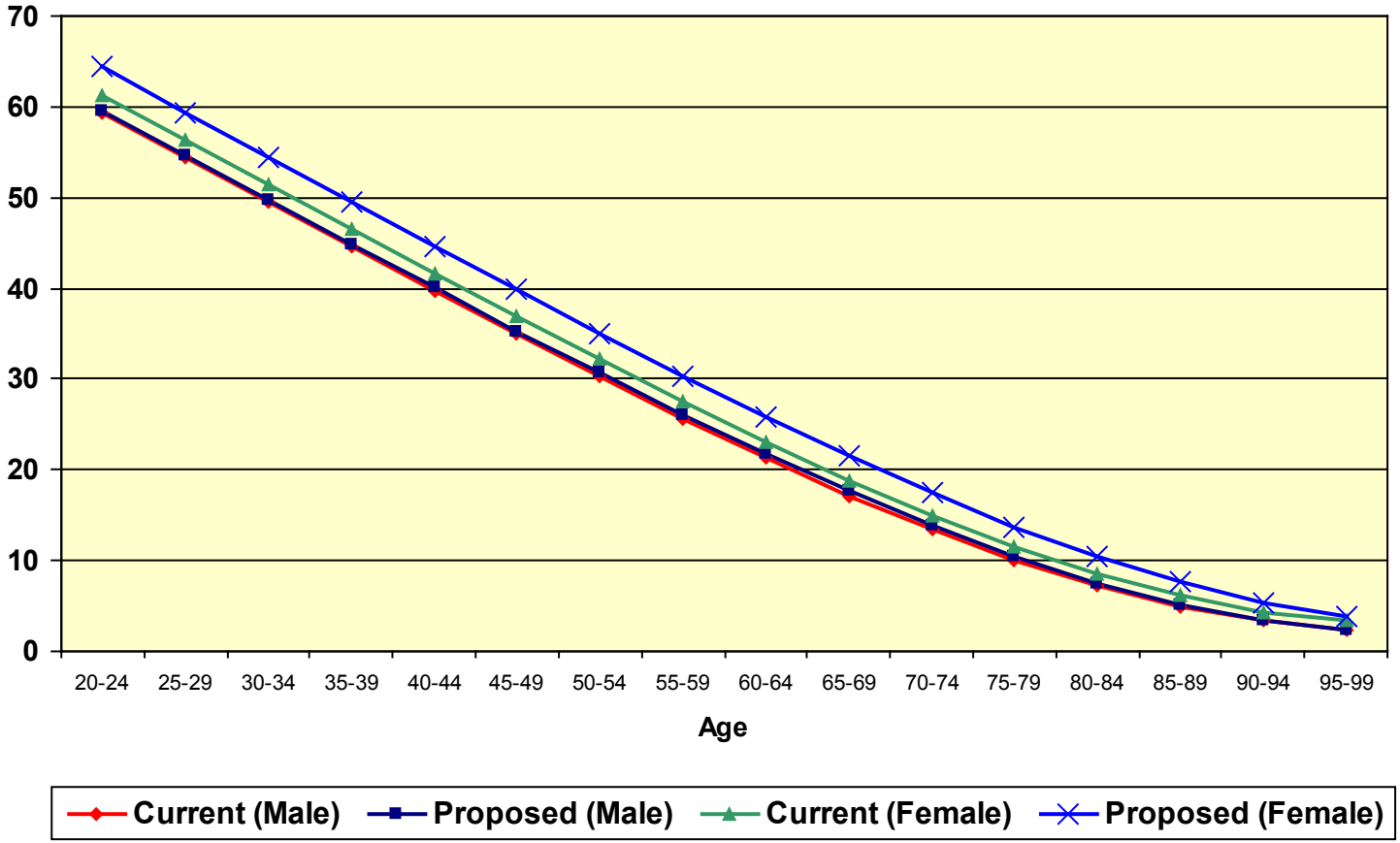


Chart 9
Life Expectancies (Safety)



C. MORTALITY RATES - DISABLED

Since death rates for disabled members are typically higher than for healthy members, a different mortality assumption is used. The table currently being used for General members is the RP-2000 Combined Healthy Mortality Tables for Males and Females set forward four years. For Safety members, the RP-2000 Combined Healthy Mortality Tables for Males and Females set forward two years is used.

The number of actual deaths compared to the number expected for the last three years has been as follows:

	General – Disability			Safety – Disability		
Ending 11/30	Actual Deaths	Current Expected Deaths	Proposed Expected Deaths	Actual Deaths	Current Expected Deaths	Proposed Expected Deaths
2011	14	13	12	4	3	4
2012	14	14	13	4	3	4
2013	15	15	13	5	4	4
Total	43	42	38	13	10	12
Actual/Expected		102%	113%		130%	108%

Based on this experience, we recommend that the mortality table for disabled General members be changed to the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, set forward seven years for males and set forward four years for females. For Safety, we recommend the RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020, set forward six years for males and set forward three years for females. Note that when the results of our proposed assumptions for General and Safety members are viewed in combination, our preferred margin of 10% will be achieved.

Chart 10 compares actual to expected deaths under both the current and proposed assumptions for disabled General members over the last three years. Chart 11 compares actual to expected deaths under both the current and proposed assumptions for disabled Safety members over the last three years. Charts 12 and 13 show the life expectancies under both the current and proposed tables for General and Safety, respectively.

