

**SAN LUIS OBISPO COUNTY PENSION TRUST**

ACTUARIAL EXPERIENCE STUDY

AS OF DECEMBER 31, 2015

January 26, 2017

Board of Trustees  
San Luis Obispo County Pension Trust  
1000 Mill Street  
San Luis Obispo, CA 93408

Members of the Board:

**Subject: Results of the Actuarial Experience Study for the Five-Year Period  
ending December 31, 2015**

We are pleased to present our report on the results of the 2015 Experience Study for the San Luis Obispo County Pension Trust (SLOCPT). We have reviewed each of the actuarial assumptions and compared them to actual experience over a five-year period ending December 31, 2015. This report summarizes the findings. It is our recommendation that changes be made to the actuarial assumptions and methods used for the SLOCPT actuarial valuations.

This experience investigation study was conducted in accordance with generally accepted actuarial principles and practices, and in full compliance with the Actuarial Standards of Practice as issued by the Actuarial Standards Board. Ms. Thompson is a member of and meets the Qualification Standards of the American Academy of Actuaries. She has extensive experience performing experience investigations for public sector retirement systems.

We wish to thank the SLOCPT staff for their assistance in providing data for this study.

Sincerely,



Leslie L. Thompson, FSA, FCA, MAAA, EA  
Senior Consultant

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## **SECTION I**

### EXECUTIVE SUMMARY

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## Executive Summary

The purpose of this report is to review actual experience for the five year period of January 1, 2011 to December 31, 2015 and to compare this to the current actuarial assumptions and methods. If the actual experience shows significant deviations from the assumptions, or our expectations for future experience have changed significantly, we offer recommendations for changes in the assumptions or methods.

Following is a brief summary of the current assumptions and recommended changes. The actuarial impact of these changes will be shown later in the report.

Actuarial Assumption	Current	Proposed	Comments*
Inflation	2.75%	2.625%	
Investment Return	7.25%	7.125%	
Salary Increase-			
Inflation component	2.75%	2.625%	
Productivity component	0.50%	0.25%	
Merit component	5.25%- 0.00%	5.25%- 0.00%	
Payroll growth	3.75%	3.375%	
Post Retirement Mortality- Base table	RP 2000	RP 2014	With modifications
Post Retirement Mortality- projection scale	Scale AA	MP 2015	With modifications
Active member mortality- Base table	RP 2000	RP 2014	With modifications
Active member mortality- projection scale	Scale AA	MP 2015	With modifications
Disabled member mortality- Base table	RP 2000	RP 2014- disabled table	With modifications
Active member mortality- projection scale	Scale AA	MP 2015	With modifications
Retirement Rates	SLOCPT rates	SLOCPT rates	Change to reflect experience for misc. and safety, no change for probation
Vested termination	SLOCPT rates	SLOCPT rates	Change probation to match safety
Disability rates	SLOCPT rates	SLOCPT rates	No change
Refunds	SLOCPT rates	SLOCPT rates	No change
Percent married	70% males 50% females	80% males 60% females	
COLA – Tier 1	2.75%	2.625%	
COLA – Tier 2 & 3	2.0%	2.0%	

\*Modifications to tables explained more fully later in this study

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**SECTION II**  
INTRODUCTION

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## Introduction

In determining liabilities, contribution rates and funding periods for retirement plans, actuaries must make assumptions about the future. Among the assumptions that must be made are:

- Retirement rates
- Mortality rates
- Turnover rates
- Disability rates
- Investment return rate
- Salary increase rates
- Inflation rate

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For other assumptions, such as the investment return rate, the link between past and future results is much weaker. In either case, though, actuaries review the assumptions periodically and determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

In conducting experience studies, actuaries generally use data over a period of several years. This is necessary in order to gather enough data so that the results are statistically significant. In addition, if the study period is too short, the impact of the current economic conditions may lead to misleading results. It is known, for example, that the health of the general economy can impact salary increase rates and withdrawal rates. Using results gathered during a short-term boom or bust will not be representative of the long-term trends in these assumptions. Also, the adoption of legislation, such as plan improvements or changes in salary schedules, will sometimes cause a short-term distortion in the experience. For example, if an early retirement window was opened during the study period, we would usually see a short-term spike in the number of retirements followed by a dearth of retirements for the following two-to-four years. Using a longer period prevents giving too much weight to such short-term effects. On the other hand, using a much longer period would water down real changes that may be occurring, such as mortality improvement or a change in the ages at which members retire. In our view, using a five-year period is reasonable.

In an experience study, we first determine the number of deaths, retirements, etc. that occurred during the period. Then we determine the number expected to occur, based on the current actuarial assumptions. The number “expected” is determined from using the probability of the occurrence at the given age, times the “exposures” at that same age. For example, let’s look at a rate of retirement of 50% at age 55. The number of exposures can only be those members who are age 55 and eligible for retirement at that time. Thus they are considered “exposed” to that assumption. Finally we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were "perfect", the A/E ratio would be 100%. For some assumptions (e.g. termination), an A/E ratio greater than 100% is conservative (i.e. generates actuarial gains for the System) while for other assumptions (e.g. retirement) an A/E

ratio less than 100% is conservative. When the A/E ratio varies much from 100%, it is a sign that new assumptions may be needed. Of course we not only look at the assumptions as a whole, but we also review how well they fit the actual results by sex, by age, and by service.

Finally, the actuary "graduates" or smoothes the results since the raw results can be quite uneven from age to age or from service year to service year.

Please bear in mind that, while the recommended assumption set represents our best estimate, there are other reasonable assumption sets that could be supported. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods.

## **ORGANIZATION OF REPORT**

Section III contains our findings and recommendations for each actuarial assumption. The impact of adopting our recommendations on liabilities and contribution rates is shown in Section IV. Section V summarizes the recommended changes. Section VI presents a summary of all the actuarial assumptions and methods, including the recommended changes.



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## **SECTION III**

### ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

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## Analysis of Experience and Recommendations

This section begins by discussing the economic assumptions: inflation, the investment return rate, the salary increase assumption, and the payroll growth rate. Next, the discussion will turn to the demographic assumptions: mortality, disability, retirement and termination. Finally, the analysis will include a review of the actuarial methods used in the valuation.

### ECONOMIC ASSUMPTIONS

Actuarial Standards of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, provides guidance to actuaries on giving advice on selecting economic assumptions for measuring obligations for defined benefit plans. In September 2013, the Actuarial Standard Board adopted changes to ASOP No. 27 which significantly reduced the reasonable range for an acceptable investment return assumption. Generally speaking, the revised version indicates that economic assumptions should be based on the actuary's estimate of future experience and no longer includes the "best-estimate range" standard.

Generally, the economic assumptions are much more subjective in nature than the demographic assumptions. As no one knows what the future holds, it is necessary for the actuary to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data.

### INFLATION RATE

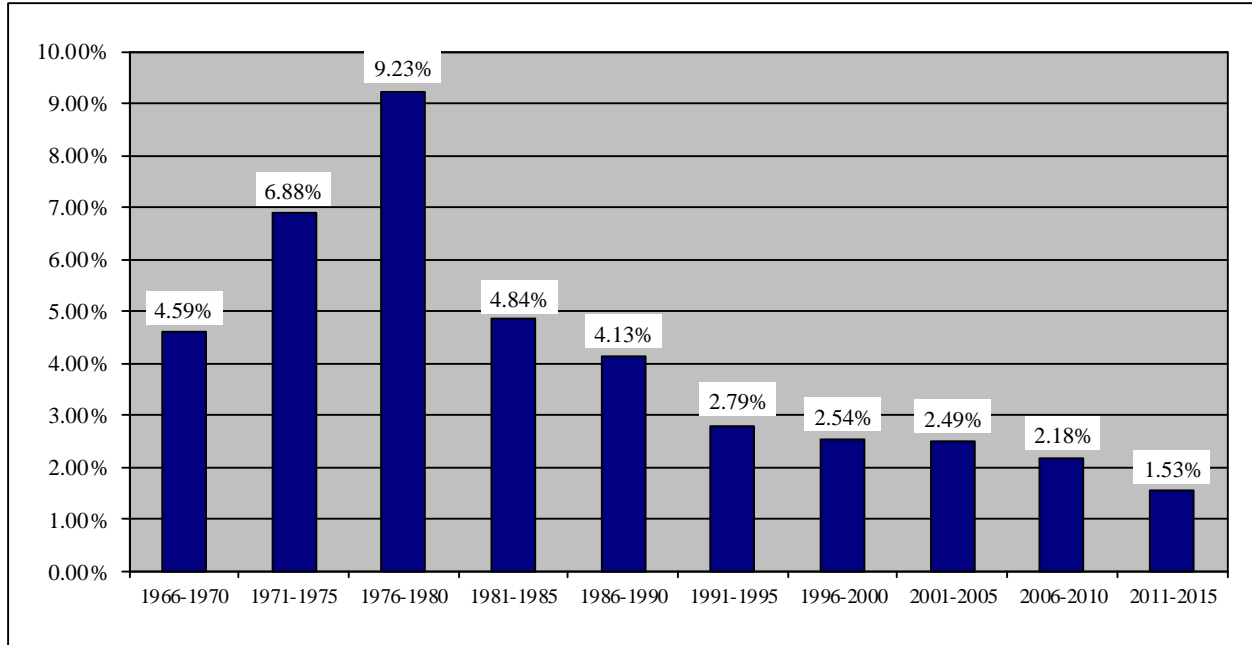
By "inflation", we mean price inflation, as measured by annual increases in the national Consumer Price Index (CPI). This inflation assumption underlies all of the other economic assumptions used in an actuarial valuation, including the investment return, individual salary increases, payroll growth and COLA assumptions.

