GRS Gabriel Roeder Smith & Company
Consultants & Actuaries

FIRE AND POLICE PENSION ASSOCIATION OF COLORADO

2015 ACTUARIAL EXPERIENCE STUDY

FOR THE PERIOD ENDING DECEMBER 31, 2014

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June 1, 2015

Board of Directors
Fire and Police Pension Association of Colorado
5290 DTC Parkway, #100
Greenwood Village, Colorado 80111

Dear Members of the Board:

Subject: Results of 2015 Experience Study

We are pleased to present our report of the 2015 Experience Investigation Study for the Fire and Police Pension Association of Colorado (FPPA). Our report includes a discussion of the recent experience of the System, it presents our recommendations for new actuarial assumptions and methods, and it provides information about the actuarial impact of these recommendations on the liabilities and other key actuarial measures of FPPA.

With the Board of Trustees' approval of the recommendations in this report, we believe the actuarial condition of the System will be more accurately measured and portrayed.

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. All of the undersigned are members of and meet the Qualification Standards of the American Academy of Actuaries.

We wish to thank the FPPA staff for their assistance in this project.

Sincerely,

Joseph P. Newton, FSA, EA, MAAA
Senior Consultant and Actuary

Dana Woolfrey, FSA, EA, MAAA
Consultant and Actuary

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SECTION I

INTRODUCTION

Introduction

A periodic review and selection of the actuarial assumptions is one of many important components of understanding and managing the financial aspects of the Fire and Police Pension Association of Colorado (FPPA). Use of outdated or inappropriate assumptions can result in understated costs which will lead to higher future contribution requirements or perhaps an inability to pay benefits when due; or, on the other hand, produce overstated costs which place an unnecessarily large burden on the current generation of members, employers, and taxpayers.

A single set of assumptions is typically not expected to be suitable forever. As the actual experience unfolds or the future expectations change, the assumptions should be reviewed and adjusted accordingly.

It is important to recognize that the impact from various outcomes and the ability to adjust from experience deviating from the assumption are not symmetric. Due to compounding economic forces, legal limitations, and moral obligations outcomes from underestimating future liabilities are much more difficult to manage than outcomes of overestimates, and that un-symmetric risk should be considered when the assumption set, investment policy and funding policy are created. As such, the assumption set used in the valuation process needs to represent the best estimate of the future experience of the System and be at least as likely, if not more than likely, to overestimate the future liabilities versus underestimate them.

Using this strategic mindset, each assumption was analyzed compared to the actual experience of FPPA and general experience of other large public employee retirement systems. Changes in certain assumptions and methods are suggested upon this comparison to remove any bias that may exist and to perhaps add in a slight margin for future adverse experience where appropriate. Next, the assumption set as a whole was analyzed for consistency and to ensure that the projection of liabilities was reasonable and consistent with historical trends.

The following report provides our recommended changes to the current actuarial assumptions.

Summary of Process

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
- Termination 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 should review their assumptions periodically and determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

This study is generally based on experience during the four-year period of January 1, 2011 to December 31, 2014. The last experience study was prepared in 2011, following completion of the January 1, 2011 actuarial valuation report. That report generally covered experience during the period of January 1, 2006 to December 31, 2010.

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 termination 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, 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 increases the difficulty of identifying changes in behavior that may be occurring, such as mortality improvement or a change in the ages at which members retire. In our view, using a four to five-year period is reasonable. However, note that in our analysis of termination and salary increases, we incorporated the results from the prior experience study.

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 by multiplying the probability of the occurrence at the given age, by the “exposures” at that same age. For example, let’s look at a rate of retirement of 15% 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%. When it varies much from this figure, it is a sign that a new assumption may be needed. (However, in some cases we prefer to set our assumptions to produce an A/E ratio a little above or below 100%, in order to introduce some conservatism.) Of course we not only look at the assumptions as a whole, but we also review how well they fit the actual results by gender, by age, and by service.

Finally, if the data leads the actuary to conclude that new tables are needed, 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. Some reasonable assumption sets would show higher or lower liabilities or costs.

ORGANIZATION OF REPORT

Section II of this report summarizes our recommended changes. Section III contains our findings and a more detailed analysis of our recommendation for each actuarial assumption. The impact of adopting our recommendations on liabilities and contribution rates is shown in Section IV. Section V shows a summary of the recommended assumptions. Finally, Section VI presents detailed summaries of the data and comparisons of the A/E ratios.

PLANS

This study pertains to the following plans:

- Statewide Defined Benefit Plan (SWDB)
- Statewide Death and Disability Plan (SWDD) which includes members covered under the Defined Benefit (DB) Plans as well as the Money Purchase (MP) Plans
- Statewide Hybrid Plan (SWH)
- Colorado Springs New Hire Plans
- Local defined benefit pension plans for firefighter and police employees in the State of Colorado hired before April 8, 1978 whose employers have chosen to affiliate with FPPA (Old Hire Plans)
- Volunteer firefighter defined benefit pension plans in the State of Colorado who have chosen to affiliate with FPPA (Volunteer Plans)

The study of all demographic assumptions except disability incidence and mortality was completed based on census data for the SWDB plan. The study of mortality was completed based on census data for the Old Hire Plans. The study of disability incidence and disabled mortality was completed using census data for the SWDD plan. In addition, census data for the Volunteer Firefighter plans was used to review the termination assumption for those plans.

SECTION VI EXHIBITS

The exhibits in Section VI should generally be self-explanatory. For example, on page 53, we show the exhibit analyzing the service-based termination rates. The second column shows the total number of members who terminated during the study period. This excludes members who died, became

disabled or retired. Column (3) shows the total exposures. This is the number of members who could have terminated during any of the years. In this exhibit, the exposures exclude anyone eligible for retirement. A member is counted in each year they could have terminated, so the total shown is the total exposures for the study period. Column (4) shows the probability of termination based on the raw data. That is, it is the result of dividing the actual number of terminations (col. 2) by the number exposed (col. 3). Column (5) shows the current termination rate and column (6) shows the new recommended termination rate. Columns (7) and (8) show the expected numbers of terminations based on the current and proposed termination assumptions. Columns (9) and (10) show the Actual-to-Expected ratios under the current and proposed termination assumptions.

SECTION II

SUMMARY OF RECOMMENDATIONS

Summary of Recommendations

Our recommended changes to the current actuarial assumptions may be summarized as follows.

Economic Assumptions

1. We recommend no change to the current nominal investment assumption of 7.50%. Based on a blending of the current capital market assumptions from eight independent sources and the System's target asset allocation and adjusting for a 20- 25 year timeframe, a 7.50% investment return is very close to the median expected geometric return. Even though lowering the inflation assumption below actually increases the assumed real rate of return assumption, there have been adjustments to the asset allocation as inflation expectations have continued to decrease in order to increase the real return of the portfolio.

2. The current 7.50% assumption is based on earning the 7.50%, net of all investment *and* administrative expenses. This actually equates to a gross assumption in excess of 7.50%. We recommend adding an explicit charge for administrative expenses instead of netting the expenses against the investment return assumption. The amount will differ by Plan and will be based on the administrative expenses in the CAFR. This will mimic the approach used in determining the investment return assumption under the accounting rules so that one investment return assumption can be used for each purpose.

3. Reduce the inflation assumption from 3.00% to 2.50%. The current assumption is higher than the long term historical average, the recent historical average, and most sources of future expectations. Lowering the assumption to 2.50% will put the assumption closer to recent inflation levels and closer to the levels expected in the bond market.

4. Increase the productivity component of the salary scale assumption from 1.00% to 1.50%. Combining with the inflation rate of 2.50% creates ultimate salary scale assumption of 4.00%, which is unchanged from the current assumption.

5. In accordance with the observed experience, slightly modify the service-based promotional/longevity component of the salary scale.

6. In conjunction with no change to the ultimate salary scale, also leave the payroll growth assumption unchanged at 3.50%. This assumption does not impact the liabilities, only the development of the amortization of the unfunded actuarial accrued liability, with lower assumptions being more conservative. This will also be used to project increases in the salary schedule for future cohorts of new entrants. Historical payroll growth for the SWDB plan is not reflective of future expectations because additional employers have been joining the plan.

Mortality Assumptions

7. Update the post-retirement mortality tables for non-disabled retirees to the RP-2014 generational mortality tables with blue collar adjustment which shows to be a good fit to the Plan's experience. In addition, update the projected rate of improvement in longevity from Scale AA to the more recently published Scale BB. Because of this assumption of continuous improvement, life expectancies for today's younger active members are expected to be materially longer than those of today's retirees, and this has a significant impact on costs and liabilities.

8. Update the occupationally disabled post-retirement mortality assumption to be the same table as used for the healthy annuitants, except there will be a three year set-forward, meaning a disabled member age 70 will be valued as if they were a 73 year old healthy retiree.

9. Update the totally disabled post-retirement mortality assumption to the RP 2014 generational mortality tables for disabled annuitants, except add an additional provision to apply a minimum 3% mortality probability to reflect substantial impairment for this population.

10. Update the pre-retirement non-duty mortality tables to 55% of the RP-2014 mortality tables for active employees. Make no adjustment to the current duty mortality rate of 0.00020. For the duty mortality rate, a margin for conservatism was maintained due to the potential for a catastrophic event creating adverse experience with this assumption in a short period of time.

Other Demographic Assumptions

11. Slightly increase the pattern of retirement.

12. Combine the police and fire groups into one population for this assumption, but in aggregate, make no change to the ultimate number of terminations.

13. For members covered under a defined benefit plan, increase the rates of both occupational and total disability to reflect higher incidence of disability observed during the study period than expected. For members covered under the MP plan, retain the current rates of both total and occupational disability.