Chart 10
Post - Retirement Deaths
Disabled General Members

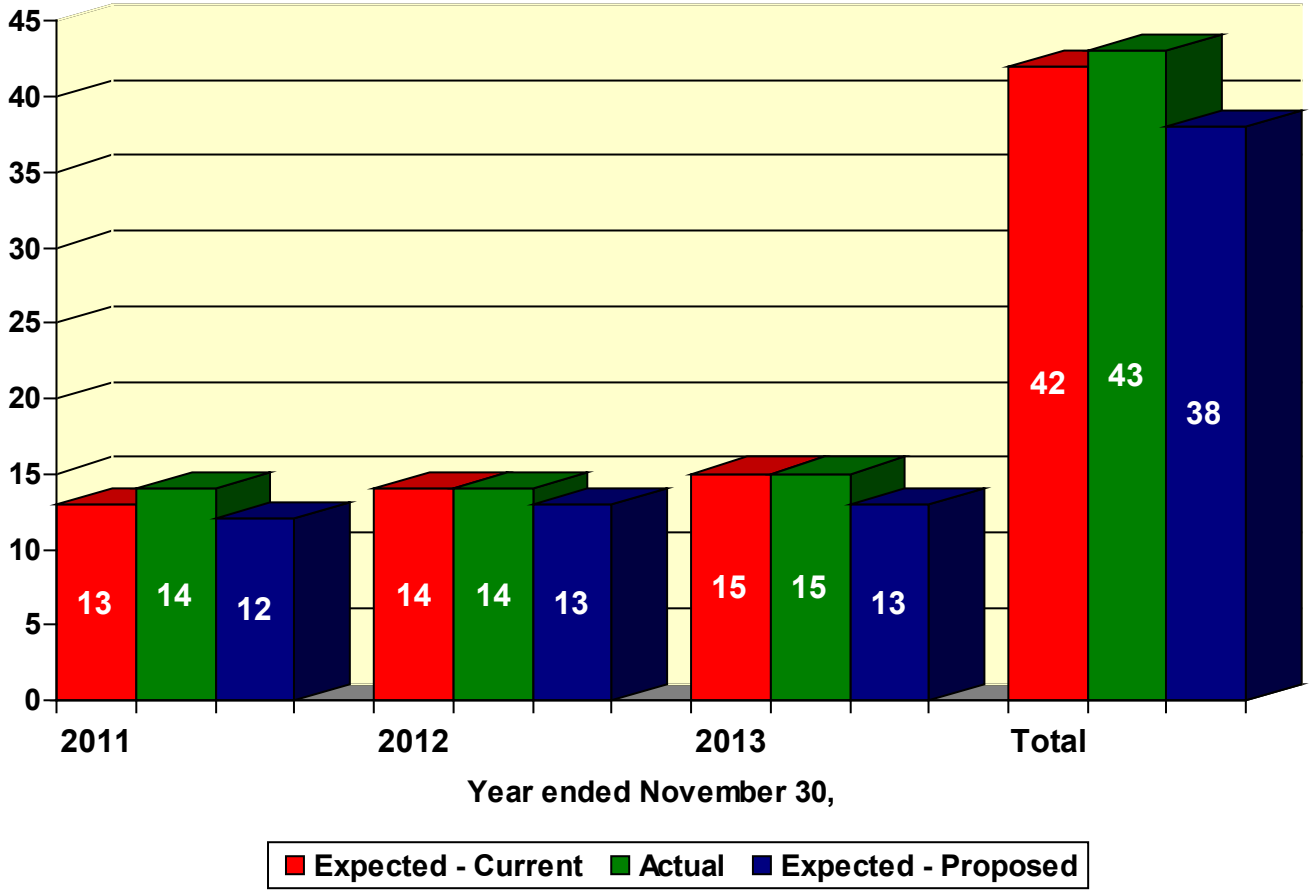


Chart 11
Post - Retirement Deaths
Disabled Safety Members

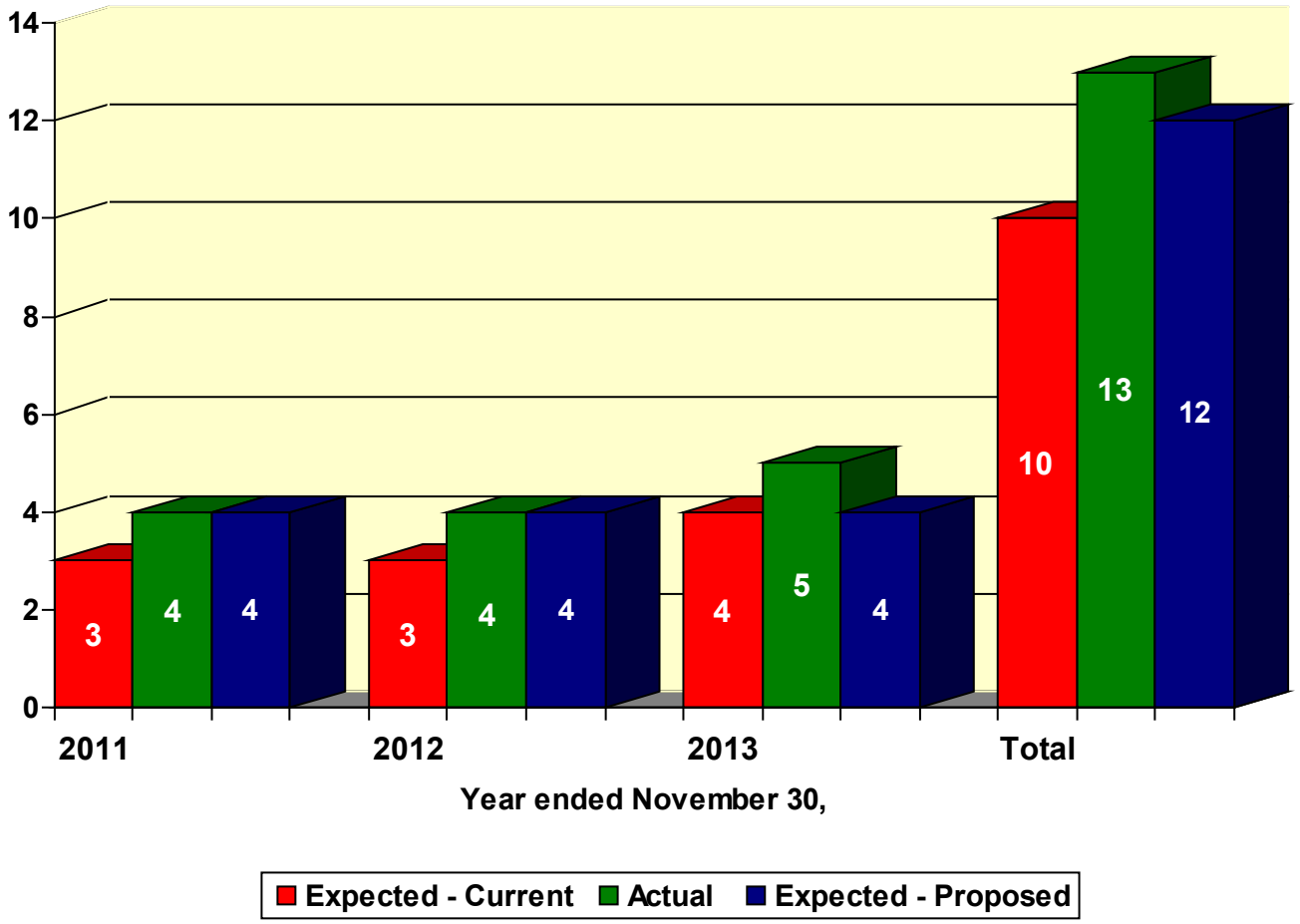


Chart 12
Life Expectancies (General Disabled)

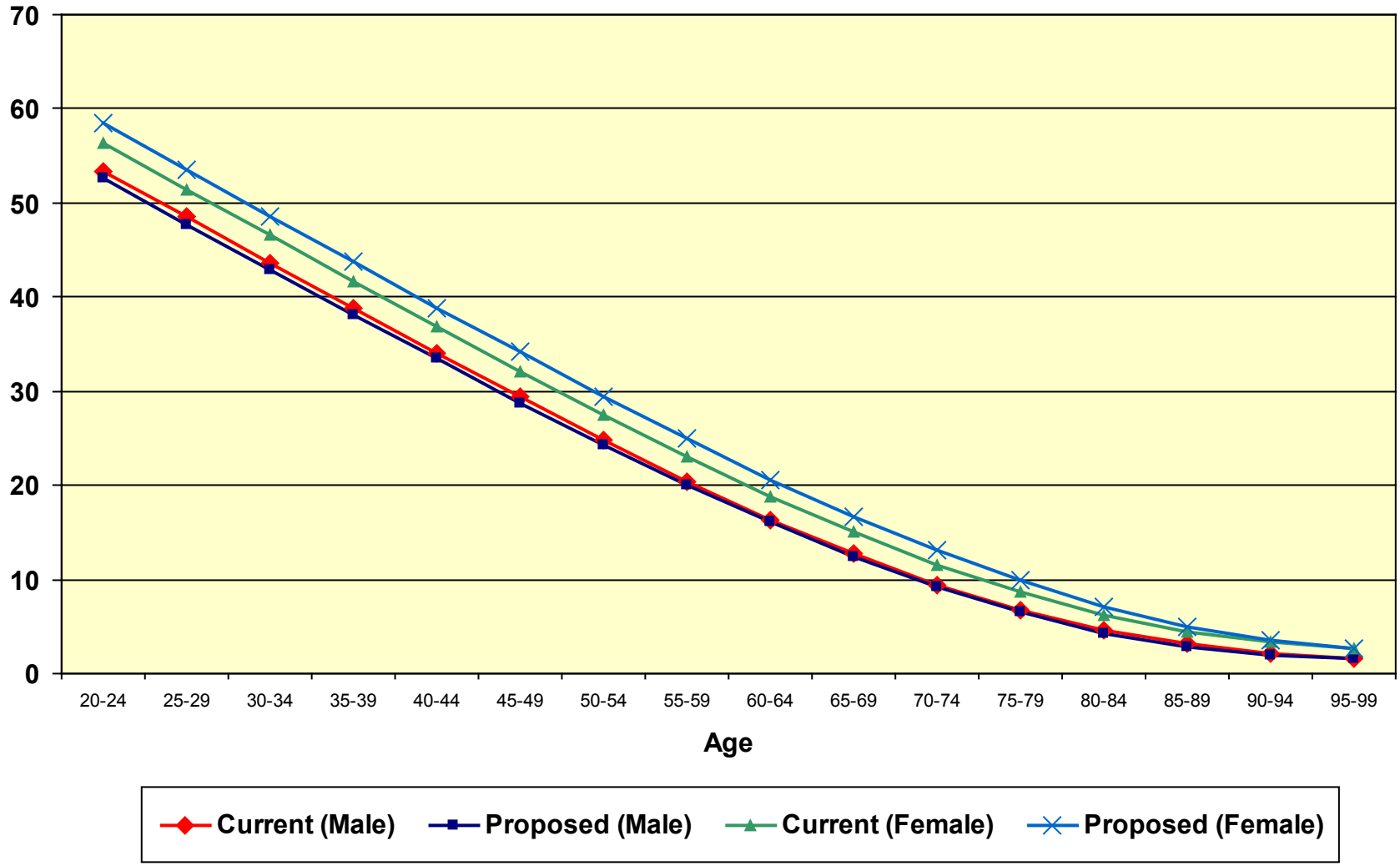
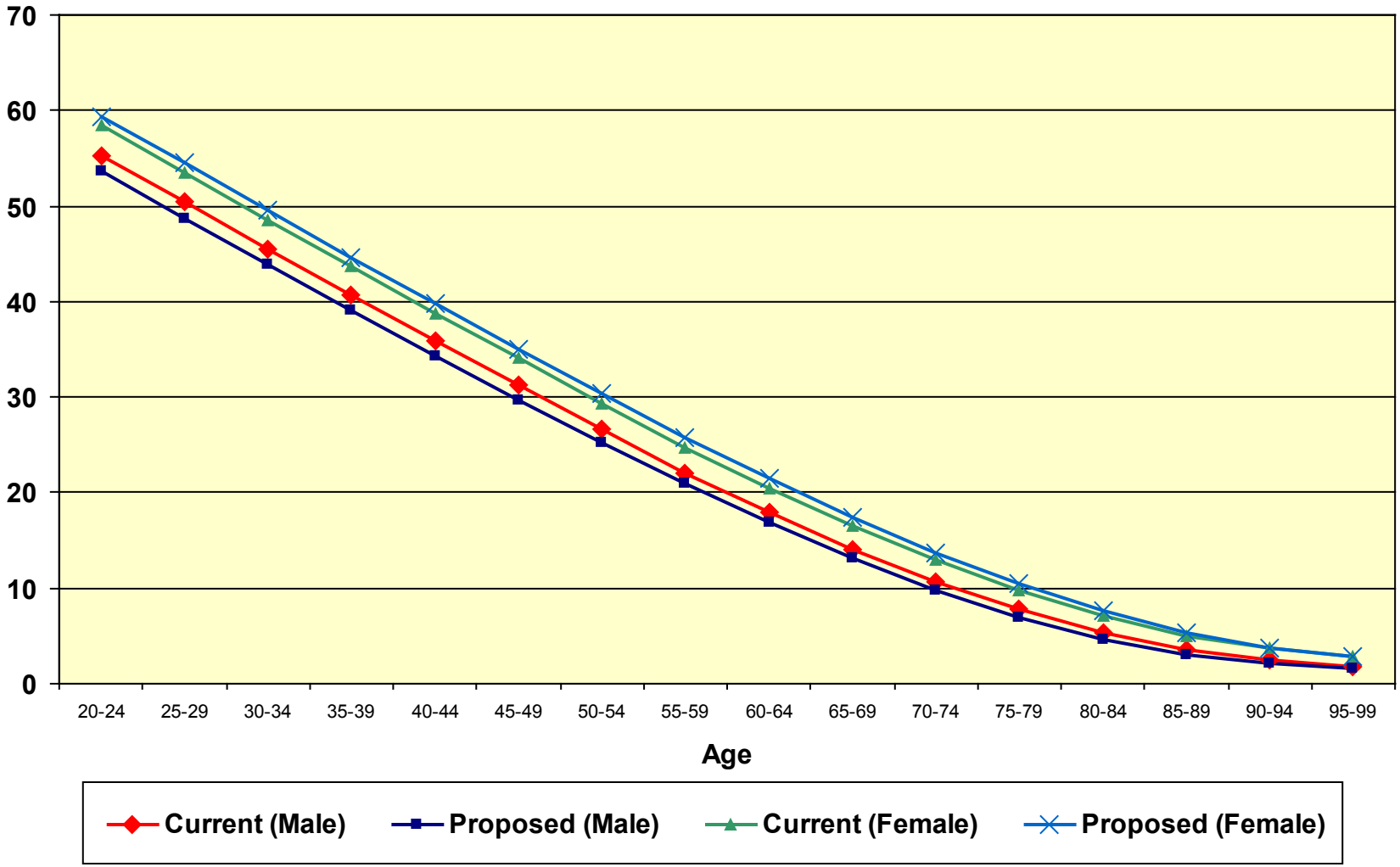


Chart 13
Life Expectancies (Safety Disabled)



D. TERMINATION RATES

Termination rates include all terminations for reasons other than death, disability, or retirement. Under the current assumption structure there is a separate set of assumptions for members with less than five years of service and members with five or more years of service. There is also another set of assumptions to anticipate the percentage of members who will withdraw their contributions and members who will leave their contributions on deposit and receive a deferred vested benefit. The termination experience over the last three years for General and Safety members split between those members with under five years of service and those with five or more years of service is as follows:

Rates of Termination (General)

(Fewer than Five Years of Service)

Years of Service	Observed Rate	Current Rate	Proposed Rate
0	7.50%	13.00%	10.00%
1	9.79	9.00	9.00
2	5.55	8.00	7.00
3	4.54	6.00	6.00
4	4.85	5.00	5.00

Rates of Termination (Safety)

(Fewer than Five Years of Service)

Years of Service	Observed Rate	Current Rate	Proposed Rate
0	2.53%	5.00%	5.00%
1	6.67	3.00	4.00
2	2.65	3.00	3.00
3	0.00	2.00	2.00
4	1.38	2.00	1.00

Rates of Termination (General)

(Five or More Years of Service)

Age	Observed Rate	Current Rate*	Proposed Rate*
20 – 24	0.00%	5.00%	5.00%
25 – 29	4.20	5.00	5.00
30 – 34	2.77	5.00	5.00
35 – 39	2.77	4.50	4.00
40 – 44	3.18	3.20	3.00
45 – 49	1.65	2.10	2.50
50 – 54	6.53	2.00	2.50
55 – 59	5.21	2.00	2.50
60 – 64	5.48	2.00	2.50
65 – 69	6.93	2.00	2.50

Rates of Termination (Safety)

(Five or More Years of Service)

Age	Observed Rate	Current Rate*	Proposed Rate*
20 – 24	0.00%	2.00%	2.00%
25 – 29	0.00	2.00	2.00
30 – 34	0.26	2.00	1.50
35 – 39	1.35	1.00	1.00
40 – 44	1.27	1.00	1.00
45 – 49	0.64	1.00	1.00
50 – 54	2.13	1.00	1.00
55 – 59	1.89	1.00	1.00
60 – 64	4.17	0.00	0.00

* *At central age in age range shown.*

Chart 14 compares actual to expected terminations of the past three years for both the current and proposed assumptions for General members and Safety members.