San Luis Obispo County Pension Trust currently assumes a 2.75% price inflation assumption. The last time the inflation assumption was changed was in 2011 when the assumption was decreased from 3.75% to 2.75%.

Over the five-year period from January 1, 2011 through December 31, 2015, the CPI-U has increased at an average rate of 1.53%. However, the assumed inflation rate is only weakly tied to past results, and this has been a period of relatively low inflation.

The chart below shows the average annual inflation in each of the ten consecutive five-year periods ending December 31 over the last fifty years.

**Average Annual Inflation (CPI-U) over 5 year periods**



The table below shows the average inflation over various periods, ending December 2015:

Periods Ending December 2015	Average Annual Increase in CPI-U
Last five (5) years	1.53%
Last ten (10) years	1.86%
Last fifteen (15) years	2.07%
Last twenty (20) years	2.19%
Last thirty (30) years	2.61%
Since 1913 (first available year)	3.15%

Source: Bureau of Labor Statistics, CPI-U, all items, not seasonally adjusted

As shown above, inflation has been relatively low over the last twenty years, compared to prior periods. There has been a steady decline in inflation statistics over the last 30 years.

However, the assumed inflation rate is only weakly tied to past results, so it is helpful to use other sources of information to gain insight into expectations for the future. Inflation trends run in economic cycles, experiencing periods of relatively high rates and period of relatively lower rates of increase.

**Investment Consulting Firms**

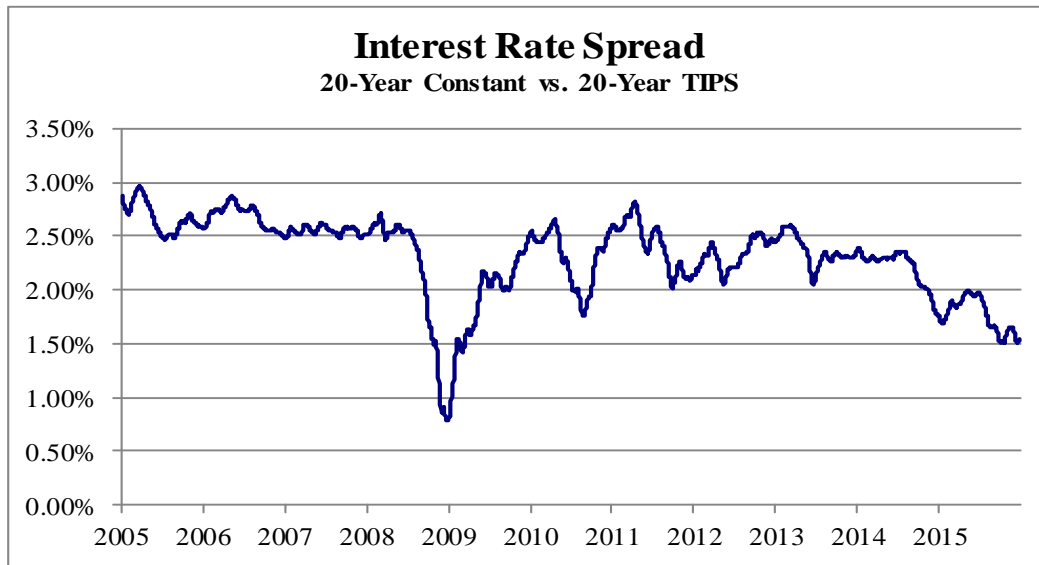
Most investment consulting firms develop an underlying inflation assumption for their forecasting and derivation of forward-looking capital market assumptions. The 2015 capital market assumption sets for seven investment consulting firms were examined, including New England Pension Consulting (NEPC), Hewitt Ennis Knupp, J. P. Morgan, Mercer, Pension Consulting Alliance (PCA), RV Kuhns and BNY Mellon. The average assumption for short-term inflation among these firms was 2.29%, with a range of 2.11% to 2.50%. Verus Associates, the plan's investment managers, assume 1.98% inflation over the next 10 years (*January 2016 Capital Market Assumptions*). It should be noted that investment consulting firms typically set their assumptions based on a five to ten year outlook, while actuaries must make projections encompassing a longer time period. This horizon difference may create a difference between the inflation assumption in the valuation and the inflation assumption used by the investment consultant.

**Bond Market**

Another source of information about future inflation is the market for US Treasury bonds. Comparing the yields for conventional Treasury securities and Treasury Inflation-Protected Securities (TIPS) provides a useful measure of the market's expectation of future inflation. Conventional Treasury securities compensate its holders by providing a nominal yield with two components, the real rate of interest plus inflation compensation. Since TIPS already adjust for inflation, the yield only includes the real rate of interest. Therefore the difference roughly reflects the inflation expectation for that maturity horizon.

For example, the December 31, 2015 yield for 20-year TIPS was 1.07% plus actual inflation. The yield for 20-year non-indexed US Treasury bonds was 2.67%. Simplistically, this means that on that day the bond market was predicting that inflation over the next twenty years would average 1.60% ( $2.67\% - 1.07\%$ ) per year. However, this analysis is known to be imperfect. It ignores the inflation risk premium that buyers of US Treasury bonds should ask for, and it ignores the differences in liquidity between US Treasury bonds and TIPS.

Below is a chart with the historical spread between 20-year constant and 20-year inflation protected Treasury bonds.



The historical spread between the constant and inflation protected securities was relatively constant from 2005 up to the beginning of the crisis in the credit market. The decrease in the spread during the collapse of the US investment markets and the subsequent volatility reflect differences in liquidity and the risk premiums that buyers of US Treasury securities require.

The Federal Reserve Bank of Cleveland has developed a model that combines information from a number of sources to address the shortcomings of the "break-even" rate illustrated above. Based on the results of its model, the Federal Reserve Bank of Cleveland reported in May 2016 that it estimates the 10-year expected inflation to be 1.75%, which implies expectations for inflation to be less than 2.00% on average for the next decade.

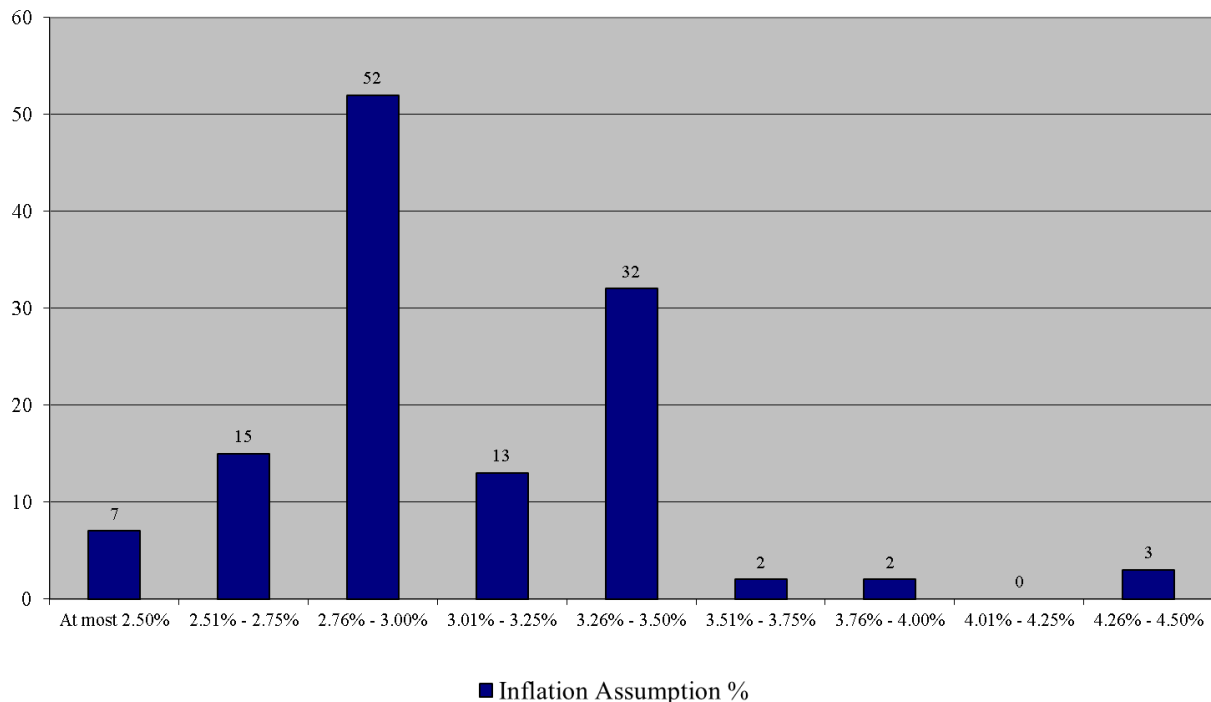
### **Other Sources of Inflation Forecasts**

In the Social Security Administration's 2015 Trustees Report, the Office of the Chief Actuary is projecting a long-term average annual inflation rate of 2.70% under the intermediate cost assumption. (The inflation assumptions are 2.00% and 3.40% respectively in the low cost and high cost projection scenarios.) These inflation assumptions were lowered slightly in the last two years. (Since the experience study results were presented in May, the SSA has published their 2016 Trustees Report and the long-term average annual inflation has been lowered again to 2.60% under the intermediate assumption but no change to the 2.00% low cost scenario.)

The Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. Its most recent forecast (first quarter of 2016) was for inflation over the next five years to average 2.08% and over the next ten years to average 2.12%.

Another source of information about this assumption is the Public Funds Survey that is prepared on behalf of the National Association of State Retirement Administrators (NASRA) and the National Council on Teacher Retirement (NCTR). This report surveys about 126 plans, including all of the largest public funds covering state employees or teachers.

**Price Inflation Assumption  
Frequency of Plans in Public Funds Survey**



Source: <http://www.publicfundsurvey.org/publicfundsurvey/actuarialassumptions.asp>

The current survey shows that the median inflation rate assumed for large public retirement systems in the U.S. is 3.00%, with the most prevalent assumption also at 3.00%. Approximately 59% of the surveyed systems use an assumption of 3.00% or less. The information in the Public Funds Survey for many of the systems is more than a year old and it is possible that some systems have subsequently updated their assumptions. In fact, several statewide public retirement systems have lowered this assumption in recent years.

#### *Recommendation*

Based on all of this information, we believe a reasonable long-term inflation assumption range is between 2.00% and 2.75%. The recommendation to the Board is to decrease the inflation assumption from 2.75% to 2.625%. While the 2.625% assumption is slightly higher than the expected rates of future inflation for many of the various sources above, it is within a reasonable range of acceptable long-term assumptions. Also, since the cost-of-living increase for Tier 1 retirees is tied to local inflation results, we also recommend that the COLA assumption for Tier 1 be decreased from 2.75% to 2.625%.

## **INVESTMENT RETURN RATE**

Currently, San Luis Obispo County Pension Trust assumes an investment return rate of 7.25%, net of investment and administrative expenses. This is the rate used in discounting future payments and in calculating the actuarial present value of those payments. The current assumption assumes inflation of 2.75% per annum and an annual real rate of return of 4.50% net of expenses. This assumption was last changed in 2011 when it was decreased from 7.75% to 7.25%.

### **Expenses**

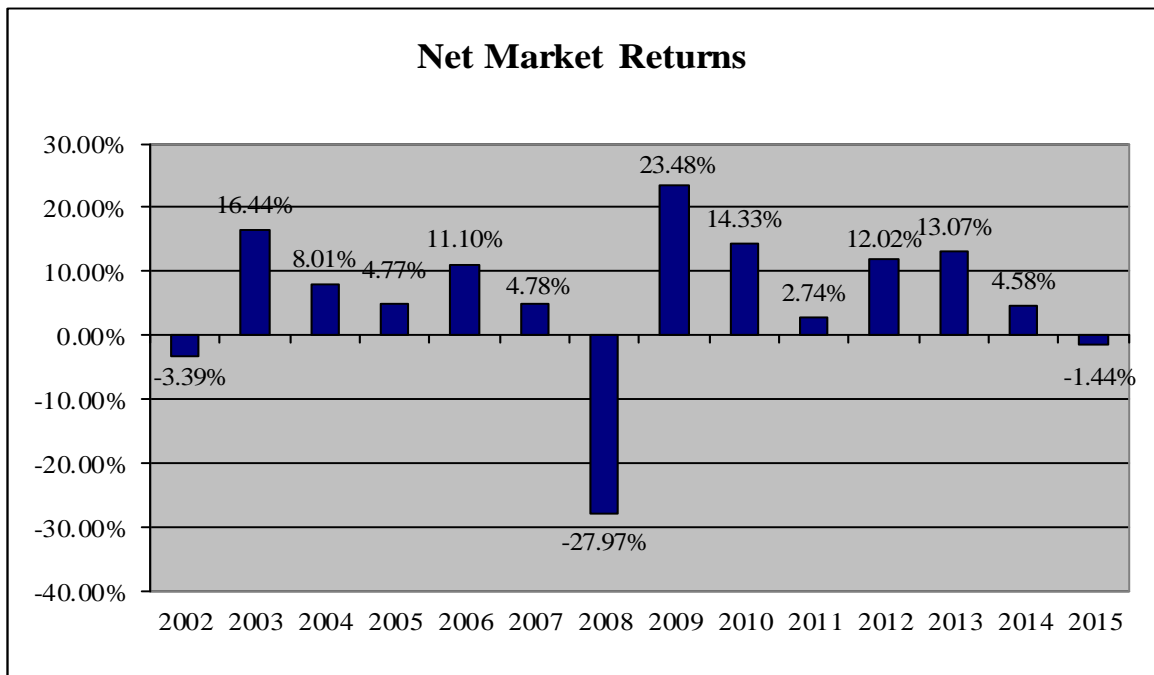
There are two primary types of expenses that are paid from the trust. First, administrative expenses are those expenses associated with running the retirement system (e.g., custodial fees, audit fees, actuarial fees, etc.). The other primary type of expense is investment expenses that are paid from the trust (transaction costs, investment consultants, etc.). Since the trust fund pays these expenses from plan assets, it is necessary to incorporate the expected expenses into the actuarial valuation

There are two common approaches to incorporating these expenses into the actuarial valuation. Plan expenses may be explicitly assumed as a direct increase to the annual recommended contribution or implicitly assumed by developing an investment return assumption that is expected to meet the return target after paying plan expenses from the investment earnings. Our past practice has been to set the investment return assumption as the net return after payment of both investment and administrative expenses (implicit assumption for all expenses). We believe that an implicit expense assumption is still appropriate.

We developed an estimate of the administrative expense assumption of .20% used in the analysis below by reviewing the past five years of expenses in relation to total pension assets. The market returns assumed for the various asset classes discussed below are already assumed to be net of investment expenses.

### **Historical Information**

The following chart shows the year-by-year returns, net of investment and administrative expenses, since 2002.



For the last five years, the average market return, net of investment and administrative expenses, has been 6.05% and over the last 10 years has been 4.73%. However, for this assumption, past performance, even averaged over five years or longer, is not a reliable indicator of future performance.

**Asset Allocation**

The actual asset allocation of the trust fund will significantly impact the overall performance, so returns achieved under a different allocation are not meaningful. More importantly, the real rates of return for many asset classes, especially equities, vary so dramatically from year to year that even a ten-year period is not long enough to provide reasonable guidance. There are reasons to believe the next twenty years will be different than the last twenty, in large part because current bond yields are significantly lower than they were 20 years ago.

The current target asset allocation, as established by the Board, is shown below, with subcategories of assets allocated based on benchmark weights.



<b>Investment</b>	<b>Policy Target %</b>
Large Cap U.S. Equity	19%
Small/Mid Cap U.S. Equity	4%
International Large - Equity	14%
Emerging Markets - Equity	8%
US Core Fixed Income	20%
Global Credit - Fixed	10%
TIPS	5%
Commodities	5%
Real Estate	10%
Private Equity/VC	5%
<b>Total Allocation</b>	<b>100%</b>

Source: SLOCPT Investment Policy Statement, November 2015

### Capital Market Assumptions

The allocation of assets within the universe of investment options will significantly impact the overall performance. Therefore, it is meaningful to identify the range of expected returns based on the fund's targeted allocation of investments and an overall set of capital market assumptions.

Because GRS is a benefits consulting firm and does not provide investment advice, we reviewed capital market assumptions developed and published by the following seven independent investment consulting firms:

- BNY Mellon
- JP Morgan
- R.V. Kuhns
- NEPC
- PCA
- Hewitt Ennis Knupp
- Mercer Consulting

These investment consulting firms periodically issue reports that describe their capital market assumptions, that is, their estimates of expected returns, volatility, and correlations. While these assumptions are developed based upon historical analysis, many of these firms also incorporate forward looking adjustments to better reflect near-term expectations. The estimates for core investments (i.e. fixed income, equities, and real estate) are generally based on anticipated returns produced by passive index funds that are net of investment related fees. Investment return expectations for the alternative asset class such as private equity and hedge funds are also net of investment expenses. Therefore, we did not make any additional adjustments to account for investment related expenses. Please note that the actuarial standards generally do not allow us to consider alpha that may be generated by active management.

Using capital market assumptions for 2015 from these seven large investment consulting entities and using the above asset allocation targets for the Plan, the following range for assumptions was developed, net of investment and administrative expenses.

The following analysis assumes an inflation assumption of 2.625%, which is the recommended inflation rate assumption from the prior section of this report. If this assumption is modified, the results shown below will change accordingly.

The average expected return for this group is 6.92%, net of investment and administrative expenses and assuming a rate of inflation of 2.625%.