Actuarial Methods and Policies

14. Recommend no change to the use of the 5-year smoothing technique to determine the actuarial value of assets, used for determining the annual employer contribution rates.

15. Recommend continued use of the Entry Age Actuarial Cost Method for all Plans, except for

the SWDD which uses the Aggregate Cost Method which we continue to find appropriate.

Other Plans

16. For Volunteer and Old Hire Plans, only the mortality and economic assumption recommendations apply. Old Hire Plans are essentially retiree plans at this point (not subject to active member demographic assumptions) and Volunteer Plans have their own demographic assumptions for which no changes were recommended. For Colorado Springs New Hire Plans, all assumption recommendations apply with some alteration to reflect the Colorado Springs benefit structure. For additional details regarding the Volunteer, Old Hire, and Colorado Springs specific recommendations, please see pages 47-48.

SECTION III

ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

Analysis of Experience and Recommendations

We will begin by discussing the economic assumptions: inflation, expenses, the investment return rate, the salary increase assumption, and the rate of payroll growth. Next are the demographic assumptions: mortality, disability, termination and retirement. Finally, we will discuss all of the actuarial methods used.

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. ASOP No. 27 was revised and adopted by the Actuarial Standards Board (ASB) in September 2013.

As no one knows what the future holds, it is necessary for an actuary to estimate possible future economic outcomes. Recognizing that there is not one right answer, the current standard calls for an actuary to develop a reasonable economic assumption. A reasonable assumption is one that is:

a. appropriate for the purpose of the measurement,

b. reflects the actuary's professional judgment,

c. takes into account historical and current economic data that is relevant as of the measurement date,

d. is an estimate of future experience; an observation of market data; or a combination thereof,

e. and has no significant bias except when provisions for adverse deviation or plan provisions that are difficult to measure are included.

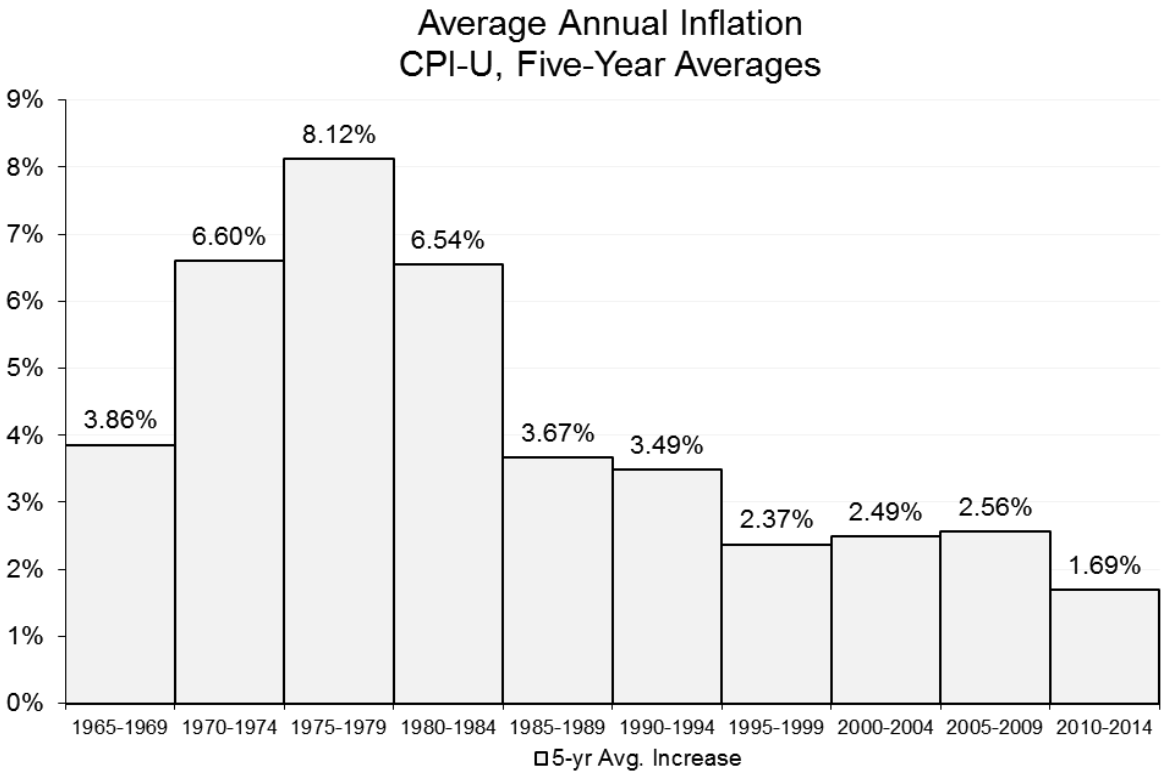
However, the standard explicitly advises an actuary not to give undue weight to recent experience.

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period. Generally, the economic assumptions are much more subjective in nature than the demographic assumptions.

INFLATION ASSUMPTION

By "inflation," we mean price inflation, as measured by annual increases in the Consumer Price Index (CPI). This inflation assumption underlies most of the other economic assumptions. It impacts investment return, salary increases, and overall payroll growth. The current annual inflation assumption is 3.00%.

The following chart shows the average annual inflation, as measured by the increase in the Consumer Price Index (CPI-U) in each of the ten consecutive five-year periods over the last fifty years.



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

The table below shows the average inflation over various periods, ending December 2014.

Periods Ending Dec. 2014	Average Annual Increase in CPI-U
Last five (5) years	1.69%
Last ten (10) years	2.12%
Last fifteen (15) years	2.25%
Last twenty (20) years	2.28%
Last twenty-five (25) years	2.52%
Last thirty (30) years	2.71%
Since 1913 (first available year)	3.17%

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

As you can see, inflation has been relatively low over the last twenty years. Even if we look back over a period of 30 years, inflation has averaged below 3% per year. It is hard to ignore the relatively steady inflation statistics shown in the charts above.

All of the investment consulting firms in our survey, in setting their capital market assumptions, currently assume that inflation will be 2.50% or less. We examined the 2015 capital market assumption sets for seven investment consulting firms: BNY Mellon, Hewitt EnnisKnupp, JP Morgan, Mercer Consulting, Pension Consulting Alliance (PCA), Towers Watson, and RV Kuhns. The average assumption for inflation was 2.30%, with a range of 2.11% to 2.50%.

In the Social Security Administration's 2014 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 low cost assumption was 2.00% and the high cost assumption was 3.40%.)

Another source of information about future inflation is the market for U.S. Treasury bonds. The December 31, 2014 yield for a 20-year inflation indexed Treasury bond (20-year TIPS) was 0.68% plus actual inflation. The yield for a 20-year non-indexed U.S. Treasury bond was 2.47%. This means the bond market was predicting that inflation over the next twenty years would average 1.78% [(1 + 2.47%) / (1 + 0.68%) - 1] per year. One year earlier, as of December 31, 2013, the spread between the 20-year inflation protected and constant maturity bonds was noticeably higher, with a difference of 2.33%, so there has been a noticeable change in this expectation. The imputed 30-year inflation level is close to the 20-year level, being 1.90% and 2.28% at December 31, 2014 and December 31, 2013, respectively.

Also, the Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. Their most recent forecast (first quarter of 2015) predicts inflation over the next ten years will average 2.1% (2015 to 2024). The survey forecasts have also remained relatively stable over the last few years.

As a result, we recommend lowering the inflation assumption to 2.50%. While the 2.50% assumption is slightly higher than the expected rates of future inflation for many of the various sources above, including the bond market and the surveys of the Society of Professional Forecasters, it is equal to the assumption used by PCA (FPPA's investment consultant), it is within a reasonable range of acceptable assumptions and represents a large decrease from the current assumption.

INVESTMENT AND ADMINISTRATIVE EXPENSES

Since the trust fund pays expenses in addition to member benefits and refunds, we must make some assumption about these. Almost all actuaries treat investment expenses as an offset to the investment return assumption. That is, the investment return assumption represents expected return after payment of investment expenses.

In regards to investment expenses, investment consulting firms periodically issue reports that describe their capital market assumptions. 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. The 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 adjustments to account for investment related expenses. Some of the Retirement Systems may also employ active management investment strategies that result in higher investment

expenses compared to strategies that invest in passive index funds. We have assumed that active management strategies would result in the same returns, net of investment expenses, as passive management strategies.

On the other hand, there is a divergence of practice on the handling of administrative expenses. Some actuaries make an assumption that administrative expenses will be some fixed or increasing dollar amount. Others assume that the administrative expenses will be some percentage of the plan's actuarial liabilities or normal cost. And others treat administrative expenses like investment expenses, as an offset to the investment return assumption. For FPPA, the practice has been to set the investment return assumption as the net return after payment of both investment and administrative expenses. The new accounting standards require administrative expenses to be separately accounted for, to produce an investment return assumption that is net of investment expenses, but not administrative expenses. To be consistent with this, we are recommending a change to our approach to explicitly charge the administrative expenses as a percentage of payroll as a charge on the normal cost. By changing our methodology for the funding valuation, we will be able to use the same investment return assumption and process for funding and accounting purposes. It will also reduce the burden placed on the investment return for funding future benefits.

Each plan will have a specific assumption based on actual expenses from the FPPA Comprehensive Annual Financial Report immediately preceding the valuation. For the SWDB Plan, this results in an administrative load of 0.66% of payroll as of January 1, 2015 that will be added to the normal cost in the funding calculations.