Chart 15 shows the current along with the proposed termination rates for General members with less than five years of service.

Chart 16 shows the same information as Chart 15, but for Safety members.

Chart 17 shows the current along with the proposed termination rates for General members with five or more years of service.

Chart 18 shows the same information as Chart 17, but for Safety members.

Based upon the recent experience, the termination rates for members with less than five years of service have generally been decreased for General and Safety members. For General members with five or more years of service, we have decreased the termination rates at the younger ages and have increased the termination rates at the older ages. For Safety members with five or more years of service, we have maintained the termination rates in most cases. We also continue to assume that all termination rates are zero for all members eligible to retire; that is, it is assumed that members eligible to retire at termination will retire rather than defer their benefit.

The following table shows the recommended percentages for members who are anticipated to withdraw their contributions and members who will leave their contributions on deposit and receive a deferred vested benefit. The current assumption is that 70% of all members who terminate with less than five years of service will withdraw and receive a refund and 30% will choose a deferred vested benefit. For the members with five or more years of service, the current assumption is that 40% will withdraw and receive a refund and 60% will receive a deferred vested benefit.

	Members with Fewer than Five Years of Service					
Group	Observed Withdrawal	Observed Vested Termination	Current Withdrawal	Current Vested Termination	Proposed Withdrawal	Proposed Vested Termination
General	49%	51%	70%	30%	60%	40%
Safety	35%	65%	70%	30%	60%	40%

	Members with Five or More Years of Service					
Group	Observed Withdrawal	Observed Vested Termination	Current Withdrawal	Current Vested Termination	Proposed Withdrawal	Proposed Vested Termination
General	33%	67%	40%	60%	40%	60%
Safety	42%	58%	40%	60%	40%	60%

Chart 14
Actual Number of Terminations Compared to Expected

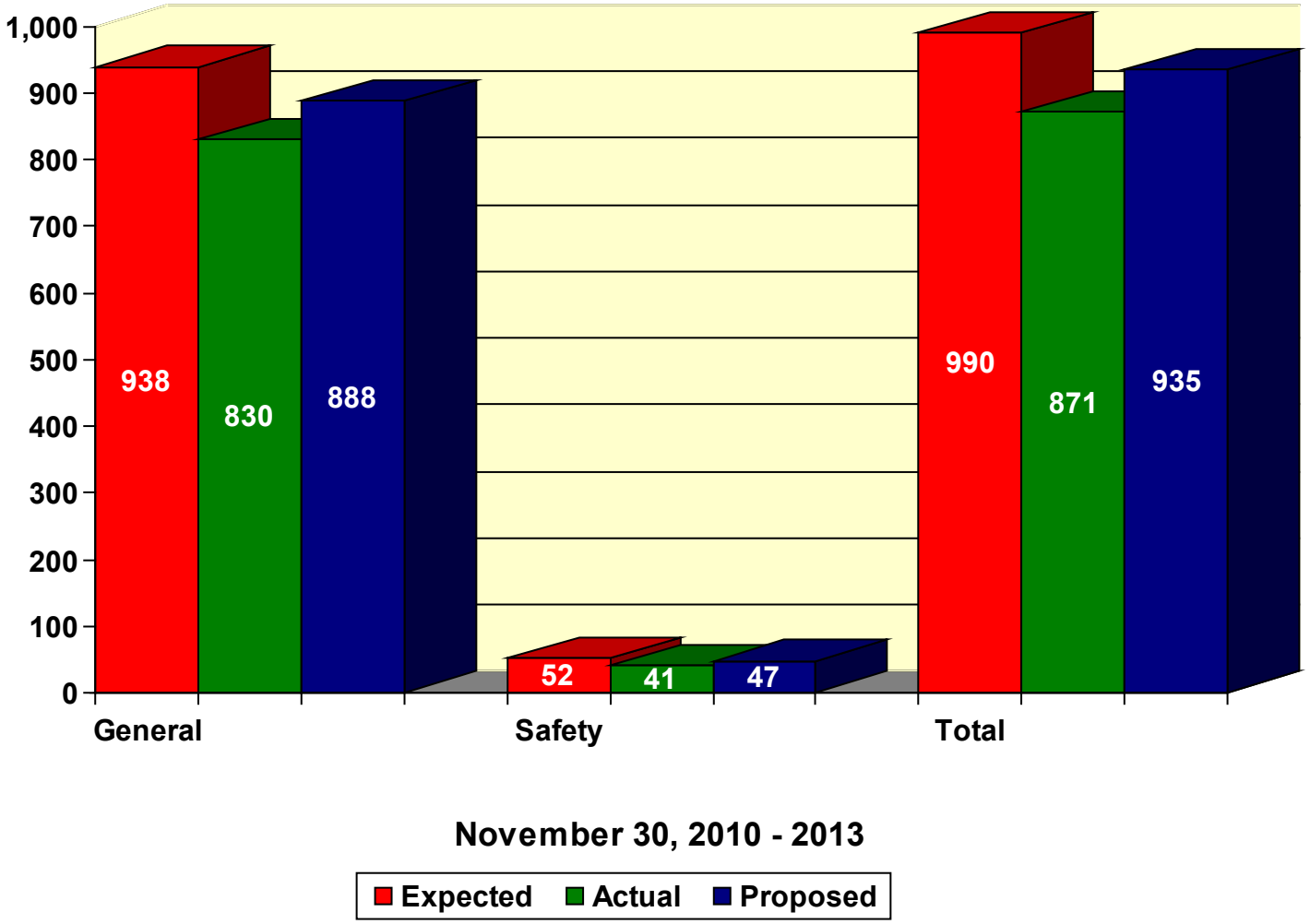


Chart 15
Termination Rates - General Members
(Fewer than 5 Years of Service)

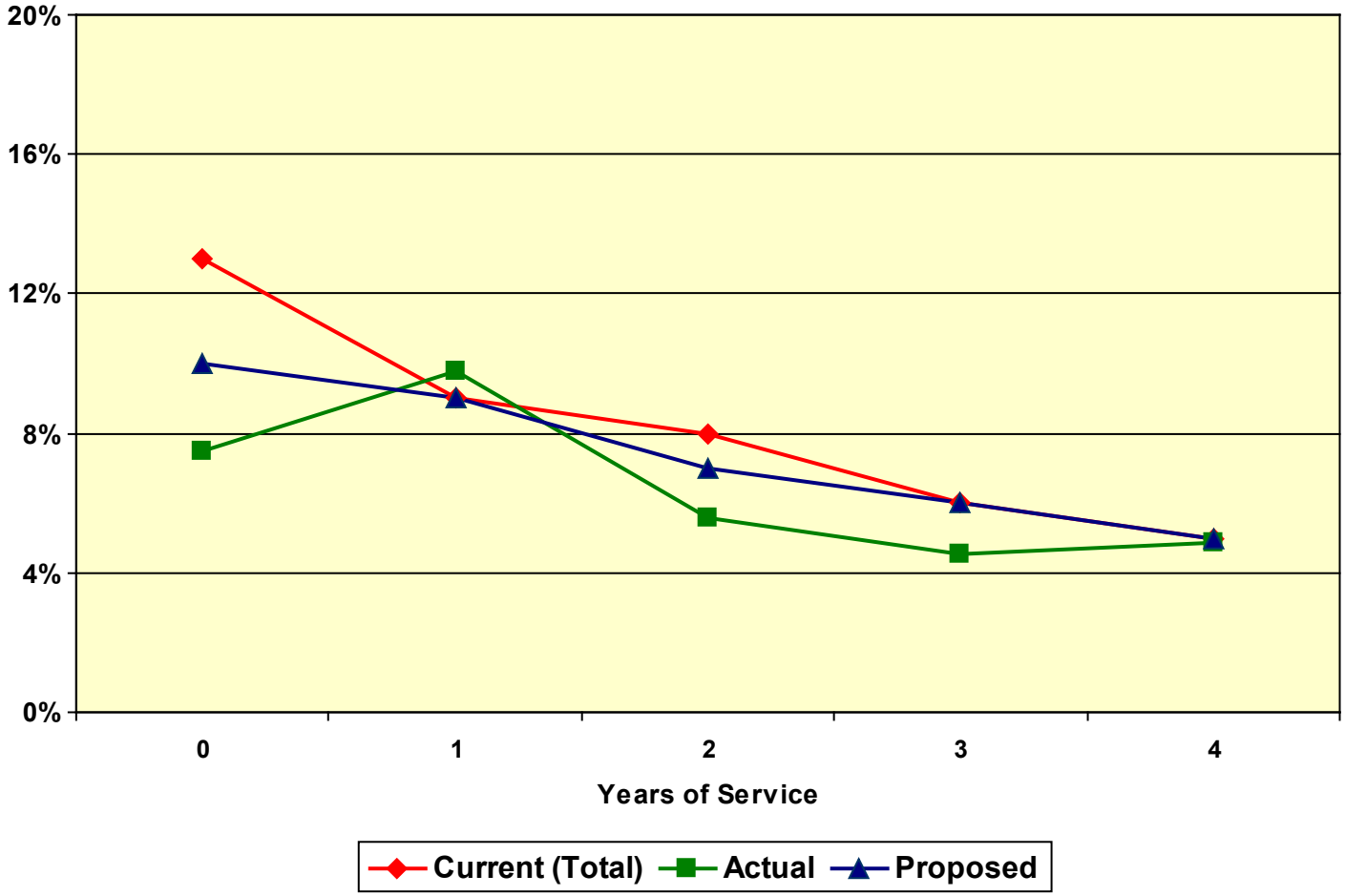


Chart 16
Termination Rates - Safety Members
(Fewer Than 5 Years of Service)