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2) - (3)	Actuary Inflation Assumption	Expected Nominal Return (4) + (5)	Plan Incurred Expenses Assumption	Expected Nominal Return Net of Expenses (6) - (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	6.45%	2.50%	3.95%	2.63%	6.57%	0.20%	6.37%
2	6.56%	2.50%	4.06%	2.63%	6.68%	0.20%	6.48%
3	6.61%	2.20%	4.41%	2.63%	7.04%	0.20%	6.84%
4	6.55%	2.11%	4.45%	2.63%	7.07%	0.20%	6.87%
5	6.72%	2.25%	4.47%	2.63%	7.10%	0.20%	6.90%
6	7.12%	2.26%	4.86%	2.63%	7.49%	0.20%	7.29%
7	7.43%	2.20%	5.23%	2.63%	7.86%	0.20%	7.66%
<b>Average</b>	<b>6.78%</b>	<b>2.29%</b>	<b>4.49%</b>	<b>2.63%</b>	<b>7.12%</b>	<b>0.20%</b>	<b>6.92%</b>

We have determined for each firm the expected nominal return rate, then subtracted that firm's expected inflation to arrive at their expected real return in col. (4). Then we added 2.625% for the plan's inflation assumption and 0.20% for expenses to get the expected nominal return, net of administrative and investment expenses. As the table shows, the average net one-year real return of the seven firms is 4.49% and the average expected nominal return net of expenses is 6.92%, compared to the plan's assumptions of 4.50% and 7.25%, respectively.

The current investment consultant for San Luis Obispo County, Verus Associates, provided their ten year arithmetic return forecast for various asset classes in the January 2016 Asset Allocation Study. Using these assumptions and the target asset allocation indicated above, the analysis below was developed, which corresponds in methodology with the results from the peer group above. The expected real return is 3.89% and expected nominal return is 6.32%.

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2) - (3)	Actuary Inflation Assumption	Expected Nominal Return (4) + (5)	Plan Incurred Expenses Assumption	Expected Nominal Return Net of Expenses (6) - (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Verus	5.89%	2.00%	3.89%	2.63%	6.52%	0.20%	6.32%

*Net of administrative and investment expenses*

Expected volatility plays a key role in building future return expectations. For example, no volatility over a four year period, with a return of exactly 8% in each of those four years will

show a return of 8%. However, a four year return pattern of 4%, 12%, 4%, 12% will return only 7.926%. The increasing volatility decreases the long term actual return.

In addition to examining the expected one-year return, it is important to review anticipated volatility of the investment portfolio and understand the range of long-term net return that could be expected to be produced by the investment portfolio. Therefore, the following table provides the 25<sup>th</sup>, 50<sup>th</sup>, and 75<sup>th</sup> percentiles of the 20-year geometric average of the expected nominal return, net of investment expenses.

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding 7.25% *
	25th	50th	75th	
(1)	(2)	(3)	(4)	(5)
1	4.30%	5.85%	7.42%	27.4%
2	4.16%	5.86%	7.59%	29.3%
3	4.70%	6.29%	7.91%	34.4%
4	4.71%	6.32%	7.95%	34.9%
5	4.54%	6.26%	8.01%	35.1%
6	5.22%	6.77%	8.35%	41.9%
7	5.33%	7.04%	8.77%	46.7%
<b>Average</b>	<b>4.71%</b>	<b>6.34%</b>	<b>8.00%</b>	<b>35.7%</b>

\*Plan's current return assumption net of expenses.

### Recommendation

Based on all of this information, we believe a reasonable investment return assumption range is between 7.00% and 7.75%. The recommendation to the Board is to retain the real rate of return assumption of 4.50% but to decrease the investment return assumption based on the recommended decrease in the inflation assumption. Therefore, the recommendation to the Board is to decrease the investment return assumption from 7.25% to 7.125% net of investment and administrative expenses.

## **SALARY INCREASE RATES**

The current salary increase rates assumed for the valuation vary by service. The assumed increase rates range from 8.50% for new members to 3.25% for members with eight or more years of service.

Generally, the salary scale assumption consists of a wage inflation assumption that represents the increases for long-service employees plus a component for merit and promotion increases for members early in their career. Historically, wage inflation almost always exceeds price inflation. This is because wage inflation is in theory the result of (a) price inflation, and (b) productivity gains being passed through to wages. Since 1951, wage inflation has been about 1.00% a year larger than price inflation but has been trending down in recent years.

Salary increases for governmental employees can vary significantly from year to year, especially for groups such as SLOCPT where many members participate in unions and are subject to labor negotiated contracts. Our experience across many governmental plans shows several occasions in which salary increases will be low for a period of several years followed by a significant increase in one year, for instance when a new contract goes into effect. Therefore, for this assumption in particular, we sometimes will also look at data over a longer period in establishing our assumptions. For this analysis, we also looked at a ten-year period but ultimately based the conclusions on the five-year analysis.

### **Wage Inflation**

Salary increases for longer-service employees are almost entirely driven by wage inflation. Many of the factors that result in pay increases are largely inapplicable or have diminished importance for longer-service employees. Thus, longer service employees' wages are assumed to grow at the overall rate of wage inflation which is currently assumed to be 3.25% (2.75% price inflation plus 0.50% productivity increases). Actual experience observed in the study indicates productivity increases of about 0.47% above the observed price inflation over the last five years. Since we recommended a decrease to the price inflation assumption and productivity increases have been decreasing, we recommend a decrease to the wage inflation assumption from 3.25% to 2.875% based on the recommended decrease in the inflation assumption and a recommended decrease in the productivity component from 0.50% to 0.25%.

### **Merit and Promotion**

Salary increases for shorter-service employees typically include wage inflation and a component for merit and promotion increases. The current assumption includes merit increases during the first seven years of employment of up to 5.25% above wage inflation. Data observed in the study indicate merit increases were generally in line with the current assumptions, as shown below:

Service Index	Actual Merit Increase	Expected Merit Increase
1	6.46%	5.25%
2	6.33%	5.00%
3	5.32%	4.00%
4	4.04%	3.00%
5	1.77%	2.00%
6	1.15%	1.00%
7	0.72%	0.50%
>7	0.52%	0.00%

For example, active members with one year of service received an average merit increase of 6.46% compared to our current assumption of 5.25%. And merit increases for member with seven years of service were 0.72% compared to the assumption of 0.50%. The increases for members with one to four years of service are slightly higher than the current assumption but the ten-year data showed slightly smaller differences. The actual increases for members with five to seven years of service were generally in line with the current assumptions. Therefore, we recommend no change to the assumption regarding merit increases for the first seven years.

## PAYROLL GROWTH RATE

The salary increase rates discussed above are assumptions applied to individuals. These rates are used in projecting future benefits. A separate payroll growth assumption, currently 3.75% is used in determining the charge needed to amortize the unfunded actuarial accrued liability. The amortization payments are calculated to be a level percentage of payroll, so as payroll increases over time, these charges also increase. The amortization payment is dependent on the rate at which payroll is assumed to increase.

Payroll can grow at a rate different from the average pay increase for individual members. There are two reasons for this. First, when older, longer-service members terminate, retire or die, they are generally replaced with new members who have a lower salary. Because of this, in most populations that are not growing in size, the growth in total payroll will be smaller than the average pay increase for members. Second, payroll can grow due to an increase in the size of the group. However, GASB 25 prohibits systems from using anticipated membership growth in setting the payroll growth assumption.

Over the last ten years, payroll growth has averaged 2.07% per year. However, the active membership has increased slightly over the last ten years so after adjusting for the membership changes, payroll growth has averaged 1.98%. This low growth reflects the slow-growth economy since 2008 and the expected continued low growth, at least in the short-term. Therefore, we recommend a decrease in the payroll growth assumption to 3.375%. This decrease is also consistent with the decrease in the wage inflation assumption.

The difference between wage inflation and payroll growth is due to the growth in the new hire salaries. The wage inflation assumption will measure the increase in salaries once a member is

hired, while payroll growth, as an aggregate amount, will also include the growth of the new entrants' pay. The 50 basis points difference is used to reflect this growth in the average new entrant pay.

## **DEMOGRAPHIC ASSUMPTIONS**

As previously mentioned, actuaries are guided by the Actuarial Standards of Practice (ASOP) adopted by the Actuarial Standards Board (ASB). One of these standards is ASOP No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations. This standard provides guidance to actuaries giving advice on selecting noneconomic assumptions for measuring obligations under defined benefit plans. We believe the recommended assumptions in this report were developed in compliance with this standard.

## **POST-RETIREMENT MORTALITY RATES**

When choosing an appropriate mortality assumption, actuaries typically use standard mortality tables, unlike when choosing other demographic assumptions. They may choose to adjust these standard mortality tables, however, to reflect various characteristics of the covered group, and to provide for expectations of future mortality improvement (both up to and after the measurement date). If the plan population has sufficient credibility to justify its own mortality table, then the use of such a table also could be appropriate. Factors that may be considered in selecting and/or adjusting a mortality table include the demographics of the covered group, the size of the group and the statistical credibility of its experience, and future mortality improvement.

The mortality table currently being used for non-disabled retirees and beneficiaries receiving benefits is a standard table published by the Society of Actuaries (SOA) called the RP-2000 Combined Mortality table, with a white collar adjustment, a 105% multiplier, and a mechanism to automatically model future improvements in mortality each year. This type of table (or series of tables) is called generational mortality. By doing this, future mortality rates will be projected to continually decrease each year in the future. Therefore, the life expectancy at age 60 for someone reaching 60 now will not be as long as the life expectancy for someone reaching 60 in 2020, and her life expectancy will not be as long as someone reaching 60 in 2040, etc. The table has separate rates for males and females.