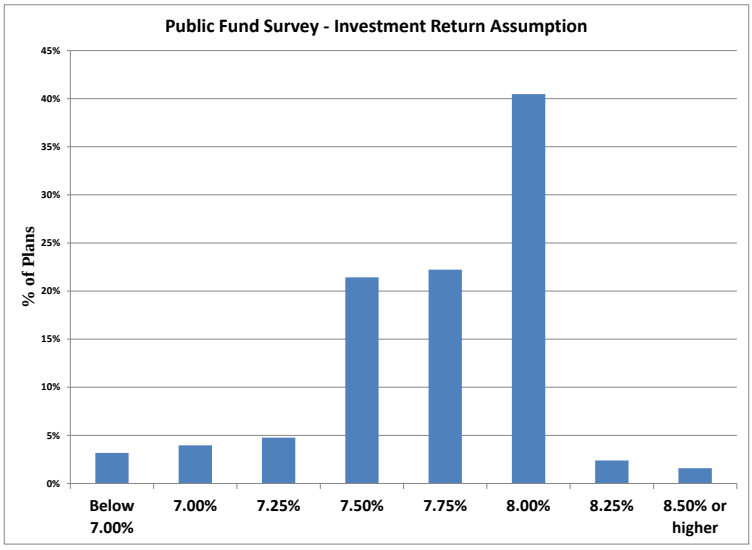
INVESTMENT RETURN RATE

The investment return assumption is one of the principal assumptions used in any actuarial valuation of a retirement plan. It is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plans. Even a small change to this assumption can produce significant changes to the liabilities and contribution rates. Currently, it is assumed that future investment returns will average 7.50% per year, net of investment and administrative expenses.

Similar to the inflation assumption, past performance is not a reliable indicator of future performance, even when averaged over a long time period. Also, the actual asset allocation of the trust fund will significantly impact the overall performance, so returns achieved under a different allocation are not meaningful.

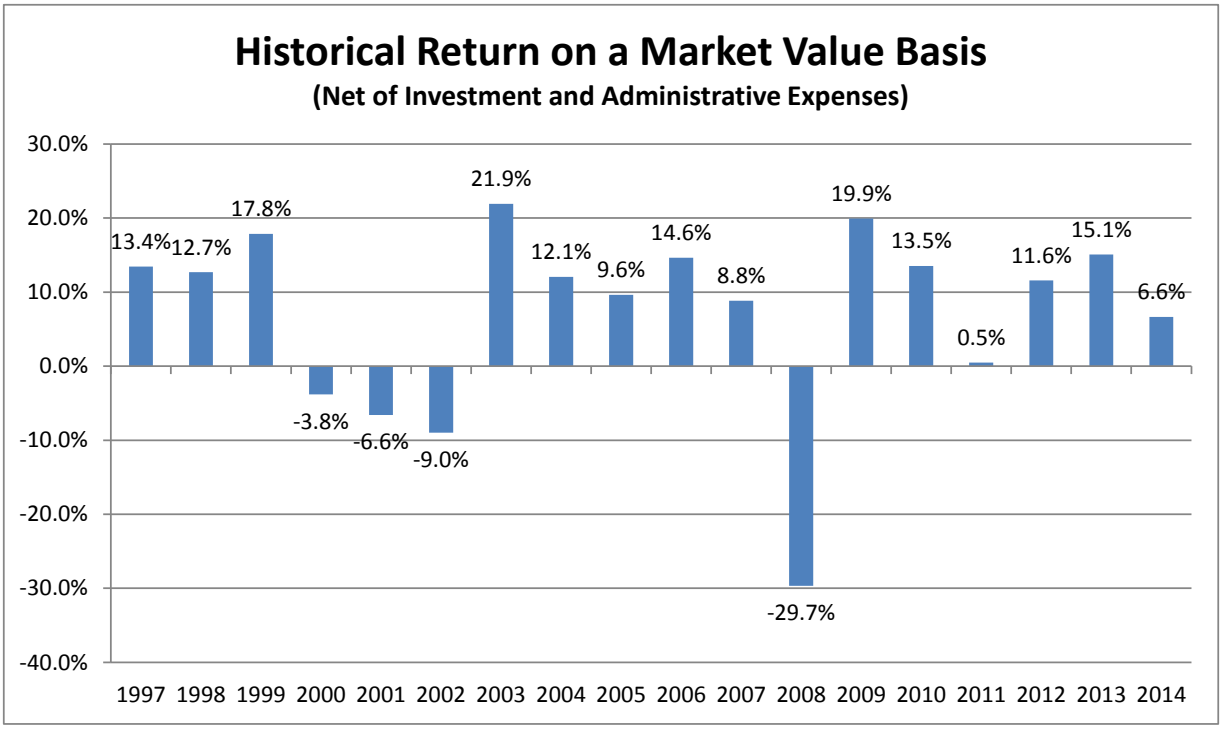
The Public Fund Survey (PFS) is a joint venture of the National Association of State Retirement Administrators (NASRA) and the National Council on Teacher Retirement (NCTR). More than 85% of all state and local government pension assets and members in the U.S. are represented in this survey. The latest PFS from May of 2015 shows that the median investment return assumption for large public plans is 7.80%. The survey median has slightly decreased from 7.90% in the same survey conducted last year. Subtracting the rate of inflation assumed for each plan gives a median real rate of return of 4.50%. However, not all of the information supplied to the survey from peer systems is actually the price inflation assumption, but instead the wage inflation assumption, making the comparable median higher than 4.50%. In addition, the FPPA portfolio may have a materially different asset allocation than other funds which targets a higher real return. While we do not

recommend the selection of an assumption based on prevalence information, it is still informative to identify where FPPA is compared to its peers. Here is a chart showing the distribution of the investment return assumptions in the Public Fund Survey:



Source: Public Fund Survey (n=126). Median investment return assumption: 7.80% nominal return.

The chart below shows an eighteen-year history of FPPA market returns through FY 2014.



The returns in the chart above are market returns, net of investment and administrative expenses, as reported in the actuarial valuations. FPPA did exceed the expected 7.50% return assumption in twelve of the last eighteen years and the average market return during this period was 6.4%, which is less than the 7.50% assumption. However, much of the underperformance has been due to netting out administrative fees, which going forward will no longer be the case.

However, for this assumption, past performance, even averaged over an eighteen-year period, is not a reliable indicator of future performance. 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 twenty-year period is not long enough to provide reasonable guidance. There are strong 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.

Asset Allocation

We believe the most appropriate approach to selecting an investment return assumption is to identify expected returns given the funds' asset allocation mapped to forward-looking capital market assumptions. Below is a summary of the approved long-term asset allocation for FPPA that was used in the analysis.

ASSET CLASS	FPPA
Cash	2.0%
Fixed Income-Traditional	4.0%
Fixed Income-Unconstrained	6.0%
Managed Futures	5.0%
Absolute Return	11.0%
Long/Short Equity	10.0%
Global Equity	36.0%
Real Estate	6.5%
Private Equity	19.5%
Total	100.0%

Because GRS is a benefits consulting firm and does not develop or maintain our own capital market assumptions, we utilized the forward-looking return expectations developed by the following investment consulting firms:

- BNY Mellon
- JP Morgan
- Mercer Consulting
- RV Kuhns
- Hewitt EnnisKnupp
- New England Pension Consultants (NEPC)
- Pension Consulting Alliance (PCA)
- Towers Watson

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.

When an analysis is performed to determine historical investment performance, calculating an average return based on a geometric basis is more appropriate for measuring the accumulation of wealth because it takes into account the return volatility (a.k.a. volatility drag). However, forecasting returns using a geometric average measure will generally result in a downward biased measure, especially when used as it is in an actuarial valuation to estimate a future value of wealth. On the other hand, forecasting a return using a measure based on an arithmetic average tends to have an upward bias in forward-looking estimates. The following is the synopsis from a 2003 article on this subject in the Financial Analysts Journal:

> *An unbiased forecast of the terminal value of a portfolio requires compounding of its initial value at its arithmetic mean return for the length of the investment period. Compounding at the arithmetic average historical return, however, results in an upwardly biased forecast. This bias does not necessarily disappear even if the sample average return is itself an unbiased estimator of the true mean, the average is computed from a long data series, and returns are generated according to a stable distribution. In contrast, forecasts obtained by compounding at the geometric average will generally be biased downward. The biases are empirically significant. For investment horizons of 40 years, the difference in forecasts of cumulative performance can easily exceed a factor of 2. And the percentage difference in forecasts grows with the investment horizon, as well as with the imprecision in the estimate of the mean return. For typical investment horizons, the proper compounding rate is in between the arithmetic and geometric values.*
>
> *Geometric or Arithmetic Mean: A Reconsideration* ©2003, *Eric Jacquier, Alex Kane, and Alan J. Marcus*

Because of these effects, we recommend developing a single best point estimate that is somewhere between these two averages.

Given the plan's current asset allocation and the investment consultant's capital market assumptions, the development of the average nominal return, net of investment expenses, is provided in the following tables. The table on the following page shows the expected nominal return (arithmetic average) for FPPA using each of the investment consulting firm's capital market assumptions. The forward-looking return expectations were mapped to the target asset class allocation.

Expected Nominal Arithmetic Return for FPPA Based on Short-Term Capital Market Assumptions (Return Expectations for the Next 7 to 10 Years)

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 Expense Assumption	Expected Nominal Return Net of Expenses (6)-(7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	6.17%	2.12%	4.05%	2.50%	6.55%	0.00%	6.55%
2	7.52%	2.50%	5.02%	2.50%	7.52%	0.00%	7.52%
3	7.36%	2.20%	5.16%	2.50%	7.66%	0.00%	7.66%
4	7.47%	2.26%	5.21%	2.50%	7.71%	0.00%	7.71%
5	7.74%	2.50%	5.24%	2.50%	7.74%	0.00%	7.74%
6	7.73%	2.11%	5.62%	2.50%	8.12%	0.00%	8.12%
7	7.62%	1.75%	5.86%	2.50%	8.36%	0.00%	8.36%
8	8.95%	2.20%	6.75%	2.50%	9.25%	0.00%	9.25%
Average	**7.57%**	**2.21%**	**5.37%**	**2.50%**	**7.87%**	**0.00%**	**7.87%**

Note: The expected nominal return assumption is based on the arithmetic average.