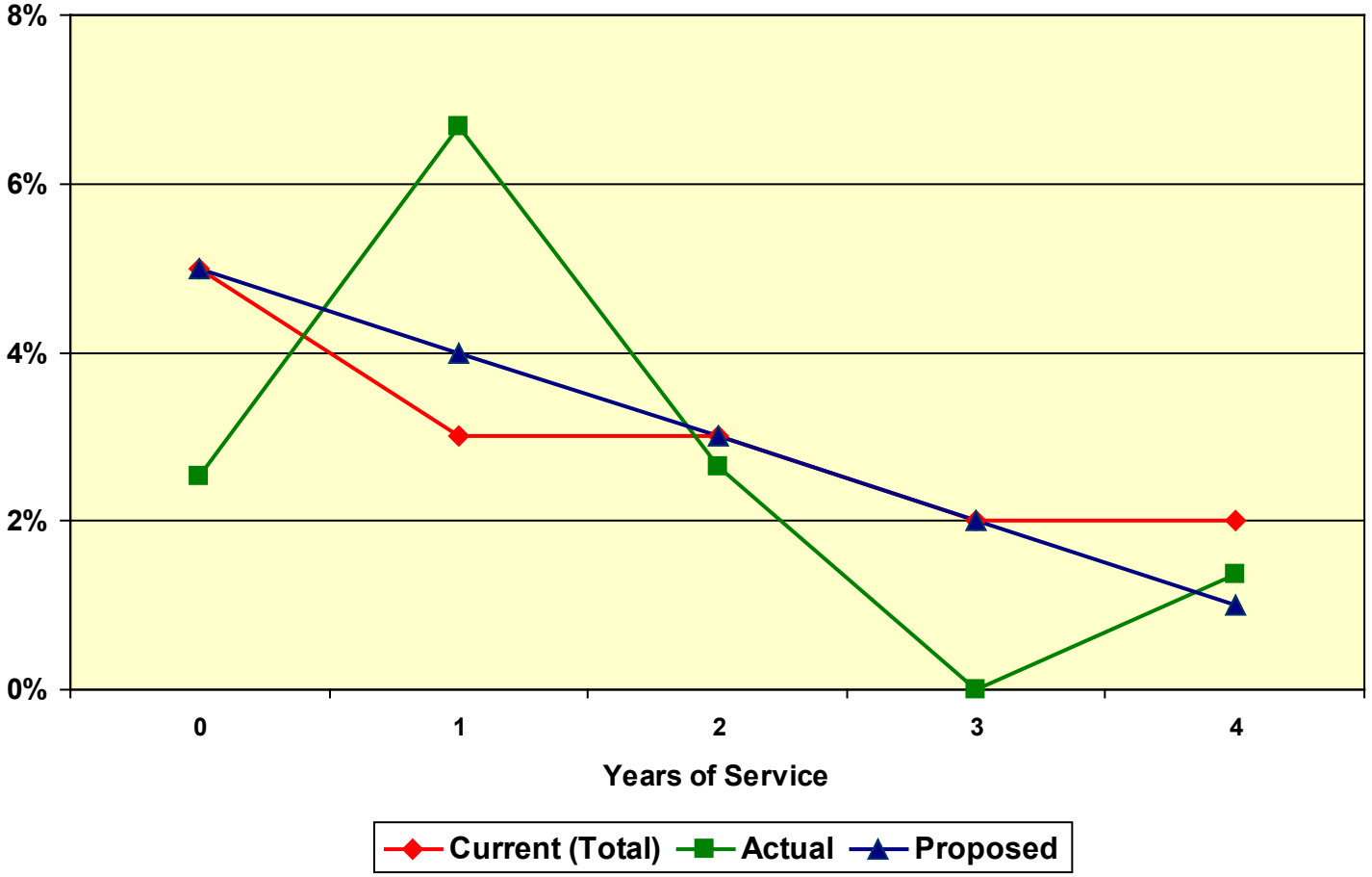


Chart 17
Termination Rates - General Members
(5 or More Years of Service)

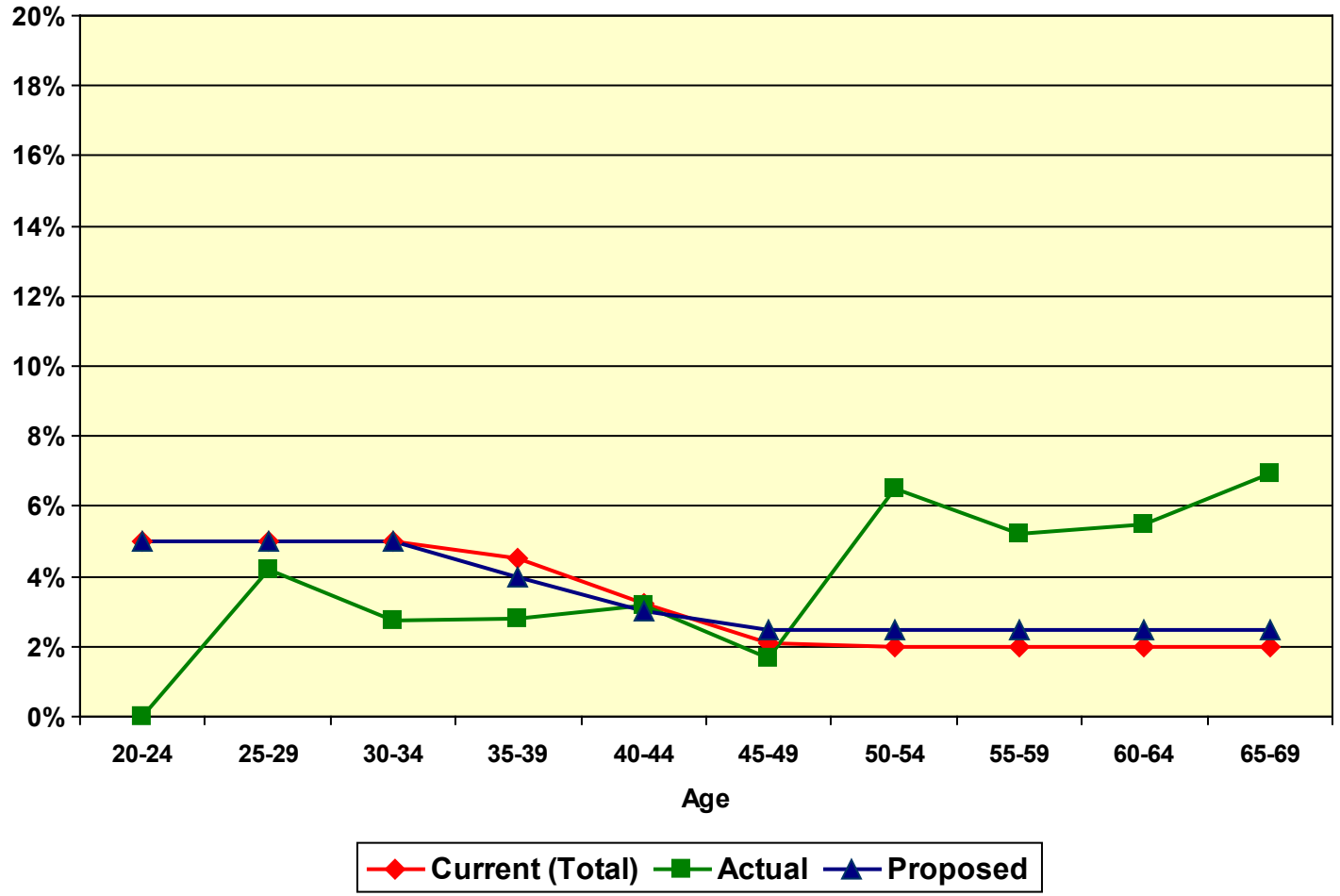
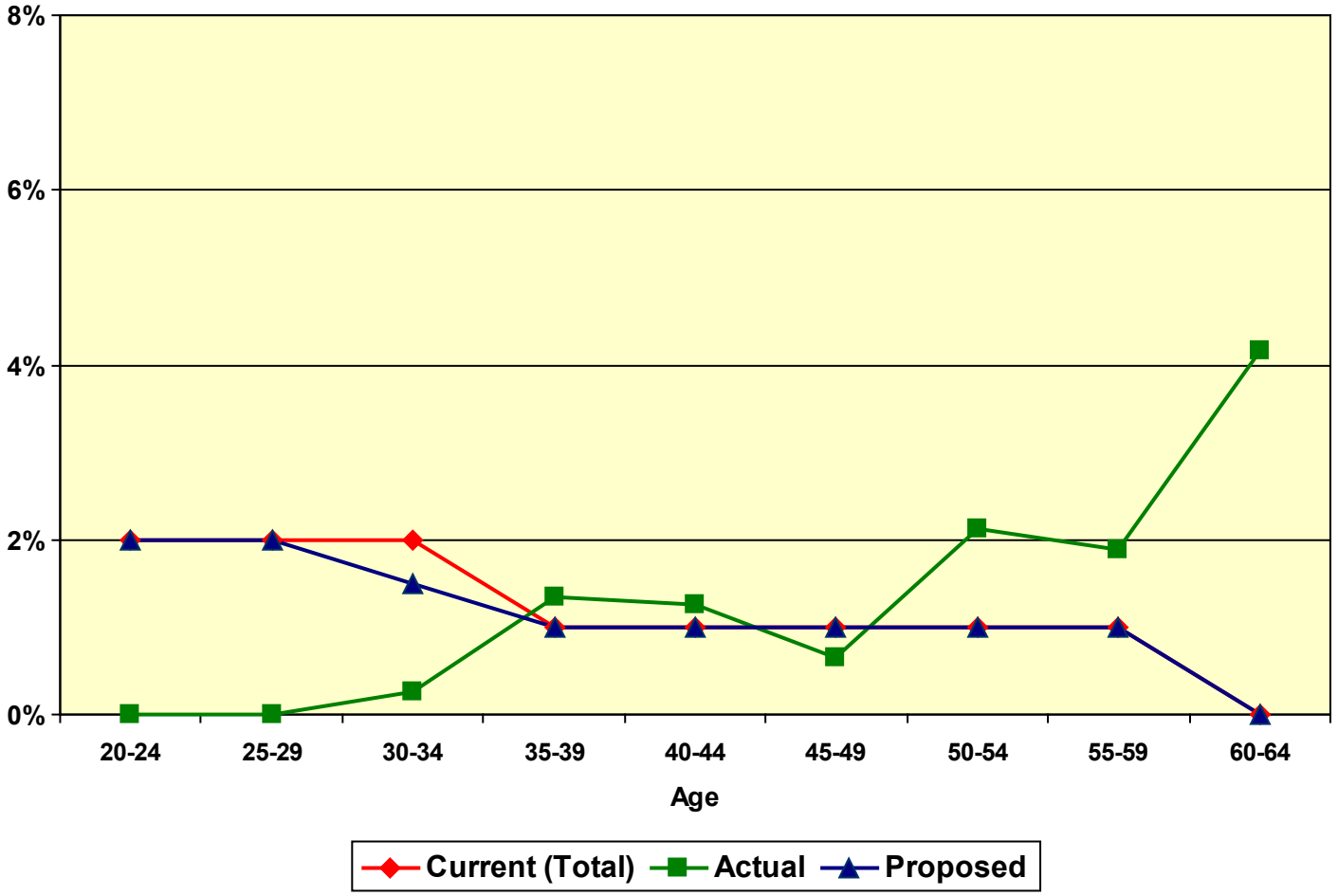


Chart 18
Termination Rates - Safety Members
(5 or More Years of Service)



E. DISABILITY INCIDENCE RATES

When a member becomes disabled, he or she may be entitled to either a 50% pension (service connected disability), or a pension that depends upon the member's years of service (non-service connected disability). The following summarizes the actual incidence of combined service and non-service connected disabilities over the past three years compared to the current and proposed assumptions for combined service-connected and non-service connected disability incidence:

Rates of Disability Incidence (General)*

Age	Observed Rate	Current Rate	Proposed Rate
20 – 24	0.00%	0.00%	0.00%
25 – 29	0.00	0.01	0.01
30 – 34	0.00	0.05	0.05
35 – 39	0.10	0.10	0.10
40 – 44	0.14	0.20	0.15
45 – 49	0.20	0.25	0.25
50 – 54	0.26	0.40	0.35
55 – 59	0.24	0.50	0.40
60 – 64	0.30	0.65	0.45
65 – 69	0.18	0.75	0.50

Rates of Disability Incidence (Safety)*

Age	Observed Rate	Current Rate	Proposed Rate
20 – 24	0.00%	0.00%	0.00%
25 – 29	0.34	0.00	0.05
30 – 34	0.33	0.40	0.35
35 – 39	0.36	0.50	0.45
40 – 44	0.36	0.50	0.50
45 – 49	1.13	0.50	0.75
50 – 54	2.88	1.50	1.75
55 – 59	0.86	2.20	2.00
60 – 64	2.29	2.20	2.25

* *At central age in age range shown.*

Chart 19 compares the actual number of non-service connected and service connected disabilities over the past three years to that expected under both the current and proposed assumptions. The proposed disability rates were adjusted to reflect the past three years' experience. Please note that we have reflected in the observed disability incidences those members whose applications for a disability retirement are pending as of the end date of the experience study. Consistent with the last experience study, we have applied a 75% probability to anticipate the number that will be granted a disability benefit.