The issue of future mortality improvement is one that the governing bodies of our profession have recently become more concerned about. This has resulted in recent changes to the relevant Actuarial Standard of Practice, ASOP 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations. The standard now requires pension actuaries to make and disclose an assumption as to expected mortality improvement after the valuation date. In particular, the Internal Revenue Service now requires the use of generational mortality for plans in the private sector that are covered under the provisions of the Pension Protection Act of 2006 (PPA).

The generational improvements are currently modelled by using Scale AA, another standard mortality improvement table used in both pension and life insurance work to convert a table to a generational set of tables. Scale AA was released in conjunction with the RP-2000 tables, and was

the most current projection table published by the profession and recommended for use when SLOCPT adopted the change to use generational tables. Since then, the Retirement Plans Experience Committee (RPEC) of the Society of Actuaries has been working on updating both the RP-2000 tables and the projection scale tables based on more recent experience and in October 2014 published their most recent findings. The following are excerpts from the Society of Actuaries Report on their mortality improvement scale, referred to as MP-2014:

*“In late 2009, RPEC initiated a comprehensive analysis of pension plan mortality experience in the United States. At an early stage of its analysis, the Mortality Improvement subcommittee of RPEC noticed that mortality improvement experience in the United States since 2000 was clearly different from that anticipated by Scale AA. In particular, there was a noticeable degree of mismatch between the Scale AA rates and actual mortality experience for ages under 50, and the Scale AA rates were lower than the actual mortality improvement rates for most ages over 55.”*

There were 59 deaths among the male retirees and 113 deaths among female retirees during the last five years. (These figures exclude deaths among beneficiaries and disabled retirees.) Based on the current tables, we expected 82 and 131 deaths respectively. This produced A/E ratios of 72% for males and 86% for females. Unlike a static mortality table where an A/E ratio between 110% and 120% is generally desired to allow for a margin, an A/E ratio of 100% is desirable when using generational mortality because the margin is built into future mortality improvement rates. These results are consistent with the RPEC’s findings that the projection table AA no longer provides a good fit for past experience. Therefore, we recommend updating the mortality tables to the new RP-2014 Healthy Annuitant tables, with a white collar adjustment, and also adopting the new projection tables, referred to as MP-2015. We recommend adjustments to the MP-2015 table as follows:

Year	Multiplier
2017	90%
2018	85%
2019	80%
2020	75%
2021	75%
2022	70%
2023	70%
2024	65%
2025	60%
2026	55%
2027+	50%

The Scale AA tables are one-dimensional in that they are only based on the age of the member. That means, for instance, the life expectancy of a 60 year old retiree today is different than the life expectancy of a 60 year old retiree in 2020 but the rate at which mortality is improving is the same



for both members. The new MP-2015 tables are two-dimensional in that they are also based on the year of birth of the member. Under that scenario, the rate of improvement for the 60 year old in 2020 will be greater than the rate of improvement for the 60 year old retiree today and the implementation of those new tables may result in an increase in liabilities and costs.

While the MP-2015 projection tables should provide a better fit than the current Scale AA tables, we also need to keep in mind that these tables were based on national mortality data. Studies have shown that California is one of the healthier states in the country so in some respects the improvement modelled in the SOA tables is a reflection more of the improvement in other parts of the nation and less so in California and other healthier states. In other words, the mortality improvements come largely from medical advances in treating diseases or other chronic conditions that affected mortality and less so from extending natural longevity. We believe using the full improvements in the new MP tables may be overstating the future improvements in mortality in California since California may already be “ahead of the curve”. Therefore, we are recommending an adjustment to the improvements modelled in the MP tables by dampening the rate of future improvements. If future mortality experience in the SLOCPT plan follows expectations, then this adjustment should be a good fit for future experience. If, on the other hand, California is not as ahead of the curve as we suspect, then future improvements will be faster than our adjustment anticipates and we may need to remove the dampening effect in the future.

Also, the SOA study was based on data from retirees in the private sector. The SOA is currently working on another mortality study based on data from retirees in the public sector. Historically, public sector mortality experience has sometimes shown itself to be slightly better than private sector experience (possibly due to lower work-related stress, or better retiree health coverage). If the SOA study finds similar results, then potentially any new tables coming from that study might show better current mortality rates with slower improvements than the MP-2015 tables and the proposed dampening effect we are recommending could be thought of as a bias towards that effect.

To illustrate the impact of future generational improvements under the current assumption, if we assume the same set of exposures and actual deaths for the next five years, we would expect these A/E ratios to be 76% for males and 88% for females five years from now. The results of this analysis are shown in the following tables:



<b>Post-Retirement Mortality (non-disabled) – Males</b>					
<b>RP-2000 White Collar with Generational Improvements</b>					
		<b>Based on last 5 years</b>		<b>Based on next 5 years*</b>	
Age	Actual deaths	Expected deaths	A/E ratio	Expected deaths	A/E ratio
50 - 54	0	0	0%	0	0%
55 - 59	2	2	133%	1	143%
60 - 64	3	6	50%	6	55%
65 - 69	9	12	74%	11	80%
70 - 74	11	10	112%	9	122%
75 - 79	5	11	47%	10	51%
80 - 84	9	16	58%	15	61%
85 - 89	12	14	85%	14	88%
90 and over	8	12	69%	12	70%
<b>Totals</b>	<b>59</b>	<b>82</b>	<b>72%</b>	<b>77</b>	<b>76%</b>

\* Assumed based on the same group of exposures and actual deaths

<b>Post-Retirement Mortality (non-disabled) – Females</b>					
<b>RP-2000 White Collar with Generational Improvements</b>					
		<b>Based on last 5 years</b>		<b>Based on next 5 years*</b>	
Age	Actual deaths	Expected deaths	A/E ratio	Expected deaths	A/E ratio
50 - 54	1	0	333%	0	333%
55 - 59	1	2	42%	2	42%
60 - 64	7	7	96%	7	99%
65 - 69	6	15	41%	14	43%
70 - 74	17	16	107%	15	110%
75 - 79	7	14	49%	14	51%
80 - 84	19	19	102%	18	106%
85 - 89	22	26	86%	25	88%
90 and over	33	32	103%	32	104%
<b>Totals</b>	<b>113</b>	<b>131</b>	<b>86%</b>	<b>128</b>	<b>88%</b>

\* Assumed based on the same group of exposures and actual deaths

**DISABLED MORTALITY RATES**

This is a minor assumption, and it has little impact on the total plan liabilities. There were 9 male deaths and 4 female deaths among the disabled retirees during the five-year study period. This produced A/E ratios of 92% and 129% respectively. The current assumption is a static table (as opposed to generational) using the standard RP-2000 Disabled Mortality Table, projected to 2020 using Scale AA with an 80% multiplier for males and a 50% multiplier for females with a one year setback. For similar reasons as discussed for the post-retirement assumption and the poor fit provided by scale AA, we recommend changing this assumption to a generational table using the new SOA tables (RP-2014 Disabled Mortality projected with scale MP-2015 modified). The results of this analysis are shown below:

<b>Disability Mortality – Males</b>			
		<b>RP-2000 Disabled Projected to 2020</b>	
Age	Actual deaths	Expected deaths	A/E ratio
50 - 54	0	1	0%
55 - 59	0	1	0%
60 - 64	3	1	240%
65 - 69	2	2	100%
70 - 74	2	1	278%
75 - 79	0	1	0%
80 - 84	1	1	81%
85 - 89	1	0	227%
90 and over	0	1	0%
<b>Totals</b>	<b>9</b>	<b>10</b>	<b>92%</b>

<b>Disability Mortality – Females</b>			
		<b>RP-2000 Disabled Projected to 2020</b>	
Age	Actual deaths	Expected deaths	A/E ratio
50 - 54	0	0	0%
55 - 59	1	1	127%
60 - 64	1	1	156%
65 - 69	1	1	143%
70 - 74	1	0	294%
75 - 79	0	0	0%
80 - 84	0	0	0%
85 - 89	0	0	N/A
90 and over	0	0	0%
<b>Totals</b>	<b>4</b>	<b>3</b>	<b>129%</b>

**ACTIVE MORTALITY RATES**

A separate mortality table is used for active members. The results of this analysis are shown below:

		RP-2000 Projected to 2020	
	Actual Deaths	Expected Deaths	A/E ratio
Males	10	7	143%
Females	3	5	60%
<b>Total</b>	<b>13</b>	<b>12</b>	<b>108%</b>

The current assumption is a static table based on the standard RP-2000 Employee Mortality Table projected to 2020 setback 1 year with a 90% multiplier for males and setback 3 years with a 50% multiplier for females. Since the counts are so small and the credibility of actual experience is not statistically significant, we recommend also changing this assumption to a generational table using the new SOA tables (RP-2014 Employee Mortality projected with scale MP-2015 modified).