As can be seen from the previous Table, based on the 2015 capital market assumptions for investment consultant #1, the annual expected rate of return is 6.17%. Based on their inflation assumption of 2.12%, this implies an expected net real return of 4.05%. Adding the plan's 2.50% inflation assumption gives a nominal expected return for FPPA of 6.55%. The overall 7.87% is the arithmetic average and becomes the top end of the range for our analysis.

In addition to examining the expected one-year return, it is important to review anticipated volatility of the investment portfolio and to understand the range of net returns that could be produced by the investment portfolio. Therefore, the table below provides the 40th, 50th, and 60th percentiles of the 10-year geometric average of the expected nominal return, net of expenses, as well as the probability of exceeding the current 7.50% assumption.

Expected Annual Geometric Returns and Return Probabilities (Based on Short-Term Capital Market Assumptions)

Investment Consultant	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of exceeding 7.50%*
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	4.88%	5.84%	6.81%	33.3%
2	5.35%	6.50%	7.67%	41.4%
3	6.08%	7.01%	7.95%	44.7%
4	5.87%	6.90%	7.95%	44.2%
5	5.99%	6.99%	7.99%	44.9%
6	6.36%	7.36%	8.38%	48.6%
7	6.37%	7.46%	8.57%	49.7%
8	7.45%	8.47%	9.51%	59.5%
Average	**6.04%**	**7.07%**	**8.10%**	**45.8%**

*Plan's current return assumption net of expenses.

However, the capital market assumptions provided by the investment consultants and used in the analysis above are based on 7 to 10 year investment horizon. Investment consultants develop their forecast assumptions with this time horizon in part because most pension investment management teams use this time period for developing and monitoring their investment strategies.

On the other hand, the investment return assumption used in the actuarial valuation has a much longer investment horizon. Therefore, it may be necessary to identify and reflect differences in the economy and financial markets over the short-term and long-term time horizon.

Expected investment returns can be thought of as the sum of a risk-free rate of return and a risk premium. This is the fundamental premise in the Capital Asset Pricing Model (CAPM) that is used in Modern Portfolio Theory. Riskier investments have a higher risk premium to compensate the investor for the increased uncertainty. Generally, the risk premium for each asset class is constant over long periods of time. But there can be differences in the risk-free return, depending on the investor's time horizon. We define a risk-free investment as one where the expected return is known with absolute certainty. This also means that the risk-free investment has no default and reinvestment risk. Based on this definition, we believe it is reasonable to benchmark a risk-free rate using zero coupon U.S. Treasury securities. Thus a 10-year risk-free rate is equal to the current yield of a 10-year zero coupon US Treasury bond, and a 20-year zero coupon U.S. Treasury bond is the risk-free rate for a 20-year time horizon. For the longer-term point, we have chosen the 20-year yield because it is close to an approximation of the duration of the liabilities of the Systems, meaning the average, interest-discounted benefit payment is expected to be paid 20 years form the valuation date (assuming an open group). As of May 9, 2015, the yields of the 10-year and 20-year zero coupon Treasury bonds were 2.62% and 3.12%, respectively. Therefore, it is reasonable to assume that as the investment time horizon expands from 10 years to 20 years, the risk free rate of return and corresponding expected nominal return on the portfolios would be 0.50% higher over the longer, 20-year time horizon.

The table on the following page provides the 40th, 50th, and 60th percentiles of the 20-year geometric average of the expected nominal return, net of expenses, as well as the probability of exceeding the current 7.50% assumption, based on the capital market assumptions adjusted to reflect the difference in the risk-free returns due to the different investment time horizons.

Expected Annual Geometric Returns and Return Probabilities (Based on Short-Term Capital Market Assumptions Adjusted By GRS to Reflect a 20-Year Investment Horizon)

Investment Consultant	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of exceeding
	40th	50th	60th	7.50%*
(1)	(2)	(3)	(4)	(5)
1	5.38%	6.34%	7.31%	38.2%
2	5.85%	7.00%	8.17%	45.7%
3	6.58%	7.51%	8.45%	50.1%
4	6.37%	7.40%	8.45%	49.0%
5	6.49%	7.49%	8.49%	49.9%
6	6.86%	7.86%	8.88%	53.7%
7	6.87%	7.96%	9.07%	54.3%
8	7.95%	8.97%	10.01%	64.3%
Average	**6.54%**	**7.57%**	**8.60%**	**50.6%**

Two investment consulting firms, Hewitt EnnisKnupp and NEPC, develop capital market assumptions with a 30-year investment horizon. One showed an increase of 1.27% in relation to the shorter term assumptions and the other 0.34%. In addition, the assumptions from both firms would support the 7.50% investment return assumption based on a geometric average.

Based on this analysis, we recommend that FPPA continue using a 7.50% investment return assumption, which is comprised of a 5.00% net real return and a 2.50% inflation assumption.

7.50% is below the 7.87% arithmetic average based on the average of the investment consulting firms analyzed. Also, while there is slightly less than a 50% (45.8%) likelihood of attaining a 7.50% investment return over the next 10 years, the probability is projected to be closer to 50% over a longer time horizon.

We believe this recommendation satisfies the best-estimate requirement under ASOP No. 27 as revised and adopted in September 2013. Also, this recommendation is consistent with the recommendations regarding the use of an investment return assumption that is estimated to be realizable at least 50% of the time from a report released by the Society of Actuaries Blue Ribbon Panel on public pension plan funding in February 2014.

Salary increase rates

In order to project future benefits, the actuary must project future salary increases. Salaries may increase for a variety of reasons:

- Across-the-board increases for all employees;
- Across-the-board increases for a given group of employees;
- Increases to a minimum salary schedule;
- Additional pay for additional duties;
- Step or service-related increases;

- Increases for acquisition of advanced degrees or specialized training;
- Promotions; or
- Merit increases, if available.

Our salary increase assumption is meant to reflect all of these types of increases.

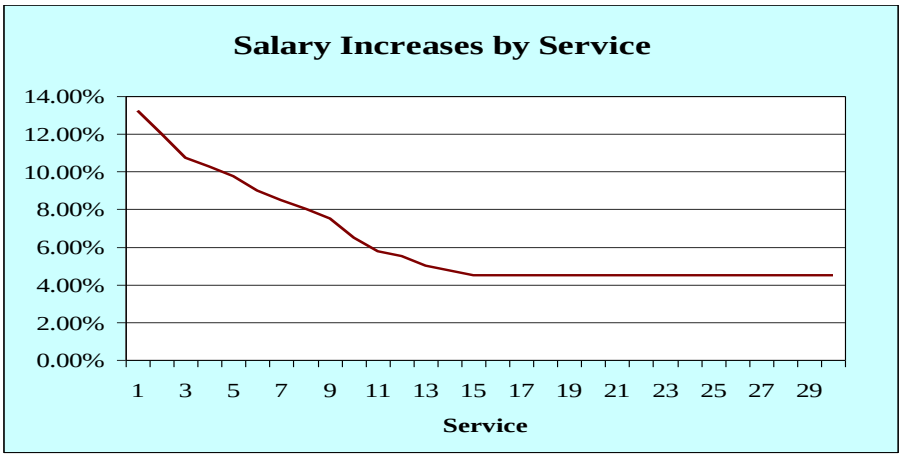
The actuary should not look at the overall increases in payroll in setting this assumption, because payroll can grow at a rate different from the average pay increase for individual members. There are two reasons for this. First, when older, longer-service employees terminate, retire or die, they are generally replaced with new employees who have a lower salary. Because of this, in most populations that are not growing in size, the growth in total payroll is smaller than the average pay increase for members. Second, payroll can change due to an increase or decrease in the size of the group. Therefore, to analyze salary increases, we examine the actual increase in salary for each member who is active in two consecutive fiscal years.

Salary increases for governmental employees can vary significantly from year to year. When the employer's tax revenues stall or increase slowly, salary increases often are small or nonexistent. During good times, salary increases can be larger. Our experience across many governmental plans also shows several occasions in which salary increases will be low for a period of several years followed by a significant increase in one year. Therefore, for this assumption in particular, we prefer to use data over a longer period in establishing our assumptions. We used a nine-year period for this analysis.

Most actuaries recommend salary increase assumptions that include an element that depends on the member's age or service, especially for large, public retirement systems. It is typical to assume larger pay increases for younger or shorter-service employees. This is done in order to reflect pay increases that accompany step increases, changes in job responsibility, promotions, demonstrated merit, etc. The experience shows salaries have been more closely correlated to service (rather than age), as promotions and productivity increases tend to be greater in the first few years of a career, even if the new employee is older than the average new hire.

We analyzed the salary increases based on the change in the member's reported pay from one year to the next. That is, we looked at each member who appeared as an active member in two consecutive valuations individually, and measured his/her salary increase. Then we grouped the increases for all members with the same service, and determined their average increase.

If we graph the increases by service, we usually get a graph where the increases are larger for shorter service employees and then level out at a lower level after a period that may be ten to twenty-five years. It might look like this, although in practice not this smooth:



Therefore, we divide the task of setting the salary increase into two pieces:

1. Determining the assumption for long-service employees
2. Determining the additional increases to be applied to shorter-service employees

The next two subsections will discuss these components of the salary assumption.