Chart 20 shows actual disablement rates, compared to the assumed and proposed rates for General members.

Since 55% of all new disabled General members have received a service connected disability, we recommend that 60% of the proposed rates be used to anticipate service connected disability retirement (reduced from the current assumption of 70%). The remaining 40% of the rates will be used to anticipate non-service connected disability.

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

Since 93% of all new disabled Safety members have received a service connected disability, we recommend that 100% of the proposed rates continue to be used to anticipate service connected disability retirement. This assumption remains unchanged.

Chart 19
Actual Number of Disabilities Compared to Expected

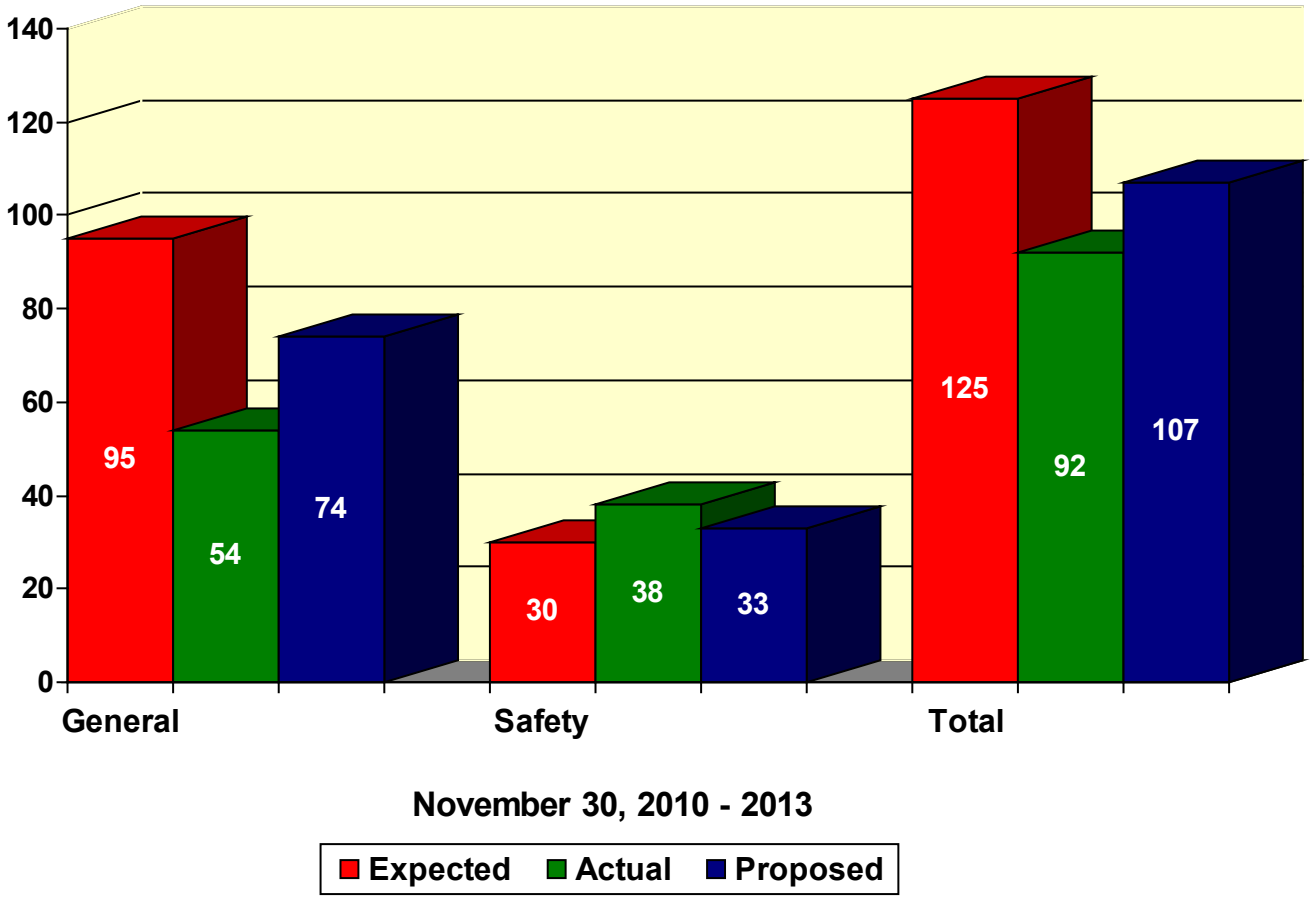


Chart 20
Disablement Rates for General Members

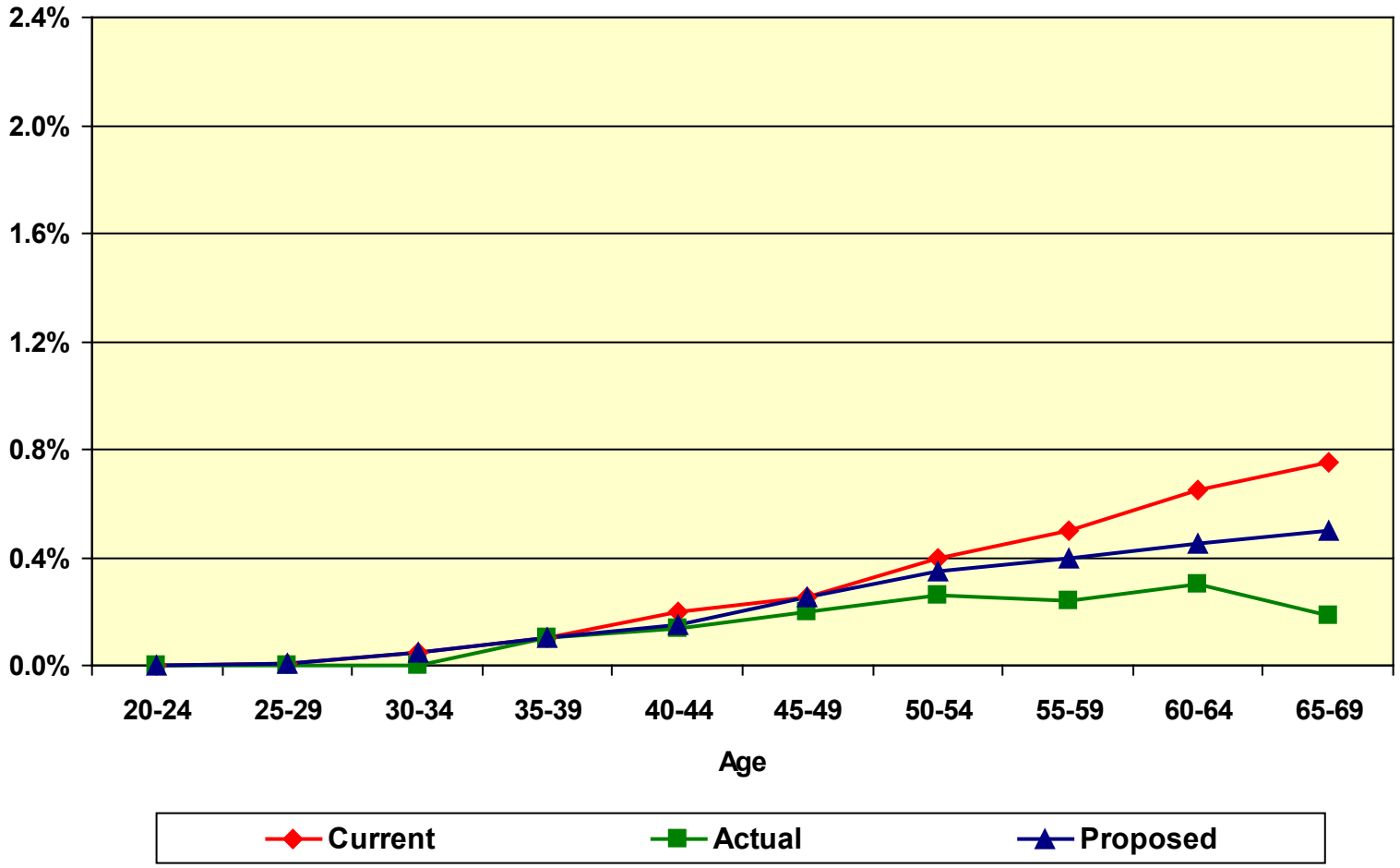
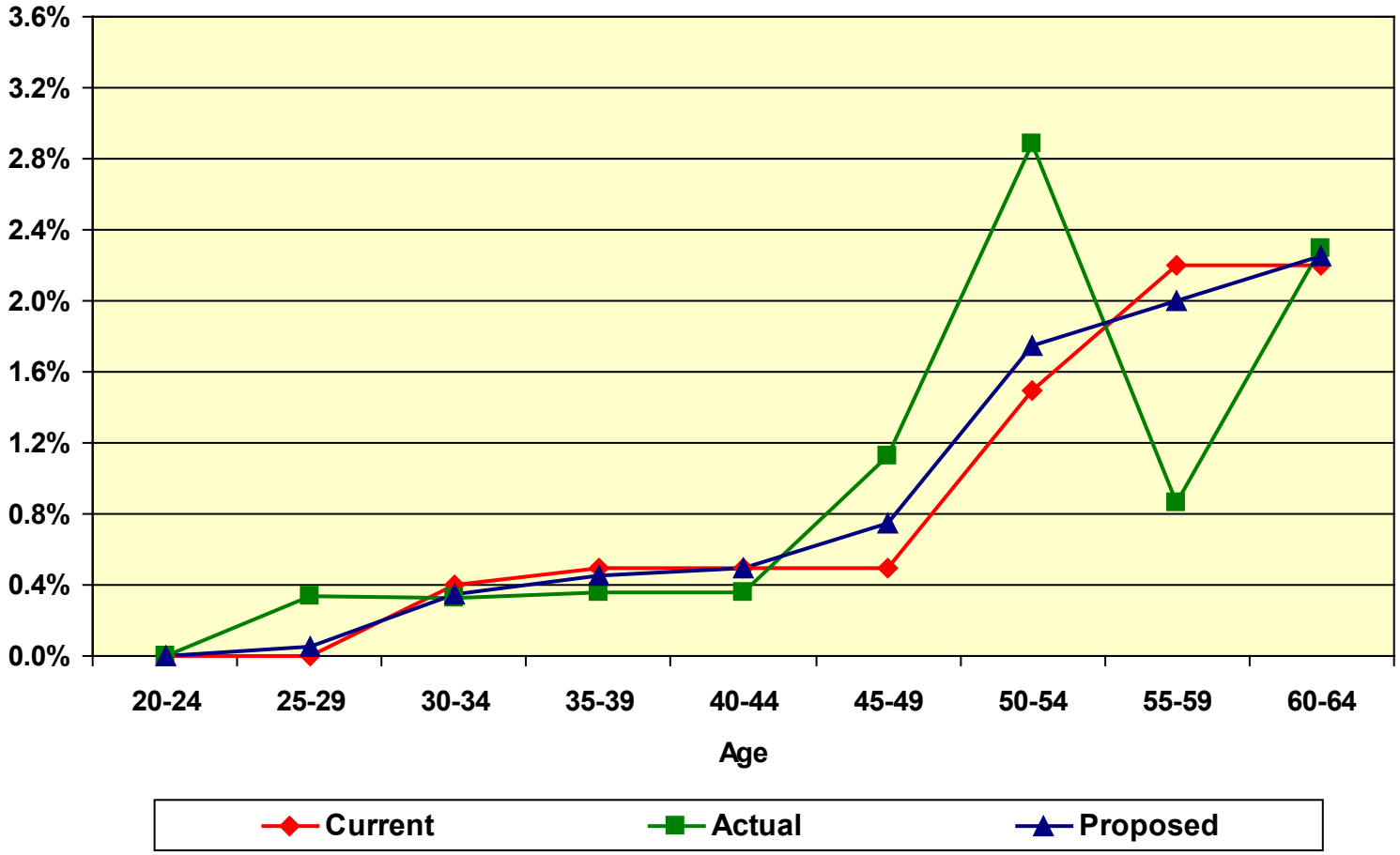