**DISABILITY RATES**

Disability is an assumption with a minor impact on the liabilities of the trust. The A/E ratio on a combined basis for Miscellaneous and Probation members (combined since these are all assumed to be non-duty disabilities) was 78% and 42% for Safety members (assumed to be all duty-related). This assumption is based on actual plan experience instead of a standard table since experience can differ significantly for each population based on various factors such as occupation, local culture, plan requirements for meeting the definition of disability, etc. The Board adopted significant decreases to this assumption as of the 2012 experience study and we recommend no new changes to this assumption. The results of this analysis are shown below:

		Current Assumption	
	Actual Disabilities	Expected Disabilities	A/E ratio
Miscellaneous	6	9	67%
Probation	1	0	N/A
Safety	2	5	42%

**RETIREMENT RATES**

Retirement rates vary by age and for this assumption A/E ratios under 100% are conservative (fewer actual retirements generally leads to a retirement gain for the Plan). There were 469 retirements during the five-year period for Miscellaneous members, 20 retirements for Probation members, and 56 retirements for Safety members. This includes only members who retired from active status. It excludes those who were inactive for over a year before retiring.

The analysis shows A/E ratios of 89% for Miscellaneous members, 147% for Probation members, and 138% for Safety members. In the last study, the A/E was 91% for Miscellaneous, 97% for Probation, and 113% for Safety. The Board adopted changes to this assumption as of the 2012 experience study (decrease Miscellaneous rates and increase Probation and Safety rates). The results of the current analysis are shown below:

<b>Retirement (Current Assumption)*</b>									
	Miscellaneous			Probation			Safety		
Age	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio
Under 50	1	0	N/A	0	0.0	N/A	0	0.0	N/A
50	6	11	54%	0	0.9	0%	12	7.2	167%
51	4	9	44%	0	1.4	0%	7	7.0	100%
52	8	9	87%	1	1.4	71%	5	4.5	111%
53	5	9	55%	0	1.1	0%	6	3.7	162%
54	9	13	67%	3	0.8	375%	3	3.7	81%
55	16	22	74%	4	0.7	571%	5	3.6	139%
56	30	22	139%	1	0.5	200%	2	2.3	87%
57	18	27	66%	0	0.6	0%	7	1.9	368%
58	14	29	49%	1	0.7	143%	0	1.1	0%
59	34	27	125%	1	0.6	167%	3	1.1	273%
60	34	32	105%	1	0.6	167%	2	1.0	200%
61	41	30	135%	1	0.3	333%	2	0.6	333%
62	61	53	115%	1	0.6	167%	0	0.0	N/A
63	47	44	107%	1	0.6	167%	1	1.0	100%
64	29	32	91%	0	0.8	0%	0	0.8	0%
65	39	50	79%	3	1.6	188%	1	1.0	100%
66	32	26	124%	2	0.4	500%	0	0.0	N/A
67	14	12	119%	0	0.0	N/A	0	0.0	N/A
68	9	8	113%	0	0.0	N/A	0	0.0	N/A
69	6	6	103%	0	0.0	N/A	0	0.0	N/A
70	5	23	22%	0	0.0	N/A	0	0.0	N/A
Over 70	7	32	22%	0	0.0	N/A	0	0.0	N/A
<b>Total</b>	<b>469</b>	<b>526</b>	<b>89%</b>	<b>20</b>	<b>13.6</b>	<b>147%</b>	<b>56</b>	<b>40.5</b>	<b>138%</b>

\*Highlighted areas are ages recommended for an assumption change

The experience reflects retirements only within Tier 1 (depending on the bargaining unit of each member, Miscellaneous members began entering Tier 2 as early as December 2010 and Safety members began entering Tier 2 as early as September 2011). Since Tier 2 is still relatively new, there is virtually no experience yet on which to base a retirement assumption. Tier 3 was also recently implemented for all members hired after January 1, 2013. Although there was no experience available yet, the retirement assumption for Tier 2 members was changed slightly as of the last study to match the Tier 3 rates reflecting the lower value of their benefits. We continue to believe this is appropriate and we recommend no change to the retirement assumption for Tier 2 and Tier 3 members.

Consistent with that change for Tier 2, we are recommending slight increases in the rates at ages 51-53 for Tier 1 Miscellaneous members to reflect that we expect to see future Tier 1 members retire at a slightly higher rate than Tier 2 or Tier 3 members. The data shows the expected retirements were greater than the number of actual retirements, but we believe many members may have been delaying retirement recently as they worked to reestablish their retirement nest egg. Stagnant wage growth may also have contributed to this trend as the economy continued to recover from the recession. The data shows there have been few Miscellaneous retirements before age 50 in the last five years but the counts are small and the actual experience is not statistically significant. Likewise, we are recommending an increase in the age 50 rate for Tier 1 Safety members to reflect the higher number of expected retirements. See the table of rates in Section VI for the recommended changes to these rates.

We also reviewed the retirement experience of sworn Safety vs. non-sworn Safety members between the ages of 50 to 55 since the non-sworn members retire with smaller benefits at these ages. We continue to see some evidence that the sworn members are retiring at an earlier age but the counts are not statistically significant enough to recommend a separate set of rates for these two groups. However, the recommended change to the age 50 retirement rate mentioned above will serve the same purpose by capturing more of the early retirements. We will continue to monitor this pattern in the future and may recommend a change if the different retirement patterns persist.

## TERMINATION RATES

Termination rates reflect members who leave for any reason other than death, disability or service retirement. They apply whether the termination is voluntary or involuntary, and whether the member takes a refund or keeps his/her account balance on deposit in the Pension Trust. The current termination rates reflect the member's age and service, and we want to continue this practice. Rates are currently broken down into three distinct subgroups:

- Rates for members who withdraw with less than five years of service and are assumed to take a refund
- Rates for members who withdraw with five or more years of service and are assumed to take a refund
- Rates for members who withdraw with five or more years of service and are assumed to leave their contributions on deposit and receive a deferred vested retirement benefit.

In the aggregate for all three withdrawal decrements, the current assumptions produce an A/E ratio for Miscellaneous members of 103%, for Probation members of 50%, and for Safety members of 92%. For this assumption, A/E ratios over 100% are conservative (when there are more terminations than expected, the Plan usually experiences a gain).

This experience study overlaps the period during which the economy was recovering from the Great Recession. During this time, most plans saw fewer terminations as members elected to remain in their current job. However, as the economy improves, there should be a trend towards more terminations again. The Board adopted changes to this assumption as of the 2012 experience study but no changes were made in the 2014 experience study. In light of the continued recovery, we recommend no change to all three sets of assumptions again. However, as we discuss below, we are recommending a change in how the rates are used by recommending that the assumption for Probation members be changed to match that of Safety members. The results are shown on the following tables:

<b>Refunds with Less Than 5 Years of Service – Males and Females</b>									
	Miscellaneous			Probation			Safety		
Age	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio
Under 20									
20 - 24	5	6	83%	0	0	N/A	0	0	N/A
25 - 29	43	43	100%	0	5	0%	3	4	75%
30 - 34	53	50	106%	3	2	150%	1	3	33%
35 - 39	29	32	91%	1	2	50%	1	1	100%
40 - 44	21	19	111%	1	1	100%	0	1	0%
45 - 49	22	14	157%	0	0	N/A	0	0	N/A
50 - 54	17	14	121%	0	0	N/A	0	0	N/A
55 - 59	18	15	120%	0	0	N/A	0	0	N/A
60 and over	23	11	209%	0	0	N/A	0	0	N/A
<b>Totals</b>	<b>231</b>	<b>204</b>	<b>113%</b>	<b>5</b>	<b>10</b>	<b>50%</b>	<b>5</b>	<b>9</b>	<b>56%</b>

Refunds with 5 or More Years of Service – Males and Females									
Age	Miscellaneous			Probation			Safety		
	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio
Under 20	0	0	N/A	0	0	N/A	0	0	N/A
20 - 24	0	0	N/A	0	0	N/A	0	0	N/A
25 - 29	2	6	33%	0	1	0%	0	0	N/A
30 - 34	6	16	38%	0	2	0%	0	1	0%
35 - 39	8	12	67%	2	1	200%	1	1	100%
40 - 44	5	10	50%	1	1	100%	0	1	0%
45 - 49	6	6	100%	0	0	N/A	1	0	N/A
50 - 54	1	0	N/A	0	0	N/A	0	0	N/A
55 - 59	5	0	N/A	0	0	N/A	1	0	N/A
60 and over	6	0	N/A	0	0	N/A	0	0	N/A
<b>Totals</b>	<b>39</b>	<b>50</b>	<b>78%</b>	<b>3</b>	<b>5</b>	<b>60%</b>	<b>3</b>	<b>3</b>	<b>100%</b>

Vested Terminations – Males and Females									
Age	Miscellaneous			Probation			Safety		
	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio
Under 20	0	0	N/A	0	0	N/A	0	0	N/A
20 - 24	0	0	N/A	0	0	N/A	0	0	N/A
25 - 29	12	3	433%	1	1	183%	2	1	385%
30 - 34	21	16	132%	1	2	47%	3	2	160%
35 - 39	21	20	106%	2	2	86%	3	2	123%
40 - 44	24	25	98%	1	2	55%	2	3	68%
45 - 49	16	35	46%	0	2	0%	3	4	72%
50 - 54	14	34	42%	0	2	0%	1	0	N/A
55 - 59	11	0	N/A	0	0	N/A	0	0	N/A
60 and over	8	0	N/A	0	0	N/A	0	0	N/A
<b>Totals</b>	<b>127</b>	<b>131</b>	<b>97%</b>	<b>5</b>	<b>11</b>	<b>47%</b>	<b>14</b>	<b>12</b>	<b>117%</b>

Most of these results are consistent with our expectation that there have been fewer terminations during this period as the economy begins to recover. However, the one result that is noticeable is that the number of actual terminations for Probation members has been much less than the expected number across all three assumptions (and we saw a similar pattern in the 2014 study). Currently, the valuation assumes Probation members terminate at the same rate as Miscellaneous members and Safety members terminate at a lower rate. Given the actual experience over the last two studies, and the fact that the job duties of Probation members are more similar to that of Safety members than Miscellaneous (and therefore their termination behavior would be expected to be more like Safety), we are recommending that the termination assumption for Probation members be changed to match the Miscellaneous members instead of Safety.