Salary increase assumptions for long-service employees (wage inflation)

Many of the factors that result in pay increases are largely inapplicable or have diminished importance for longer-service employees. Step or service-related increase have stopped or are minimal. Promotions occur with less frequency. Additional training or acquisition of advanced degrees usually occurs early in the career. In theory, then, salary increases for longer-service employees are almost entirely driven by wage inflation. Wage inflation is the increase in the average wage of all members of the workforce.

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. For the last ten years, for the economy as a whole, wage inflation has outpaced price inflation by about 0.30%, and for the last twenty years, wage inflation has exceeded price inflation by about 0.79%. Since 1951, wage inflation has been about 1.00% a year larger than price inflation.

We currently assume wage inflation will be 4.00%, and this is the assumed salary increase for members with fifteen or more years of service. This 4.00% assumed increase can be thought of as the sum of the prior 3.00% price inflation assumption and 1.00% addition for productivity gains. Note that the assumed 1.00% productivity growth is above both the 50-year average and the last ten-year average for the economy as a whole.

The analysis we carried out shows that salary increases level off after about fifteen years. For members with more than 15 years of service, the average salary increase during the ten-year period was 4.06%. Inflation during this 10-year period averaged 2.08%. Therefore, long-service employees received an average salary increase of 1.98% above inflation, clearly above the current 1.00% assumption. Using a longer period back to 1997, the average has been 2.11%. However, we

believe the decade of the 2000's will be viewed historically as a period with abnormally high wage increases, especially for public safety employees. Using only the past 5 years the average has been 1.34%.

We are proposing an increase from 1.00% to 1.50% for the productivity component of wage inflation - higher than the current assumption but lower than the longer term history. Combined with the lower inflation assumption, the long term salary scale assumption will remain unchanged at 4.00%.

Salary increase assumptions for shorter-service employees

To analyze the service-related salary assumption, we looked at the excess in the average increases for shorter-service employees over the average for longer-service employees. For example, active members with three years of service received an average increase of 10.59%, which was 6.53% more than the average increase of 4.06% for members with fifteen or more years of service.

We then determined new service-related assumptions reflecting this data, if changes were warranted. The salary experience showed that the service-related salary assumption remains appropriate.

Details of our analysis are shown in Section VI on page 51.

Payroll growth rate

The salary increase rates discussed above are assumptions applied to individuals and are used in projecting future benefits. We use a separate payroll growth assumption (currently 3.50% annually) in determining the annual payment needed to amortize the unfunded actuarial accrued liability. The amortization payments are calculated to be a level percentage of payroll. Therefore, as payroll increases over time, these amortization payments will also 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.

In theory, payroll growth in the absence of membership growth should approximate the wage inflation assumption (proposed to be 4.00%). However, we have generally set this assumption more conservatively, because we anticipate slower growth over the next twenty years as baby boomers retire and are replaced by younger members with lower salaries and as the population utilizing the DROP matures.

Based on an unchanged ultimate salary scale, we are recommending no change to the current 3.50% assumption.

POST-RETIREMENT MORTALITY RATES (LIABILITY AND COST CALCULATIONS)

FPPA's actuarial liabilities depend in part on how long retirees live. If members live longer, benefits will be paid for a longer period of time, and the liability will be larger.

The issue of future mortality improvement is one that the governing bodies of our profession have increasingly become more focused on studying and ensuring that the actuarial profession remains on the forefront of this issue. 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, and published practice notes. This ASOP now requires pension actuaries to make and disclose an assumption as to expected mortality improvement after the valuation date.

The mortality table currently being used for non-disabled retirees and for beneficiaries receiving benefits is the RP 2000 Mortality (RP2000) table. This table has separate rates for males and females. The mortality rates are projected to continually improve into the future using Scale AA based on a "generational" methodology. This means a 65 year old in 2025 is expected to have a longer life-expectancy than a 65 year old today.

We first had to determine what data to use. The SWDB is a relatively young plan and has few retirees and even fewer retiree deaths in the experience. However, the old hire plans do have a considerable number of retirees and the data there would be large enough to be mostly credible. However, the old hire plans have materially different definitions of disability than the SWDB/SWDD plans and thus using only the healthy data from the old hire plans would likely overstate longevity for future retirees from the SWDB.

So, we have combined the healthy and disabled data from the old hire plans for the analysis, but we have assumed only partial credibility and instead relied on a national published table.

To analyze the data, we begin by determining the expected number of deaths in each year at each age for males and females. Then we compare the actual number to the expected number. The ratio of the actual deaths to the expected deaths—the A/E ratio—then tells us whether the assumptions are reasonable.

There were 488 deaths among the male retirees during the experience period. Based on the current mortality assumption, we expected 536 deaths. This produced A/E ratios of 91% meaning the current mortality assumption is underestimating longevity.

The most current mortality tables and improvement assumptions have recently been published in a report by the Society of Actuaries' Retirement Plans Experience Committee (RPEC) in October of 2014. 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. Given that the full Pension Mortality Study was still many months from completion at that time, the SOA decided to publish interim mortality improvement Scale BB, which provided pension actuaries with a more up-to-date alternative to Scale AA for the projection of base mortality rates beyond calendar year 2000."

RPEC recognizes that there is a wide range of opinion with respect to future levels of mortality and that the assumptions underlying mortality improvement reflect some degree of subjectivity. RPEC characterized the assumptions that underpin Generational Scale BB (including a 1.0% long-term rate of mortality improvement and limited cohort effects) as a temporary projection scale to overcome perceived short-comings of Scale AA (noted above) until RPEC could finalize an updated generational mortality assumption, which they now refer to as MP-2014.

Based on recent analysis for several of our large clients, we are finding that the actual improvement in our data sets over the last 10 years has produced a better match to the Scale BB than MP-2014.

Therefore, we are recommending, first, the adoption of the new base tables: the RP-2014 Combined Mortality Table with Blue Collar Adjustment for males and females. We will actually use a blended version of the table that uses the Blue Collar Table for Active Employees until age 55, the Blue Collar Table for Retirees after age 65, and use a cubic splines method to combine the two for the ages between. This approach mimics the use of the DROP program by retirees (most age 55/56 retirees are not retirees, they are actively employed) and provides a better fit to the data in those ages. The generationally adjusted tables proved to be a good fit for the current data with the expected number of deaths being 103% A/E ratio.

Second, we will apply Scale BB for projecting future improvements in longevity. 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 following table provides the life expectancy for individuals retiring in future years based on the proposed assumption with full generational projection.

Proposed Life Expectancy for an Age 60 Retiree in Years					
Gender	Year of Retirement				
	2015	2020	2025	2030	2035
Male	26.8	27.3	27.9	28.4	28.9
Female	29.0	29.4	29.9	30.3	30.7

The base year for both tables is 2014. That is, improvement is projected from that year to each year in the future.

OCCUPATIONALLY DISABLED MORTALITY RATES

Currently, the same mortality assumption is used for occupationally disabled retirees as is used for healthy retirees but then loaded by 110% to reflect a partial impairment. There were only 29 occupationally disabled deaths which does not provide enough credibility to allow for assumption setting based on the actual data. We recommend using the RP-2014 Combined Mortality Table with Blue Collar Adjustment (same as the healthy post-retirement assumption) with a three year set-forward to reflect the partial impairment (the set-forward means an age 60 retiree will be valued as if they were 63). This also could reflect an implicit assumption for recovery since an explicit one is not currently utilized in the valuation.

TOTALLY DISABLED MORTALITY RATES

Currently, totally disabled retirees are valued using the RP-2000 Disabled Generational Mortality table projected with scale AA. There were only 11 totally disabled deaths which does not provide enough credibility to allow for assumption setting based on the actual data. To round out a consistent assumption set, we recommend updating this assumption to the RP-2014 Disabled Generational Mortality table projected with scale BB. However, we are going to place a minimum probability of death across all of the age groups to reflect the high impairment for this population, 3% for males and 2% for females. These rates are consistent with other mortality tables for retirees with an "unable to engage in any substantial gainful activity" definition of disability.

ACTIVE MORTALITY RATES

Due to the dynamic between the SWDB and SWDD plan, the active member mortality assumption is of more importance than in most plans. When a member dies in active status and a spouse annuity is payable, all of the member's liability is transferred from the SWDB plan to the SWDD plan.

Mortality across employee groups is generally lower than the mortality rates in the post-retirement mortality tables. The current assumption is set at 40% of the RP-2000 Generational Mortality Table with Blue Collar Adjustment with projection Scale AA for off-duty mortality and a flat rate of 0.00020 for on-duty mortality. There were only 27 active member deaths (6 while off duty, 21 while on duty) which does not provide enough credibility to allow for assumption setting based on the actual data. We recommend updating the active assumption to 55% of the RP-2014 Generational Mortality Table with Blue Collar Adjustment with projection Scale BB for off-duty mortality rates and keeping the flat rate assumption for off-duty mortality to 0.00020. The A/E ratios under the proposed rates are well less than 100%; however given the lack of credible data and the potential for a catastrophic event to create a large amount of adverse experience in a short period of time, it is preferable to remain conservative.

DISABILITY RATES

For the same reason that applies to active mortality (transfer of liability from the SWDB to the SWDD plan), this assumption is of more importance than in most plans. The number of disability retirements during the study period was more than expected for members of a defined benefit plan and about equal to expected for members of a MP plan, and for both occupational and total disability. For the defined benefit groups, the number of disability retirements is increased under the recommended rates, although full credibility was not given to the current data (proposed rates were set between actual experience and current rates).

The following table shows the resulting A/E ratios under both the current and proposed rates:

	A/E Ratio Current	A/E Ratio Proposed
Defined Benefit Occupational	127%	112%
Money Purchase Occupational	93%	93%
Defined Benefit Total Disability	142%	113%
Money Purchase Total Disability	100%	100%

The data shows that approximately 10% of the members from SWDB plan who qualify for an occupational disability will be granted a temporary disability. If these members choose to do so, they can transfer back to the SWDB plan once eligible to retire. We have assumed 10% of members who become occupationally disabled after the age of 50 will transfer back to the SWDB plan at age 55.