Chart 21
Disablement Rates for Safety Members



F. MERIT AND PROMOTIONAL SALARY INCREASES

The Association's retirement benefits are determined in large part by a member's compensation just prior to retirement. For that reason, it is important to anticipate salary increases that employees will receive over their careers. These salary increases are made up of three components:

- Inflationary increases;
- Real "across the board" increases; and
- Merit and promotional increases.

As part of the review of the economic assumptions for the December 31, 2011 valuation, the Board adopted an inflation assumption of 3.50% and an "across the board" increase assumption of 0.50%. Therefore, the total assumed inflation and real "across the board" pay increase (i.e., wage inflation) assumed in the December 31, 2011 valuation was 4.00%; that 4.00% assumption was used as the assumed annual rate of payroll growth at which payments to the UAAL are assumed to increase. For the December 31, 2014 valuation, we are recommending to reduce the inflation assumption from 3.50% to 3.25% and to continue with the 0.50% "across the board" salary increase assumption.

The annual merit and promotional 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:

- Measuring each continuing member's actual salary increase over each year of the experience period;
- Categorizing these increases according to member demographics;
- Removing the wage inflation component from these increases (estimated as the increase in the members' average salary during the year for all members);
- Averaging these annual increases over the three year experience period; and
- Modifying current assumptions to reflect some portion of these measured increases reflective of their "credibility."

Note that based on our experience both with ACERA and with similar public retirement systems, merit and promotional increases are generally correlated more closely with service than with age. We have

recommended an increase in the service-based assumption at the early years of an employee's career and a decrease in the service based assumption for the later years of service.

The following table shows the average increases over the three-year experience period (December 1, 2010 through November 30, 2013) before removing the inflationary component:

Average Actual Increase (%)

Service Group	General Members	Safety Members
0-1	4.64	7.92
1-2	5.94	8.36
2-3	4.66	7.22
3-4	3.30	4.79
4-5	2.38	4.25
5-6	2.13	3.23
6-7	2.22	2.16
7-8	1.89	1.97
8-9	1.62	1.01
9-10	1.31	1.19
10-11	1.22	1.29
11 and over	1.19	1.69

The annual increase in average salary over this three-year period was about 1.05% for General members and 0.86% for Safety members.

The following table shows the average merit and promotional increases for the three-year period:

Average Actual Merit and Promotional Salary Increase (%)

Service Group	General Members	Safety Members
0-1	3.65	6.86
1-2	4.92	7.42
2-3	3.58	6.47
3-4	2.16	4.05
4-5	1.34	3.66
5-6	1.11	2.23
6-7	1.24	1.15
7-8	0.89	0.74
8-9	0.46	0.24
9-10	0.19	0.58
10-11	0.14	0.41
11 and over	0.16	0.82

The following table shows the current and recommended merit and promotional salary increase assumptions based on this recent experience:

Current vs. Proposed Assumed Merit and Promotional Salary Increase (%)

	General Members		Safety Members	
Service Group	Current	Proposed	Current	Proposed
0-1	3.20	3.70	6.20	6.70
1-2	3.20	3.70	6.20	6.70
2-3	2.90	3.20	5.40	5.90
3-4	2.10	2.10	3.60	3.80
4-5	2.00	1.70	3.00	3.30
5-6	1.70	1.40	2.70	2.50
6-7	1.50	1.30	1.60	1.40
7-8	1.40	1.10	1.10	0.90
8-9	1.00	0.70	1.00	0.80
9-10	1.00	0.60	1.00	0.80
10-11	0.90	0.50	1.00	0.70
11 and over	0.60	0.40	0.70	0.70

Charts 22 and 23 provide a graphical comparison of the current, actual experience and proposed merit and longevity increases.

Chart 22
Merit and Promotional Salary Increase Rates for General Members

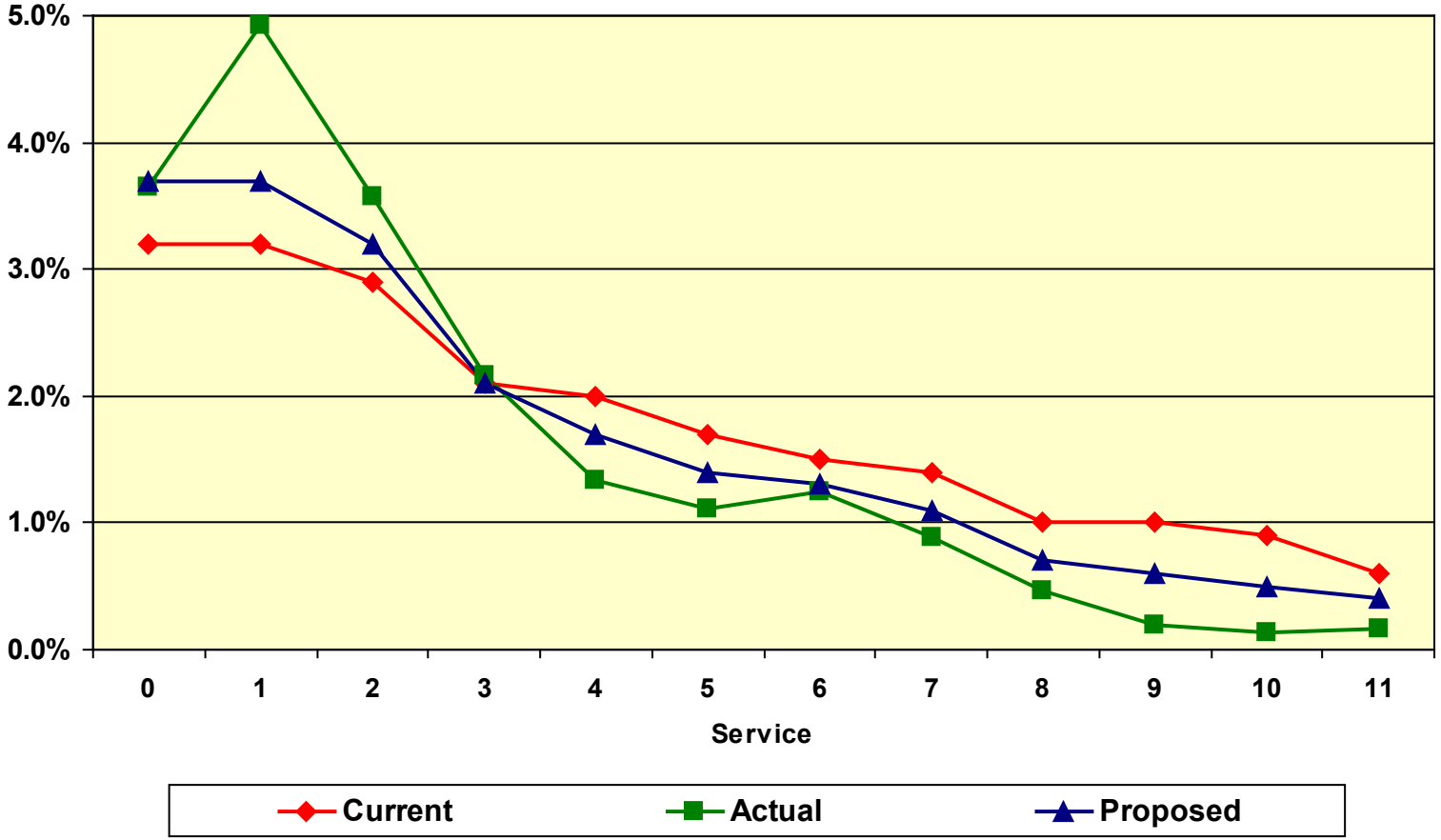
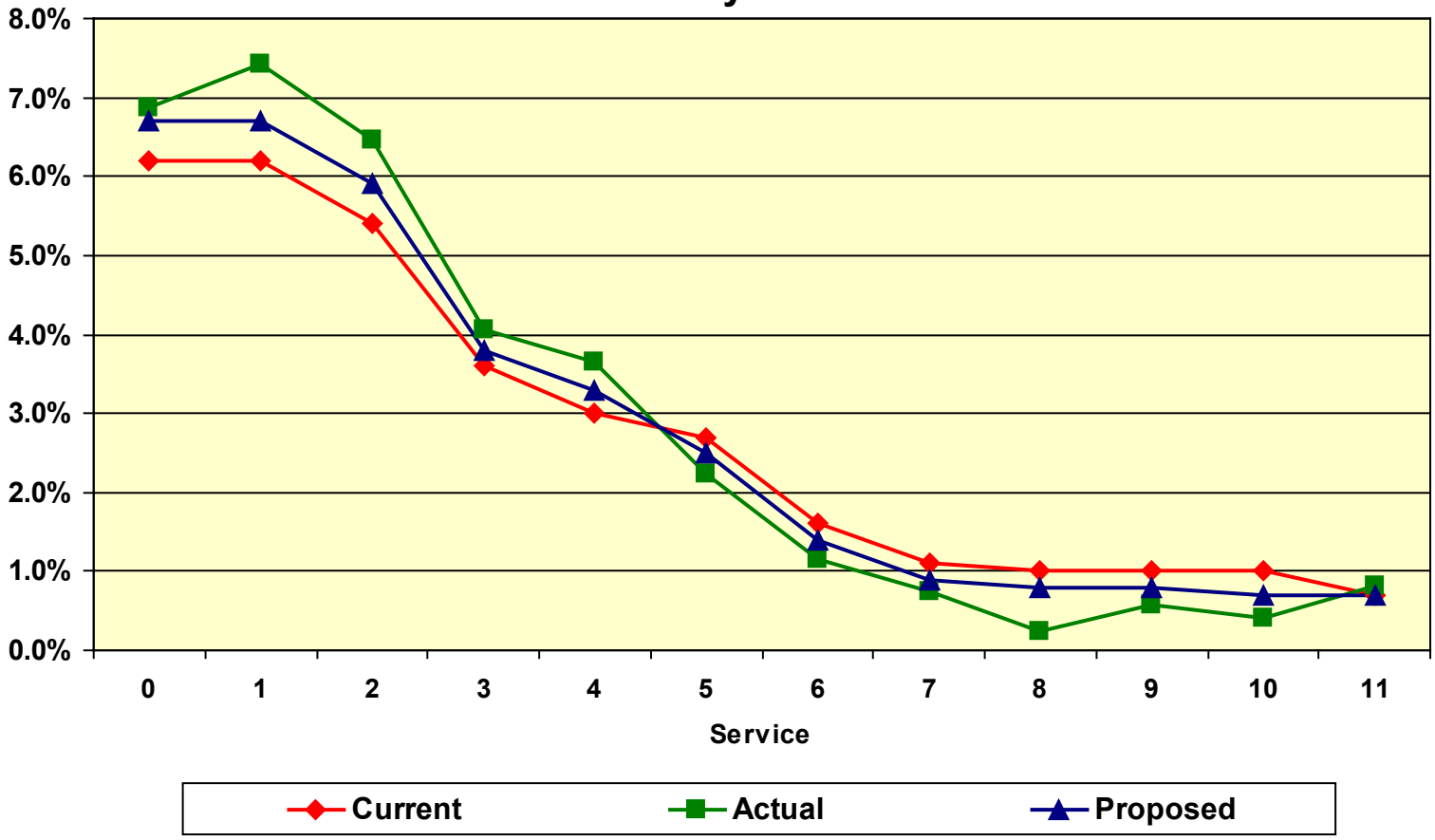