Aggregate Terminations – Males and Females									
Age	Miscellaneous			Probation			Safety		
	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio	Actual	Expected	A/E ratio
Under 20	0	0	N/A	0	0	N/A	0	0	N/A
20 - 24	5	6	83%	0	0	N/A	0	0	N/A
25 - 29	57	52	110%	1	7	15%	5	5	111%
30 - 34	80	82	98%	4	6	65%	4	6	68%
35 - 39	58	64	91%	5	5	94%	5	4	112%
40 - 44	50	54	93%	3	4	78%	2	5	40%
45 - 49	44	55	81%	0	2	0%	4	4	96%
50 - 54	32	48	67%	0	2	0%	1	0	N/A
55 - 59	34	15	227%	0	0	N/A	1	0	N/A
60 and over	37	11	336%	0	0	N/A	0	0	N/A
<b>Totals</b>	<b>397</b>	<b>385</b>	<b>103%</b>	<b>13</b>	<b>26</b>	<b>51%</b>	<b>22</b>	<b>24</b>	<b>92%</b>

The A/E ratio for Probation members, based on the recommended assumptions, would increase from 51% to 117%.

## OTHER ASSUMPTIONS AND REFUNDS

There are other assumptions made in the course of a valuation, such as the percentage of members who are married, the age difference between husbands and wives, the retirement age for vested terminations, the number of vested terminations who become Reserve members vs Reciprocal members, decrement timing, amortization period, etc. We reviewed these, and believe the current assumptions are generally realistic or conservative. However, we do recommend an increase of 10% in the marriage assumption, from 70% of men and 50% of women married at retirement, to 80% and 60% respectively. We recommend no changes to the other assumptions.

## ACTUARIAL METHODS

We have reviewed the actuarial cost method being used—the Entry Age Normal cost method—and we continue to believe that this is the method of choice for this plan, since this method usually does the best job of keeping costs level as a percentage of payroll. We also believe the method used to determine the actuarial value of assets (AVA) is appropriate, since it phases in the recognition of asset gains and losses over a five-year period (with the exception of the 2008 asset loss that was smoothed over a ten year period), and reduces fluctuations in the funding period and the contribution rate. Both of these methods are very common in the public sector retirement community and meet the Model practices definition under the California Actuarial Advisory Panel (CAAP) Guidelines that were issued in March 2013. Therefore, we recommend no change to these methods.

The current funding policy is a level-percent-of-pay amortization using a closed period of 30 years from January 1, 2010 (24 years remaining as of the January 1, 2016 valuation). The level-percent-of-pay is a CAAP Model practice and the single fixed period is deemed a CAAP Acceptable practice. To meet their Model practice, CAAP recommends using multiple layers of amortization with a new layer created each year to amortize any new unfunded or surplus liability over a 20 year closed period. We recommend no change in the amortization policy at this time but recommend



that the change be considered once the 2008 asset loss is fully recognized. At that point, the current amortization period will be down to 22 years and any increased volatility from the new policy would be insignificant. In fact, once the current period drops to under 20 years, the new policy would start to decrease volatility as the new layers are amortized over longer periods.

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## **SECTION IV**

### SUMMARY AND ACTUARIAL IMPACT OF RECOMMENDATIONS

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## Summary of Recommendations

We recommend changes to the following assumptions:

- Decrease the assumed rate of investment return from 7.25% to 7.125%
- Decrease inflation from 2.75% to 2.625%
- Decrease the cost-of-living assumption for Tier 1 members from 2.75% to 2.625%
- Decrease the wage inflation component of the salary increase assumption from 3.75% to 3.375% (0.125% decrease in inflation and 0.25% decrease in productivity)
- Decrease the total payroll growth assumption from 3.75% to 3.375%
- Update all mortality assumptions (post-retirement, disability, and pre-retirement) based on the latest SOA tables
- Alter a few retirement rates for Miscellaneous and Safety members
- Change Probation termination rates to match Safety rates

The total impact of these changes is shown below based on the January 1, 2015 valuation results. The changes are expected to lead to an increase in the total required contribution.

	New Assumptions	Baseline	Impact
	(1)	(2)	(3)
<b>Actuarial Liabilities and Funded Ratio</b>			
• Actuarial Accrued Liability (000s)			
- Active Members	\$ 620,257	\$ 598,424	\$ 21,833
- Retirees and Beneficiaries	984,886	946,455	38,431
- Inactive, Vested	61,630	60,712	918
- Total	\$1,666,773	\$1,605,591	\$ 61,182
• Actuarial Value of Assets (000s)	\$1,231,474	\$1,231,474	\$ -
• Unfunded Actuarial Accrued Liability (UAAL) (000s)	\$ 435,299	\$ 374,117	\$ 61,182
• Funded Ratio	73.9%	76.7%	-2.8%
<b>Annual Required Contribution</b>			
• Total Normal Cost	22.01%	21.64%	0.37%
• Member Contributions	13.93%	13.93%	0.00%
• County Normal Cost	8.08%	7.71%	0.37%
• Amortization Payment	15.69%	13.13%	2.56%
• Total County Cost (ARC)	23.76%	20.84%	2.93%
• Total Combined ARC	37.70%	34.77%	2.93%
<b>Impact on Charged Rate</b>			
• Total Charged Rate*	33.82%	33.82%	0.00%
• Total Required Rate	37.70%	34.77%	2.93%
• Rate Difference	3.88%	0.95%	2.93%

\* Includes 1.02% increase to charged rate effective January 1, 2016

The impact of the individual changes is shown in the table below. All of the assumptions interplay with each other, therefore they are not independent and the impacts shown should be considered as estimates only since the order in which the assumptions are changed can affect the relative impacts.

Valuation Results as of January 1, 2015												
	UAAAL (\$ in 000s)		Funded Ratio		County Normal Cost %		Amort %		County ARC %		Total ARC %	
Baseline	\$ 374,117		76.7%		7.71%		13.13%		20.84%		34.77%	
Assumption Updated:	Change	Total	Change	Total	Change	Total	Change	Total	Change	Total	Change	Total
Investment Return	\$ 21,039	\$ 395,156	-1.0%	75.7%	0.29%	8.00%	0.74%	13.87%	1.03%	21.87%	1.03%	35.80%
COLA	(22,185)	372,971	1.1%	76.8%	-0.23%	7.77%	-0.78%	13.10%	-1.01%	20.86%	-1.01%	34.80%
Salary Increase	(7,366)	365,605	0.3%	77.1%	-0.51%	7.26%	-0.26%	12.84%	-0.77%	20.09%	-0.77%	34.03%
Termination	313	365,918	0.0%	77.1%	0.13%	7.39%	0.01%	12.85%	0.14%	20.23%	0.14%	34.17%
Retirement	1,074	366,992	-0.1%	77.0%	0.03%	7.42%	0.04%	12.89%	0.07%	20.30%	0.07%	34.24%
Mortality	61,434	428,426	-2.8%	74.2%	0.43%	7.85%	2.16%	15.04%	2.59%	22.89%	2.59%	36.82%
Marriage	6,873	435,299	-0.3%	73.9%	0.23%	8.08%	0.24%	15.28%	0.47%	23.36%	0.47%	37.29%
Payroll Growth	-	435,299	<u>0.0%</u>	73.9%	<u>0.00%</u>	8.08%	<u>0.40%</u>	15.69%	<u>0.40%</u>	23.76%	<u>0.40%</u>	37.70%
Using Recommended Assumptions	\$ 435,299		73.9%		8.08%		15.69%		23.76%		37.70%	

In addition to updating the assumptions used in the actuarial valuations (beginning with the valuation as of January 1, 2016), it is our recommendation that all actuarial factors be updated to reflect these new assumptions including benefit option factors and military service purchase programs.

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## **SECTION V**

SUMMARY OF ASSUMPTIONS  
AND METHODS INCORPORATING  
THE RECOMMENDED ASSUMPTIONS

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## Summary of Assumptions and Methods Incorporating the Recommended Assumptions

### I. Valuation Date

The valuation date is December 31st of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

### II. Actuarial Cost Method

Normal cost and the allocation of benefit values between service rendered before and after the valuation date were determined using an individual entry age actuarial cost method having the following characteristics:

- (i) the annual normal costs for each active member, payable from the date of entry into the system to the date of retirement, are sufficient to accumulate the value of the member's benefit at the time of retirement;
- (ii) each annual normal cost is a constant percentage of the member's year-by-year projected covered pay.