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. The current termination rates reflect the member's service, and there are separate rates for police and fire. The current termination rate structure appears to fit the observed data well. However, we are combining the police and fire tables based on the Statewide Defined Benefit data into one table for all members to make a simpler process.

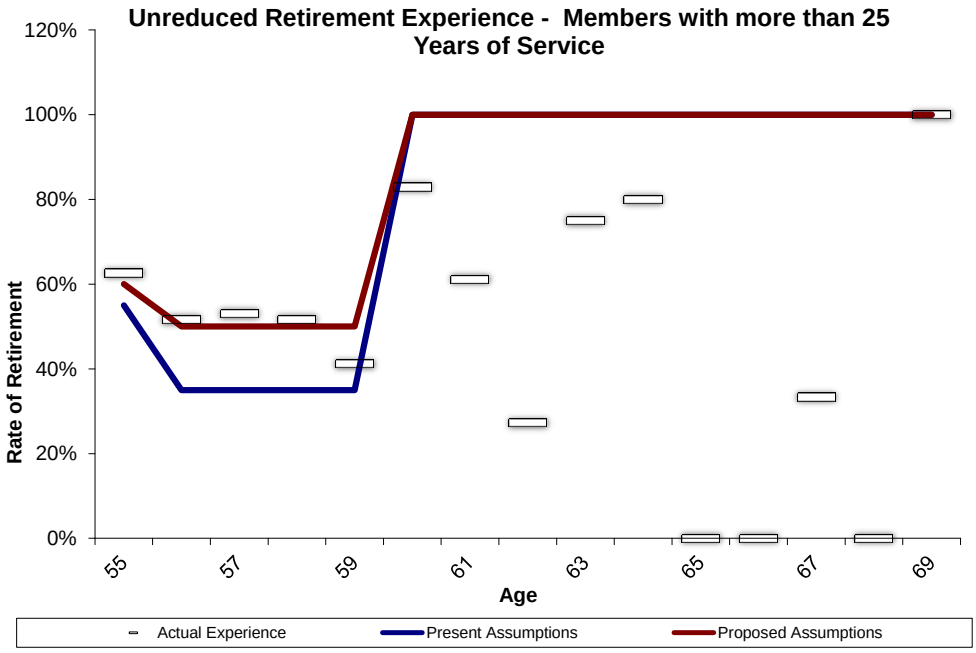
There were slightly more terminations than expected and overall we have recommended a slight increase in the termination rates. However, we have left the A/E higher than 100% (approximately 108%) to reflect future rehires of members into other departments.

For additional details see page 53.

RETIREMENT RATES

We currently use two different sets of retirement rates. For members that are at least 55 and have at least 25 years of service (normal retirement), age-based rates are applied with 100% retirement assumed at age 60. For members that have at least five years of service, but less than 25 (early retirement), service-based rates are applied starting at age 55. It is important to note that a member entering Deferred Retirement Option Plan (DROP) appears to be a retirement in the actuarial valuation and so any reference to retirement will include members entering DROP as well as members who retire directly from active status.

We recommend continued use of the current rate structure with some adjustment to the rates themselves. In the normal retirement experience, we are seeing a spike in the rate of retirement at age 55, likely due to pent up demand at first eligibility. The number of retirements after age 55 was slightly less, but still more than expected. The actual retirement rates starting at age 60 are substantially less than the 100% assumption, however, the actual experience or exposure becomes very thin at this point (the 0% actual retirement rates at ages 63 and 64 are based on three exposures each), and using the 100% rate is a conservative approach.



While there is more volatility for members in the service based pattern due to less experience at each service point, we do see a general upward trend in the rates as service increases. We also observed slightly more actual retirements than expected under the current rates and adjusted the rates upward accordingly.

For additional details see pages 54 and 55.

OTHER ASSUMPTIONS

There are other assumptions made in the course of a valuation, such as the percentage of members who are married, the age difference between members and spouses, the likelihood that a terminating employee will take a refund, etc. We have thoroughly reviewed all of these ancillary assumptions, and believe they are generally realistic and/or reasonable. Therefore, we recommend no changes to these other assumptions.

ACTUARIAL METHODS

We have reviewed the actuarial cost method being used for the SWDB plan—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 recommend no change to the use of the aggregate cost method for use in the SWDD valuation, as it does a better job of mimicking the decreasing liability from the plan as members move through their careers. Please note we also provide information on the Entry Age Normal method to assist in meeting the disclosure requirements under Governmental Accounting Standards Board (GASB).

We also believe the method used to determine the actuarial value of assets (AVA) is appropriate, since it does a good job of smoothing asset gains and losses from year to year, and reduces fluctuations in the funding period.

SECTION IV

ACTUARIAL IMPACT OF RECOMMENDATIONS

Estimated Actuarial Impact of Recommendations

For illustrative purposes, the following tables compare key statistics from the January 1, 2015 actuarial valuation report before and after taking into account the recommended new assumptions. Any actual changes, if any, in our recommendations concerning contribution rates will be addressed in the upcoming January 1, 2016 actuarial valuation reports.

The results for the SWDB, SWDD, and SWH Plans are shown on a current law basis (assuming no future COLAs are granted). Historically the Board has set the SRA contribution rate based on the 30-year ARC assuming a 3% COLA. The 30-year ARC for SWDB assuming a 3% COLA is well in excess of the current contribution rate under both the current and proposed assumptions.

Statewide Defined Benefit Plan
Valuation Results as of January 1, 2015 ($ in millions)

Result	Current Assumptions	Recommended Assumptions	Change
Normal cost %	14.35%	15.16%	0.81%
Actuarial accrued liability	$1,652.90	$1,683.60	$30.70
Actuarial value of assets	$1,714.97	$1,714.97	$0.00
Unfunded actuarial accrued liability	($62.07)	($31.37)	$30.70
Funded ratio	103.8%	101.9%	-1.9%
30-Year ARC	13.59%	14.78%	1.19%

We believe the Board's decision about whether or not to adopt our recommendations should be based on the appropriateness of each recommendation individually, not on their collective effect on the contribution rate or the actuarial liabilities. However, for informational purposes, the table on the next page shows the changes in the UAAL and the 30 year ARC expressed as a percent of payroll due to each of the recommended assumption changes.

Statewide Defined Benefit Plan - Reconciliation of Valuation Results as of January 1, 2015 ($ in millions)		
	Unfunded Accrued Liability	**30-year ARC**
Baseline/Current Assumptions	($62.07)	13.59%
Retirement	$12.75	0.31%
Termination	$0.23	0.02%
Disability	($5.84)	-0.22%
Pre-retirement Mortality	($2.74)	-0.10%
Post-retirement Mortality	$26.30	0.52%
Explicit administrative expense	$0.00	0.66%
Recommended assumptions	($31.37)	14.78%

The primary impacts to the SWDB plan were from the increased post-retirement longevity and the explicit administrative expense assumption.

Statewide Death and Disability Plan Valuation Results as of January 1, 2015 ($ in millions)			
Result	**Current Assumptions**	**Recommended Assumptions**	**Change**
Normal cost % (EAN)	2.30%	2.62%	0.32%
Present Value of Future Benefits	$470.59	$494.58	$23.98
Present Value of Future Employee Contributions	($172.46)	($174.18)	($1.71)
Actuarial Value of Assets	($345.01)	($345.01)	$0.00
Unfunded actuarial accrued liability	($46.88)	($24.61)	$22.27
Funded ratio	115.7%	107.7%	-8.0%
Aggregate Funding Cost	1.89%	2.32%	0.43%

Statewide Death and Disability Plan - Reconciliation of Valuation Results as of January 1, 2015 ($ in millions)		
	Unfunded Accrued Liability	**Aggregate Funding Cost**
Baseline/Current Assumptions	($46.88)	1.89%
Termination	($0.07)	0.01%
Disability	$24.96	0.37%
Pre-retirement Mortality	$6.45	0.10%
Post-retirement Mortality	($9.08)	-0.14%
Explicit administrative expense	$0.00	0.09%
Recommended assumptions	($24.61)	2.32%

The primary impact to the SWDD plan was from increased assumed incidence of disability.

Statewide Hybrid Plan Valuation Results as of January 1, 2015 ($ in millions)			
Result	**Current Assumptions**	**Recommended Assumptions**	**Change**
Normal cost %	9.54%	10.15%	0.61%
Actuarial accrued liability	$29.18	$29.81	$0.63
Actuarial value of assets	$39.77	$39.77	$0.00
Unfunded actuarial accrued liability	($10.59)	($9.96)	$0.63
Funded ratio	136.3%	133.4%	-2.9%
30-Year ARC	4.88%	5.77%	0.89%

The primary impacts to the SWH plan were from the increased post-retirement longevity and the explicit administrative expense assumption.

Sample Old Hire Plans Valuation Results as of January 1, 2015 ($ in millions)			
Result	**Current Assumptions**	**Recommended Assumptions**	**Change**
Aurora Police (rank escalation, post-1980 benefits limited to 3%)			
Actuarial accrued liability	$120.36	$126.68	$6.32
Actuarial value of assets	$92.03	$92.03	$0.00
Unfunded actuarial accrued liability	$28.33	$34.65	$6.32
Funded ratio	76.5%	72.6%	-3.9%
Administrative expenses	$0.00	$0.14	$0.14
20-Year ARC	$2.61	$3.41	$0.80
Englewood Police (no COLA)			
Actuarial accrued liability	$9.03	$9.35	$0.32
Actuarial value of assets	$4.91	$4.91	$0.00
Unfunded actuarial accrued liability	$4.12	$4.44	$0.32
Funded ratio	54.4%	52.5%	-1.9%
Administrative expenses	$0.00	$0.01	$0.01
16-Year ARC/17-year ARC*	$0.43	$0.47	$0.04

The Old Hire Plans are no longer affected by active member assumptions. The impacts to the Old Hire plans were from the increased post-retirement longevity and the explicit administrative expense assumption.