Chart 23
Merit and Promotional Salary Increase Rates for Safety Members



G. TERMINAL PAY

Under the Ventura Settlement, employers agreed to include several additional pay elements as Earnable Compensation for non-CalPEPRA members. There are two categories within which these additional pay elements fall:

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

The first category is recognized in the actuarial calculations by virtue of being included in the current pay of active members. The second category requires an actuarial assumption to anticipate its impact on a member's retirement benefit.

Service Retirements

In the following table, we have summarized the observed vacation and sick leave cash out from members who retired from service during December 2010 – November 2011, December 2011 – November 2012, and December 2012 – November 2013. Note that there was no experience observed for General Tier 3, Safety Tier 2C, or Safety Tier 2D members. In the current valuation, General Tier 3 shares the same terminal pay assumption as General Tier 1 because both of these Tiers use final 1-year average compensation. Similarly, Safety Tier 2C and Safety Tier 2D share the same terminal pay assumption as Safety Tier 2.

Observed Terminal Pay Percentages

	December 2010 – November 2011		December 2011 – November 2012		December 2012 – November 2013	
Membership Category	Number of Retirees	Terminal Pay*	Number of Retirees	Terminal Pay*	Number of Retirees	Terminal Pay*
General Tier 1	128	8.7%	87	8.4%	124	9.0%
General Tier 2	188	3.8%	209	4.0%	266	3.9%
Safety Tier 1	15	6.7%	6	6.1%	9	6.7%
Safety Tier 2	58	4.2%	52	4.5%	56	4.2%

* *The total of vacation and sick leave cash out expressed as a percent of final average compensation before such cash out.*

On September 12, 2012, the Governor of California approved Assembly Bill (AB) 197 which, in part, excludes "various payments from the definition of compensation earnable" including "payments made at the termination of employment." While actual experience from the last three years may support increasing the terminal pay assumptions, the action taken by the Board to implement AB 197 (which was subsequently challenged in a lawsuit) should have a dampening effect on the assumptions. We recommend no change in these assumptions until the above developments can be further analyzed and reconciled.

The current and recommended terminal pay assumptions for members who are expected to retire from service are as follows:

	Terminal Pay Assumptions for Service Retirement
Member Category	**Current and Proposed Assumptions**
General Tier 1	8.0%
General Tier 2	3.0%
General Tier 3	8.0%
Safety Tier 1	8.5%
Safety Tier 2	4.0%
Safety Tier 2C	4.0%
Safety Tier 2D	4.0%

Disability Retirements

We have also received data to analyze the terminal pay assumptions for disabled retirees. The results are as follows:

	Observed Terminal Pay Percentages	
	3-Year Period Combined	
Member Category	**Number of Retirees**	**Terminal Pay***
General Tier 1	0	0.0%
General Tier 2	6	0.2%
Safety Tier 1	0	0.0%
Safety Tier 2	8	2.7%

* *The total of vacation and sick leave cash out expressed as a percent of final average compensation before such cash out.*

For the same reason mentioned above for the terminal pay assumptions for service retirement, we are recommending no changes to the terminal pay assumptions for disability retirement. The current and recommended terminal pay assumptions for members who are expected to retire from disability are as follows:

	Terminal Pay Assumptions for Disability Retirement
Member Category	**Current and Proposed Assumptions**
General Tier 1	6.5%
General Tier 2	1.4%
General Tier 3	6.5%
Safety Tier 1	6.4%
Safety Tier 2	2.1%
Safety Tier 2C	2.1%
Safety Tier 2D	2.1%

H. OTHER ASSUMPTIONS

In prior valuations, it was assumed that 35% of future inactive General and 55% of future inactive Safety deferred vested participants would become members of a reciprocal system and receive 4.60% and 4.70% salary increases, respectively, from termination until their expected date of retirement. Based on the experience reported by the Association during the last three years, on average 29% of General and 64% of Safety members went on to be covered by a reciprocal retirement system. For this experience study, we recommend lowering the current 35% reciprocity assumption for deferred vested General members to 30%. For Safety members, we are recommending that the current 55% reciprocity assumption be increased to 60%.

Based on our recommended merit and longevity salary increase assumptions after 11 years of service of 0.40% and 0.70% for General and Safety, respectively, and based on the recommended across-the-board salary increase assumption of 3.75%, we propose that a 4.15% and 4.45% salary increase assumption be used to anticipate salary increases from termination to the expected date of retirement for General and Safety reciprocities, respectively.

In prior valuations, it was assumed that 70% of all active male members and 50% of all active female members would have an eligible survivor when they retired. According to the experience of members who retired recently, about 73% of all male members and 51% of all female members were married at retirement. We recommend maintaining this assumption at 70% for male members and 50% for female members.

Based on observed experience from members who retired during the last three years (i.e., male members were about 4 years older than their female spouses and female members were about 2 years younger than their male spouses), we recommend that we continue to apply an assumption that when active members retire, female spouses are assumed to be three years younger than their male spouses. Spouses will be assumed to be of the opposite sex to the member until we have more actual experience concerning domestic partners.

The current assumption for converting sick leave into additional service credit at retirement is that for each year of employment, an employee will convert approximately 0.006 years of sick leave into additional service credit at retirement. We have observed that the conversion of sick leave for new retirees over each of the last three years has averaged about 0.004 years for each year of employment. Based on this observed experience, we recommend that the sick leave conversion assumption be reduced from 0.006 to 0.005 years of additional service credit at retirement, for each year of employment.

APPENDIX A

CURRENT ACTUARIAL ASSUMPTIONS

Post-Retirement Mortality Rates

Healthy:	For General members and all beneficiaries: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females. For Safety members: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females.
Disabled:	For General members: RP-2000 Combined Healthy Mortality Table set forward four years. For Safety members: RP-2000 Combined Healthy Mortality Table set forward two years.
Employee Contribution Rates:	For General members: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females, weighted 30% male and 70% female. For Safety members: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females, weighted 75% male and 25% female.
Optional Forms of Benefit:	
Service Retirement and All Beneficiaries	General members: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females, weighted 30% male and 70% female. General beneficiaries: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females, weighted 70% male and 30% female. Safety members: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females, weighted 75% male and 25% female. Safety beneficiaries: RP-2000 Combined Healthy Mortality Table set back two years for males and one year for females, weighted 25% male and 75% female.
Disability Retirement	General members: RP-2000 Combined Healthy Mortality Table set forward four years, weighted 30% male and 70% female. Safety members: RP-2000 Combined Healthy Mortality Table set forward two years, weighted 75% male and 25% female.

Termination Rates Before Retirement:

	Rate (%) Mortality			
	General		Safety	
Age	Male	Female	Male	Female
25	0.04	0.02	0.04	0.02
30	0.04	0.02	0.04	0.02
35	0.06	0.04	0.06	0.04
40	0.10	0.06	0.10	0.06
45	0.13	0.10	0.13	0.10
50	0.19	0.16	0.19	0.16
55	0.29	0.24	0.29	0.24
60	0.53	0.44	0.53	0.44
65	1.00	0.86	1.00	0.86

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

	Rate (%) Disability	
Age	General[(1)]	Safety[(2)]
20	0.00	0.00
25	0.01	0.00
30	0.03	0.24
35	0.08	0.46
40	0.16	0.50
45	0.23	0.50
50	0.34	1.10
55	0.46	1.92
60	0.59	2.20

(1) *70% of General disabilities are assumed to be service connected disabilities. The other 30% are assumed to be non-service connected disabilities.*

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

Termination Rates Before Retirement (continued):

Rate (%)		
Termination (< 5 Years of Service)[1]		
Years of Service	**General**	**Safety**
0	13.00	5.00
1	9.00	3.00
2	8.00	3.00
3	6.00	2.00
4	5.00	2.00

Termination (5+ Years of Service)[2]		
Age	**General**	**Safety**
20	5.00	2.00
25	5.00	2.00
30	5.00	2.00
35	4.70	1.40
40	3.72	1.00
45	2.54	1.00
50	2.04	1.00
55	2.00	1.00
60	2.00	0.40

(1) *70% of all terminated members will choose a refund of contributions and 30% will choose a deferred vested benefit.*

(2) *40% of all terminated members will choose a refund of contributions and 60% will choose a deferred vested benefit. No termination is assumed after a member is eligible for retirement.*

Retirement Rates:

	Rate (%)							
Age	General Tier 1	General Tier 2	General Tier 3	General Tier 4	Safety Tier 1[(1)]	Safety Tier 2, 2D[(1)]	Safety Tier 2C[(1)]	Safety Tier 4
50	3.00	2.00	6.00	0.00	35.00	10.00	4.00	4.00
51	3.00	2.00	3.00	0.00	25.00	10.00	2.00	2.00
52	3.00	2.00	5.00	4.00	25.00	10.00	2.00	2.00
53	3.00	2.00	6.00	1.50	35.00	10.00	3.00	3.00
54	3.00	2.00	6.00	1.50	40.00	10.00	6.00	6.00
55	6.00	3.00	12.00	2.50	40.00	10.00	10.00	10.00
56	8.00	3.00	13.00	2.50	40.00	15.00	12.00	12.00
57	10.00	4.00	13.00	3.50	40.00	20.00	20.00	20.00
58	10.00	5.00	14.00	4.50	40.00	20.00	10.00	10.00
59	13.00	5.00	16.00	4.50	40.00	20.00	15.00	15.00
60	20.00	5.00	21.00	4.50	100.00	40.00	60.00	60.00
61	20.00	8.00	20.00	7.50	100.00	40.00	60.00	60.00
62	35.00	20.00	30.00	19.00	100.00	40.00	60.00	60.00
63	30.00	16.00	25.00	15.00	100.00	40.00	60.00	60.00
64	30.00	18.00	25.00	17.00	100.00	100.00	100.00	100.00
65	35.00	22.00	30.00	21.00	100.00	100.00	100.00	100.00
66	30.00	20.00	25.00	20.00	100.00	100.00	100.00	100.00
67	25.00	20.00	25.00	20.00	100.00	100.00	100.00	100.00
68	20.00	30.00	25.00	30.00	100.00	100.00	100.00	100.00
69	40.00	35.00	50.00	35.00	100.00	100.00	100.00	100.00
70	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

(1) Retirement rate is 100% after a member accrues a benefit of 100% of final average earnings.