Deferred and Reciprocal Member Actuarial Accrued Liability. Data provided includes date of birth, service credit, reciprocal status, and hourly pay rates at termination. The estimated benefit was used to compute the liabilities for reserve members. For reciprocal members, the estimated benefits were projected with 3.25% inflation from their date of termination to their assumed retirement date to compute those liabilities.

Amortization of Unfunded Actuarial Accrued Liabilities is done as a level percent of payroll over a closed 30 year period (24 years as of January 1, 2016) for funding computations.

### III. Actuarial Value of Assets

The funding value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income. The asset losses that occurred in 2008 are smoothed over a ten year period with recognition accelerated if a positive contribution margin develops. Expected investment income is determined using the assumed investment return rate and the actuarial value of assets (adjusted for receipts and disbursements during the year). Returns are measured net of all administrative expenses.

IV. Actuarial Assumptions

A. Economic Assumptions

1. Investment return: 7.125%, compounded annually, net of administrative expenses. This is made up of a 2.625% inflation rate and a 4.50% real rate of return.
2. Salary increase rate: Inflation rate of 2.625% plus productivity increase rate of 0.25% plus an additional service-related merit component as shown below:

<b>% Merit Increases in Salaries Next Year</b>		<b>% Total Increases in Salaries Next Year</b>	
Service Index	Rate	Service Index	Rate
1	5.25%	1	8.13%
2	5.00%	2	7.88%
3	4.00%	3	6.88%
4	3.00%	4	5.88%
5	2.00%	5	4.88%
6	1.00%	6	3.88%
7	0.50%	7	3.38%
8 +	0.00%	8 +	2.88%

3. Cost-of-living increases:  
  
Assumed to increase the full 2.625% each year (2% for Tier 2 and Tier 3)
4. Payroll growth:  
  
3.375% per year (Inflation 2.625%, productivity of 0.25%, geographic differential productivity component of 0.50%)
5. Increase to maximum earnings limit for Tier 3 members:  
  
2.625% per year
6. Contribution accumulation: Contributions are credited with 6.75% interest, compounded biweekly.

**B. Demographic Assumptions**

1. Mortality projection – The projection calculation for MP-2015 have an additional multiplier applied to future years for all of the mortality tables:

<b>Year</b>	<b>Multiplier</b>
2017	90%
2018	85%
2019	80%
2020	75%
2021	75%
2022	70%
2023	70%
2024	65%
2025	60%
2026	55%
2027+	50%

2. Mortality after termination or retirement -
  - a. Healthy males – RP-2014 with generational mortality improvements using modified scale MP-2015, a 105% multiplier and white collar adjustment applied to RP-2014
  - b. Healthy females - RP-2014 with generational mortality improvements using modified scale MP-2015, a 115% multiplier and white collar adjustment applied to RP-2014

See sample rates below:

<b>Ages</b>	<b>% Dying Within Next Year Retirees</b>	
	<b>Men</b>	<b>Women</b>
45	0.20%	0.18%
50	0.29%	0.24%
55	0.41%	0.31%
60	0.55%	0.45%
65	0.80%	0.75%
70	1.30%	1.21%
75	2.23%	2.02%
80	3.92%	3.50%
85	7.18%	6.28%



3. Mortality rates of active members – RP-2014 Employee Mortality Tables, with generational improvements using modified scale MP-2015, setback one year with a 105% multiplier for males, and setback two years with a 50% multiplier for females, applied to RP-2014, as shown below for selected ages:

Ages	% of Active Members Dying Within Next Year	
	Men	Women
30	0.05%	0.01%
35	0.05%	0.01%
40	0.06%	0.02%
45	0.09%	0.03%
50	0.16%	0.05%
55	0.27%	0.07%
60	0.44%	0.10%
65	0.77%	0.16%
70	1.31%	0.25%

4. Disability mortality after termination or retirement- RP-2014 Disabled Mortality Tables, with generational improvements using modified scale MP-2015, with setback of one year and a 100% multiplier for males, and setback one year with a 75% multiplier for females, applied to RP-2014, as shown below for selected ages:

Ages	% of Disabled Members Dying Within Next Year	
	Men	Women
30	0.42%	0.15%
35	0.78%	0.29%
40	1.19%	0.46%
45	1.60%	0.65%
50	1.97%	0.85%
55	2.28%	1.05%
60	2.59%	1.23%
65	3.04%	1.49%
70	3.83%	1.98%

5. Retirement –

- a. As shown below for Tier 1 members for selected ages (rates are only applied to members eligible for retirement):

Age	Percent of Eligible Active Members Retiring Within Next Year		
	Miscellaneous	Probation	Safety
50	4.0%	7.5%	20.0%
51	4.0%	7.5%	14.0%
52	4.0%	7.5%	10.0%
53	4.0%	7.5%	10.0%
54	4.0%	7.5%	12.0%
55	6.0%	10.0%	15.0%
56	6.0%	12.0%	12.0%
57	8.0%	12.0%	12.0%
58	8.0%	12.0%	12.0%
59	8.0%	12.0%	18.0%
60	10.0%	15.0%	25.0%
61	10.0%	15.0%	30.0%
62	20.0%	20.0%	40.0%
63	20.0%	20.0%	50.0%
64	20.0%	20.0%	75.0%
65	40.0%	40.0%	100.0%
66	30.0%	20.0%	
67	25.0%	20.0%	
68	25.0%	40.0%	
69	25.0%	50.0%	
70	100.0%	100.0%	

Current deferred vested members are assumed to retire at the later of age 60 (age 55 for Reserve Members) or attained age.

b. As shown below for Tier 2 and future Tier 3 members for selected ages (rates are only applied to members eligible for retirement):

Age	Percent of Eligible Active Members Retiring Within Next Year		
	Miscellaneous	Probation	Safety
50	3.0%	7.5%	9.0%
51	3.0%	7.5%	9.0%
52	3.0%	7.5%	10.0%
53	3.0%	7.5%	10.0%
54	3.0%	7.5%	10.0%
55	6.0%	7.5%	10.0%
56	6.0%	7.5%	10.0%
57	6.0%	7.5%	10.0%
58	6.0%	9.0%	11.0%
59	6.0%	9.0%	15.0%
60	8.0%	10.0%	20.0%
61	8.0%	10.0%	25.0%
62	20.0%	20.0%	30.0%
63	20.0%	20.0%	40.0%
64	20.0%	20.0%	60.0%
65	40.0%	40.0%	100.0%
66	30.0%	20.0%	
67	25.0%	20.0%	
68	25.0%	40.0%	
69	25.0%	50.0%	
70	100.0%	100.0%	

6. Rates of separation from active membership (for causes other than death or retirement) - As shown below for selected ages:

Sample Ages	% of Active Members Separating Within Next Year			
	Miscellaneous Members			
	Disability	Withdrawal < 5 years	Withdrawal >= 5 years	Vested Termination
20	0.00%	12.50%	8.50%	0.00%
25	0.00%	11.00%	7.75%	3.50%
30	0.01%	9.50%	3.75%	4.00%
35	0.04%	8.00%	2.00%	3.50%
40	0.06%	7.00%	1.25%	3.00%
45	0.09%	6.00%	0.50%	3.00%
50	0.11%	6.00%	0.00%	2.50%
55	0.14%	6.00%	0.00%	2.00%
60	0.16%	6.00%	0.00%	0.00%
64	0.18%	6.00%	0.00%	0.00%
GRS Table No.	762			1188

Sample Ages	% of Active Members Separating Within Next Year			
	Safety and Probation Members			
	Disability	Withdrawal < 5 years	Withdrawal >= 5 years	Vested Termination
20	0.00%	5.20%	1.50%	3.00%
25	0.03%	5.00%	1.50%	2.00%
30	0.13%	4.70%	1.00%	1.50%
35	0.23%	4.00%	0.50%	1.50%
40	0.33%	3.50%	0.50%	1.50%
45	0.43%	2.50%	0.00%	1.50%
50	0.53%	1.50%	0.00%	1.50%
55	0.63%	0.00%	0.00%	0.00%
60	0.73%	0.00%	0.00%	0.00%
64	0.81%	0.00%	0.00%	0.00%
GRS Table No.	761			1189

Vested termination rates and disability rates are applied after the member is eligible for reduced or unreduced retirement benefits. 100% of the Safety disabilities and 0% of the Miscellaneous and Probation disabilities are duty-related.

40% of Vested Terminations are assumed to be Reciprocal.

Based on Member Contribution Totals provided by Pension Trust, we are assuming that 10% of members' contribution account balances are for supplemental/additional benefits.

C. Other Assumptions

Member Refunds. All or part of the employee contribution rate is subject to potential "Pick Up" by the employer. Our understanding is that "Pick Ups", and related interest, are subject to refund.

Deferral Age. The assumed retirement age for future Reserve and Reciprocal members is age 57.

Active Death. 100% of active deaths are assumed to be duty related.

Survivor Benefits. Marital status and spouses' census data were imputed with respect to active and deferred members.

Marital Status. 80% of men and 60% of women were assumed married at retirement.

Spouse Census. Women were assumed to be 3 years younger than men for active employees.

Disability Benefits. Benefits are not assumed to be offset by Social Security benefits.

IRC Section 415 Limits. We are assuming that IRC Section 415 limits, although applicable to this plan, will not impact any individual benefits.