Sample Volunteer Plans Valuation Results as of January 1, 2015 ($ in thousands)			
Result	**Current Assumptions**	**Recommended Assumptions**	**Change**
Rocky Mountain Fire Protection District			
Actuarial accrued liability	$528.59	$542.46	$13.87
Actuarial value of assets	$418.92	$418.92	$0.00
Unfunded actuarial accrued liability	$109.67	$123.54	$13.87
Funded ratio	79.3%	77.2%	-2.1%
Normal Cost	$1.95	$1.99	$0.05
Administrative expenses	$0.00	$1.00	$1.00
20-Year ARC	$13.57	$16.06	$2.49
North Washington (Retiree Only)			
Actuarial accrued liability	$58.41	$61.92	$3.51
Actuarial value of assets	$156.73	$156.73	$0.00
Unfunded actuarial accrued liability	($98.32)	($94.81)	$3.51
Funded ratio	268.3%	253.1%	-15.2%
Administrative expenses	$0.00	$0.63	$0.63
14-Year ARC	($12.02)	($10.96)	$1.06

The volunteer plans use retirement, termination and disability rates which are specific to these plans. No changes were recommended to these assumptions. The impacts to the Volunteer plans were from the increased post-retirement longevity and the explicit administrative expense assumption. These were the only modified assumptions for these plans.

Colorado Springs New Hire Plans Valuation Results as of January 1, 2015 ($ in millions)			
Result	**Current Assumptions**	**Recommended Assumptions**	**Change**
Fire Component			
Actuarial accrued liability	$145.88	$150.64	$4.77
Actuarial value of assets	$120.35	$120.35	$0.00
Unfunded actuarial accrued liability	$25.52	$30.29	$4.77
Funded ratio	82.5%	79.9%	-2.6%
Normal Cost	$2.26	$2.20	($0.06)
Administrative expenses	$0.00	$0.20	$0.20
23-Year ARC	$4.52	$5.14	$0.62
Police Component			
Actuarial accrued liability	$297.81	$305.75	$7.94
Actuarial value of assets	$253.94	$253.94	$0.00
Unfunded actuarial accrued liability	$43.87	$51.81	$7.94
Funded ratio	85.3%	83.1%	-2.2%
Normal Cost	$5.77	$6.00	$0.23
Administrative expenses	$0.00	$0.41	$0.41
23-Year ARC	$9.65	$11.09	$1.44

The primary impacts to the CS NH plans were from the increased post-retirement longevity and the explicit administrative expense assumption.

Actuarial Factors

In addition to updating the actuarial assumptions used in the actuarial valuations (beginning with valuations as of January 1, 2016), it is our recommendation that all actuarial factors be updated to reflect these new assumptions. Examples of such assumptions include:

- Service purchase factors
- Benefit option factors (joint and survivor, etc.)
- Early retirement factors

As a matter of administrative convenience and practicality, it may be prudent to delay the effective date past January 1, 2016.

SECTION V

SUMMARY OF NEW ASSUMPTIONS

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

The following presents a summary of the actuarial assumptions and methods used in the valuation of the SWDB and the SWDD. This report focuses on those two plans because the assumptions and methods derived from those two plans translate well to the other plans covered under FPPA. Additional information regarding assumptions specific to the Volunteer Plan and Colorado Springs New Hire Plans can be found on pages 47 and 48.

I. Valuation Date

The valuation date is January 1st 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

The SWDB actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the employer contribution rate is the sum of (i) the employer normal cost rate, and (ii) a rate that will amortize the unfunded actuarial liability.

1. The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.50%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.

2. The employer contributions required to support the benefits of the Plan are determined following a level funding approach, and consist of a normal cost contribution and an accrued liability contribution.

3. The normal cost contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each new participant during the entire period of his anticipated covered service, would be required in addition to the contributions of the participant to meet the cost of all benefits payable on their behalf.

4. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability and amortizing the

result over 30 years from the valuation date. It is assumed that payments are made monthly throughout the year.

The SWDD actuarial valuation uses the Aggregate Funding Method. Under this method, the contribution rate is calculated to fully fund the present value of all benefits over the remaining working career of the active employees. The contribution rate is determined as a percentage of increasing payroll.

1. The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.50%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.

2. The actuarial value of assets is subtracted from the present value of all expected benefits to determine the present value of future normal costs. The future normal costs are spread across the future value of salaries to be paid to the current active population to determine a contribution rate.

III. Actuarial Value of Assets

The actuarial value of assets is equal to the market value of assets less a five-year phase in of the excess (shortfall) between expected investment return and actual income. The actual calculation is based on the difference between actual earnings and expected earnings each year, and recognizes the cumulative excess return (or shortfall) over at a minimum rate of 20% per year. The speed of the recognition will increase if the Plan continues to be in the same net deferred position (net gain or net loss) from one year to the next. This is intended to ensure the smoothed value of assets will converge towards the market value in a reasonable amount of time. In addition, a gain or loss that is in the opposite direction of the current net position will be immediately recognized.

Expected earnings are determined using the assumed investment return rate and the beginning of year actuarial value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of administrative and investment expenses.

IV. Actuarial Assumptions

A. Economic Assumptions

1. Investment return: 7.50% per annum, compounded annually, composed of an assumed 2.50% inflation rate and a 5.00% real rate of return. This rate represents the assumed return, net of all investment expenses.

2. Salary increase rate: Inflation rate of 2.50%, plus productivity component of 1.50%, plus step-rate/ promotional component as shown:

Years of Service	Annual Step-rate/ Promotional Rate	Total Annual Rate of Increase Including 3.00% Inflation Component and 1.00% Productivity Component
(1)	(2)	(3)
1	10.00%	14.00%
2	8.50%	12.50%
3	8.00%	12.00%
4	7.50%	11.50%
5	2.50%	6.50%
6	1.50%	5.50%
7	1.50%	5.50%
8	1.00%	5.00%
9	0.75%	4.75%
10	0.50%	4.50%
11	0.50%	4.50%
12	0.50%	4.50%
13	0.25%	4.25%
14	0.25%	4.25%
15	0.00%	4.00%

Salary increases are assumed to occur once a year, on January 1. Therefore the pay used for the period between the valuation date and the first anniversary of the valuation date is equal to the reported pay for the prior year, annualized if necessary, and then increased by the salary increase assumption.

3. Payroll growth rate: In the amortization of the unfunded actuarial accrued liability, payroll is assumed to increase 3.50% per year. This increase rate is primarily due to the effect of inflation on salaries, with no allowance for future membership growth.

B. Demographic Assumptions

1. Mortality rates (members in payment status) –

a. Healthy retirees and beneficiaries: For ages less than 55, RP-2014 Mortality Tables for Blue Collar Employees. For ages 65 and older, RP-2014 Mortality Tables for Blue Collar Healthy Annuitants. For ages 55 through 64, a blend of the previous tables. All tables are projected with Scale BB.

	Annual Rate per 1,000 Members				
Attained Age in 2015	Males	Females	Attained Age in 2015 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	2.18	1.23	70	19.39	13.80
55	3.69	1.98	75	31.03	22.70
60	7.29	4.67	80	51.08	37.71
65	12.46	8.62	85	85.53	64.23

b. Occupationally disabled retirees: Healthy retiree tables set forward three years.

	Annual Rate per 1,000 Members				
Attained Age in 2015	Males	Females	Attained Age in 2015 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	2.95	1.60	70	25.62	18.58
55	5.59	3.36	75	41.73	30.70
60	10.28	6.98	80	69.50	51.77
65	16.19	11.37	85	117.21	88.95

c. Totally disabled retirees: RP-2014 Disabled Mortality Tables, projected with Scale BB

	Annual Rate per 1,000 Members				
Attained Age in 2015	Males	Females	Attained Age in 2015 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	20.33	11.87	70	39.74	27.86
55	23.30	14.41	75	53.47	40.55
60	26.42	16.83	80	75.47	60.30
65	31.30	20.61	85	111.60	89.33

2. Mortality rates (active members) – RP-2014 Mortality Tables for Blue Collar Employees, projected with Scale BB, 55% multiplier for off-duty mortality. Increased by 0.00020 for on-duty related Fire and Police experience. Sample rates are shown below:

	Annual Rate per 1,000 Members				
Attained Age in 2015	Males	Females	Attained Age in 2015 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
20	0.29	0.10	40	0.45	0.24
25	0.34	0.11	45	0.69	0.40
30	0.32	0.13	50	1.20	0.68
35	0.37	0.18	55	1.98	1.03

3. Disability rates: Sample rates are shown below by age and disability type.

	Annual Rate per 1,000 Members			
Age	Occupational Disability Rates	Occupational Disability Rates	Total Disability Rates (MP)	Total Disability Rates (SWDB)
(1)	(2)	(3)	(4)	(5)
25	0.25	0.29	0.01	0.02
30	1.18	1.35	0.11	0.17
35	1.60	1.82	0.23	0.34
40	2.35	2.67	0.35	0.52
45	4.09	3.29	0.48	0.72
50	8.86	4.89	0.63	0.94
55	15.53	6.88	0.78	1.17

4. Termination rates (for causes other than death, disability or retirement): Termination rates are based on service. Termination rates are not applied after a member becomes eligible for a retirement benefit. Rates at selected ages are shown:

	Annual Rate per 1,000 Members				
Service	Rates	Service (cont.)	Rates	Service (cont.)	Rates
0	98.5	8	25.5	16	9.4
1	84.6	9	21.3	17	9.1
2	72.3	10	17.9	18	8.8
3	61.4	11	15.3	19	8.5
4	51.9	12	13.3	20	8.1
5	43.6	13	11.7	21	7.5
6	36.5	14	10.7	22	6.5
7	30.5	15	9.9	23	5.2

5. Retirement rates:

Members of the SWDD Plan are assumed to retire at the time of attaining:

A. Statewide Defined Benefit Plan Members and other New Hire Plan Members: Age 55 with 5 years of service or current age, if greater.