Retirement Age and Benefit for Deferred Vested Members:	For deferred vested members, retirement age assumptions are as follows: General Age: 59 Safety Age: 56 For future deferred vested members who terminate with less than five years of service and are not vested, we assume that they will retire at age 70 for both General and Safety if they decide to leave their contributions on deposit. We assume that 35% of future General and 55% of future Safety deferred vested members will continue to work for a reciprocal employer. For reciprocals, we assume 4.60% and 4.70% compensation increases per annum for General and Safety, respectively.
Future Benefit Accruals:	1.0 year of service per year of employment plus 0.006 year of additional service to anticipate conversion of unused sick leave for each 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.
Percent Married:	70% of male members; 50% of female members.
Age of Spouse:	Female (or male) spouses are 3 years younger (or older) than their spouses.
Net Investment Return:	7.80%, net of administration and investment expenses (approximately 1% of assets).
Employee Contribution Crediting Rate:	7.80%, compounded semi-annually.
Consumer Price Index:	Increase of 3.50% per year, retiree COLA increases due to CPI subject to a 3% maximum change per year for General Tier 1, General Tier 3, and Safety Tier 1, and 2% maximum change per year for General Tier 2, General Tier 4, Safety Tier 2, Safety Tier 2C, Safety Tier 2D, and Safety Tier 4.

Salary Increases:

Annual Rate of Compensation Increase (%)

Inflation: 3.50%; an additional 0.50% "across the board" salary increases (other than inflation); plus the following Merit and Promotional increases based on service.

Service	General	Safety
0-1	3.20%	6.20%
1-2	3.20	6.20
2-3	2.90	5.40
3-4	2.10	3.60
4-5	2.00	3.00
5-6	1.70	2.70
6-7	1.50	1.60
7-8	1.40	1.10
8-9	1.00	1.00
9-10	1.00	1.00
10-11	0.90	1.00
11+	0.60	0.70

Terminal Pay Assumptions:

Additional pay elements are expected to be received during a member's final average earnings period. The percentages (added to the final year salary) used in this valuation are:

	Service Retirement	Disability Retirement
General Tier 1	8.0%	6.5%
General Tier 2	3.0%	1.4%
General Tier 3	8.0%	6.5%
General Tier 4	N/A	N/A
Safety Tier 1	8.5%	6.4%
Safety Tier 2	4.0%	2.1%
Safety Tier 2C	4.0%	2.1%
Safety Tier 2D	4.0%	2.1%
Safety Tier 4	N/A	N/A

APPENDIX B

PROPOSED ACTUARIAL ASSUMPTIONS

Post-Retirement Mortality Rates

Healthy:	For General members and all beneficiaries: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set back one year for males and females. For Safety members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 with no setback for males and set back two years for females.
Disabled:	For General members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set forward seven years for males and set forward four years for females. For Safety members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set forward six years for males and set forward three years for females.
Employee Contribution Rates:	For General members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set back one year for males and females, weighted 30% male and 70% female. For Safety members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 with no setback for males and set back two years for females, weighted 75% male and 25% female.
Optional Forms of Benefit:	
Service Retirement and All Beneficiaries	General members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set back one year for males and females, weighted 30% male and 70% female. General beneficiaries: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set back one year for males and females, weighted 70% male and 30% female. Safety members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 with no setback for males and set back two years for females, weighted 75% male and 25% female. Safety beneficiaries: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set back one year for males and females, weighted 25% male and 75% female.

Optional Forms of Benefit: (continued)

Disability Retirement	General members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set forward seven years for males and set forward four years for females, weighted 30% male and 70% female. Safety members: RP-2000 Combined Healthy Mortality Table projected with Scale BB to 2020 set forward six years for males and set forward three years for females, weighted 75% male and 25% female.

Termination Rates Before Retirement:

	Rate (%) Mortality			
	General		Safety	
Age	Male	Female	Male	Female
25	0.04	0.02	0.04	0.02
30	0.04	0.02	0.04	0.02
35	0.07	0.04	0.07	0.04
40	0.10	0.06	0.10	0.06
45	0.13	0.10	0.14	0.09
50	0.19	0.15	0.20	0.14
55	0.30	0.22	0.34	0.21
60	0.53	0.37	0.59	0.33
65	0.90	0.68	1.00	0.60

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

	Rate (%) Disability	
Age	General[(1)]	Safety[(2)]
20	0.00	0.00
25	0.01	0.03
30	0.03	0.23
35	0.08	0.41
40	0.13	0.48
45	0.21	0.65
50	0.31	1.35
55	0.38	1.90
60	0.43	2.15

(1) *60% of General disabilities are assumed to be service connected disabilities. The other 40% are assumed to be non-service connected disabilities.*

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

Termination Rates Before Retirement (continued):

Rate (%)

Termination (< 5 Years of Service)[1]

Years of Service	General	Safety
0	10.00	5.00
1	9.00	4.00
2	7.00	3.00
3	6.00	2.00
4	5.00	1.00

Termination (5+ Years of Service)[2]

Age	General	Safety
20	5.00	2.00
25	5.00	2.00
30	5.00	1.70
35	4.40	1.20
40	3.40	1.00
45	2.70	1.00
50	2.50	1.00
55	2.50	1.00
60	2.50	0.40

(3) *60% of all terminated members will choose a refund of contributions and 40% will choose a deferred vested benefit.*

(4) *40% of all terminated members will choose a refund of contributions and 60% will choose a deferred vested benefit. No termination is assumed after a member is eligible for retirement.*

Retirement Rates:

	Rate (%)							
Age	General Tier 1	General Tier 2	General Tier 3	General Tier 4	Safety Tier 1[(1)]	Safety Tier 2, 2D[(1)]	Safety Tier 2C[(1)]	Safety Tier 4
50	4.00	2.00	6.00	0.00	35.00	15.00	4.00	4.00
51	4.00	2.00	3.00	0.00	30.00	15.00	2.00	2.00
52	4.00	2.00	5.00	4.00	25.00	15.00	2.00	2.00
53	4.00	2.00	6.00	1.50	35.00	15.00	3.00	3.00
54	4.00	2.00	6.00	1.50	45.00	15.00	6.00	6.00
55	7.00	2.00	12.00	2.50	45.00	15.00	10.00	10.00
56	9.00	3.00	13.00	2.50	45.00	20.00	12.00	12.00
57	12.00	4.00	13.00	3.50	45.00	25.00	20.00	20.00
58	12.00	4.00	14.00	4.50	45.00	25.00	10.00	10.00
59	16.00	5.00	16.00	4.50	45.00	25.00	15.00	15.00
60	24.00	6.00	21.00	4.50	100.00	30.00	60.00	60.00
61	24.00	9.00	20.00	7.50	100.00	30.00	60.00	60.00
62	40.00	18.00	30.00	19.00	100.00	30.00	60.00	60.00
63	35.00	18.00	25.00	15.00	100.00	30.00	60.00	60.00
64	35.00	20.00	25.00	17.00	100.00	100.00	100.00	100.00
65	35.00	25.00	30.00	21.00	100.00	100.00	100.00	100.00
66	35.00	25.00	25.00	20.00	100.00	100.00	100.00	100.00
67	30.00	25.00	25.00	20.00	100.00	100.00	100.00	100.00
68	25.00	30.00	25.00	30.00	100.00	100.00	100.00	100.00
69	35.00	35.00	50.00	35.00	100.00	100.00	100.00	100.00
70	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

[(2)] *Retirement rate is 100% after a member accrues a benefit of 100% of final average earnings.*

Retirement Age and Benefit for Deferred Vested Members:

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

General Age:	60
Safety Age:	56

For future deferred vested members who terminate with less than five years of service and are not vested, we assume that they will retire at age 70 for both General and Safety if they decide to leave their contributions on deposit.

We assume that 30% of future General and 60% of future Safety deferred vested members will continue to work for a reciprocal employer. For reciprocals, we assume 4.15% and 4.45% compensation increases per annum for General and Safety, respectively.

Future Benefit Accruals: 1.0 year of service per year of employment plus 0.005 year of additional service to anticipate conversion of unused sick leave for each 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.

Percent Married: 70% of male members; 50% of female members.

Age of Spouse: Female (or male) spouses are 3 years younger (or older) than their spouses.

	Option A	Option B
Net Investment Return:	7.75%	7.50%
Administrative Expenses:	1.6% of payroll	N/A (implicit in net investment return)
Employee Contribution Crediting Rate:	7.75% compounded semi-annually	7.50% compounded semi-annually

Consumer Price Index: Increase of 3.25% per year, retiree COLA increases due to CPI subject to a 3% maximum change per year for General Tier 1, General Tier 3, and Safety Tier 1, and 2% maximum change per year for General Tier 2, General Tier 4, Safety Tier 2, Safety Tier 2C, Safety Tier 2D, and Safety Tier 4.

Salary Increases:

Annual Rate of Compensation Increase (%)

Inflation: 3.25%; an additional 0.50% "across the board" salary increases (other than inflation); plus the following Merit and Promotional increases based on service.

Service	General	Safety
0-1	3.70%	6.70%
1-2	3.70	6.70
2-3	3.20	5.90
3-4	2.10	3.80
4-5	1.70	3.30
5-6	1.40	2.50
6-7	1.30	1.40
7-8	1.10	0.90
8-9	0.70	0.80
9-10	0.60	0.80
10-11	0.50	0.70
11+	0.40	0.70

Terminal Pay Assumptions:

Additional pay elements are expected to be received during a member's final average earnings period. The percentages (added to the final year salary) used in this valuation are:

	Service Retirement	Disability Retirement
General Tier 1	8.0%	6.5%
General Tier 2	3.0%	1.4%
General Tier 3	8.0%	6.5%
General Tier 4	N/A	N/A
Safety Tier 1	8.5%	6.4%
Safety Tier 2	4.0%	2.1%
Safety Tier 2C	4.0%	2.1%
Safety Tier 2D	4.0%	2.1%
Safety Tier 4	N/A	N/A