B. Money Purchase Plan Members: The earliest of Age 65 or Age 55 with 25 years of service; or current age, if greater.

C. Denver Police Old Hire Plan Members: Age after 25 years of service, or current age, if greater.

D. Denver Fire Old Hire Plan Members: Age 50 and 25 years of service, or current age, if greater.

E. All Other Plan members: Age 52 or current age, if greater.

Age-Based Retirement rates, for SWDB members with more than 25 years of service

Age	Annual Rate per 100 Members
55	60
56-59	50
60	100

Service-Based Retirement rates for SWDB members*

Service	Annual Rate per 100 Members
5-10	4
11	5
12	6
13	7
14	8
15	9
16	10
17	11
18	12
19	13
20	15
21	20
22-24	25

*Rates first applied at age 55; 100 percent retirement assumed at age 70.

C. Other Assumptions

1. Administrative expenses: Based on actual administrative expenses paid in the prior year.

2. Percent married: 85% of employees are assumed to be married or in a civil union.

3. Age difference: Male members are assumed to be two years older than their spouses, and female members are assumed to be two years younger than their spouses.

4. Cost of living escalators (COLA): Current Law – 0%.

5. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an annuity.

6. Percent electing deferred termination benefit: Vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.

7. For the SWDB plan, 10% of members who become occupationally disabled after the age of 50 will transfer back to the SWDB plan at age 55.

8. No surviving spouse will remarry and there will be no children's benefit.

9. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt at the first age at which unreduced benefits are available.

10. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.

11. Decrement timing: Decrements of all types are assumed to occur mid-year.

12. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

13. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

14. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll

shown in this report, and the actual payroll payable at the time contributions are made.

15. Benefit Service: All members are assumed to accrue 1 year of service each year. Exact fractional service is used to determine the amount of benefit payable.

16. Inactive Population: All members included in the inactive non-vested population with at least 10 years of service are valued using two times member contributions.

D. Participant Data

Participant data was supplied on electronic files in the form of spreadsheets. There were separate tabs for (i) active and non-vested inactive members, and (ii) members and beneficiaries receiving benefits or vested inactives.

The data for active members included birthdate, sex, service, salary and employee contribution account balance. For retired members and beneficiaries, the data included date of birth, sex, spouse's date of birth (where applicable), amount of monthly benefit, date of retirement, and a form of payment code.

Salary supplied for the current year was based on the earnings for the year preceding the valuation date adjusted for service accrued during the year. In cases where the earnings for the year two years prior to the valuation date was higher, this higher amount was used. This salary was adjusted by the salary increase rate for one year.

Assumptions were made to correct for missing, bad, or inconsistent data. These had no material impact on the results presented.

E. Allocation to SRA

The SRA contribution rate is determined annually based on the normal cost plus amortization of unfunded liability (surplus). The excess of the total contribution rate (16.50% in 2015, ratcheted up by 0.50% until reaching 20.0% in 2022) over the actuarial requirement is available as the SRA contribution rate. The Board has the authority and responsibility to choose the SRA rate. Other considerations may be evaluated such as:

1. Provision of meaningful benefit adjustments to retired members
2. Investment performance subsequent to the actuarial valuation
3. Potential future plan changes under consideration
4. Stability of SRA
5. Projections of future SRA contributions

SUMMARY OF ALTERNATE ACTUARIAL METHODS AND ASSUMPTIONS

The following presents a summary of any actuarial assumptions and methods used in the valuation of the Volunteer, Old Hire, and Colorado Springs New Hire Plans where the assumptions do not translate directly from the SWDB and SWDD assumptions.

Colorado Springs New Hire – Fire Component:

Age-Based Retirement rates, for CS NH Fire members with more than 25 years of service

Age	Annual Rate per 100 Members
55	60
56-59	50
60	100

Members eligible for early retirement have a 5% rate of retirement applied at age 50.

Termination rates are 110% of the SWDB plan rates.

Colorado Springs New Hire – Police Component:

Age-Based Retirement rates, for CS NH Police members with more than 25 years of service

Age	Annual Rate per 100 Members
50	60
51-54	50
55	100

Service-Based Retirement rates for CS NH Police members on or hired after October 1, 2003

Service	Annual Rate per 100 Members
20	15
21	20
22-24	25

*Rates first applied at age 50; 10 percent retirement assumed ages 45-49; 100 percent retirement assumed at age 70.

Early retirement rates for CS NH Police members before October 1, 2003 are set equal to termination rates.

Termination rates are 110% of the SWDB plan rates.

Volunteer Fire:

Retirement — Age 50 and 20 years of service.

Age	Annual Rate Per 100
50	50
55	50
60	50
65	100

Withdrawal (any reason other than retirement, death, or disability)

Annual Rate Per 1,000 Withdrawals			
Service	Rates	Service	Rates
1	165.79	11	76.33
2	154.54	12	70.21
3	143.79	13	64.60
4	133.56	14	59.50
5	123.85	15	54.92
6	114.65	16	50.85
7	105.96	17	47.29
8	97.78	18	44.25
9	90.12	19	41.72
10	82.97		

Twenty percent (20%) of members age 50 and eligible for a terminated vested benefit which would commence immediately are assumed to withdraw each year.

Percent married: 90% of employees are assumed to be married or in a civil union.

SECTION VI

SUMMARY OF DATA AND EXPERIENCE

List of Tables

FIRE AND POLICE PENSION ASSOCIATION OF COLORADO
SERVICE-BASED SALARY RATES

	Current Salary Scale		04/14 Actual Experience			Proposed Salary Scale	
Years of Service	Total	Step Rate/ Promotional	Total	Above Inflation	Step Rate/ Promotional	Total	Step Rate/ Promotional
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	14.00%	10.00%	**8.34%**	6.26%	4.28%	**14.00%**	10.00%
2	13.00%	9.00%	**10.88%**	8.80%	6.82%	**12.50%**	8.50%
3	12.50%	8.50%	**10.59%**	8.51%	6.53%	**12.00%**	8.00%
4	12.00%	8.00%	**11.27%**	9.19%	7.20%	**11.50%**	7.50%
5	6.50%	2.50%	**7.52%**	5.44%	3.46%	**6.50%**	2.50%
6	5.50%	1.50%	**5.27%**	3.19%	1.21%	**5.50%**	1.50%
7	5.50%	1.50%	**5.82%**	3.74%	1.76%	**5.50%**	1.50%
8	5.00%	1.00%	**5.24%**	3.16%	1.18%	**5.00%**	1.00%
9	4.75%	0.75%	**5.04%**	2.96%	0.98%	**4.75%**	0.75%
10	4.50%	0.50%	**5.52%**	3.44%	1.46%	**4.50%**	0.50%
11	4.50%	0.50%	**4.62%**	2.54%	0.56%	**4.50%**	0.50%
12	4.50%	0.50%	**5.03%**	2.95%	0.97%	**4.50%**	0.50%
13	4.25%	0.25%	**4.64%**	2.57%	0.58%	**4.25%**	0.25%
14	4.25%	0.25%	**4.22%**	2.14%	0.15%	**4.25%**	0.25%
15	4.00%	0.00%	**4.06%**	1.98%	0.00%	**4.00%**	0.00%
16	4.00%	0.00%				**4.00%**	0.00%

Current Inflation Assumption	3.00%	Proposed Inflation Assumption	2.50%
Current Productivity Component	1.00%	Proposed Productivity Component	1.50%
Actual CPI-U Inflation for Dec/04 - Dec/14	2.08%		
Apparent Productivity Component	1.98%		

FIRE AND POLICE PENSION ASSOCIATION OF COLORADO
POST-RETIREMENT MORTALITY - MALE

				Assumed Rate		Expected Deaths		Actual/Expected	
Age	Actual Deaths	Total Count	Actual Rate	Current	Proposed	Current (3) * (5)	Proposed (3) * (6)	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
50-54	1	118	0.0085	0.0030	0.0031	0	0	287%	274%
55-59	5	1,625	0.0031	0.0053	0.0055	9	9	58%	56%
60-64	38	4,589	0.0083	0.0097	0.0097	44	45	85%	85%
65-69	66	4,664	0.0142	0.0169	0.0155	79	72	84%	92%
70-74	75	3,252	0.0231	0.0275	0.0244	89	79	84%	95%
75-79	83	2,039	0.0407	0.0459	0.0394	94	80	89%	103%
80-84	98	1,349	0.0726	0.0785	0.0654	106	88	93%	111%
85-89	69	595	0.1160	0.1245	0.1055	74	63	93%	110%
90-94	42	154	0.2727	0.1975	0.1731	30	27	138%	158%
95-99	10	38	0.2632	0.2835	0.2551	11	10	93%	103%
100-104	1	1	1.0000	0.3404	0.3159	0	0	294%	317%
Other	0	0	N/A	N/A	N/A	0	0	N/A	N/A
Totals	488	18,424				537	473	91%	103%

There was insufficient Old Hire date to study female mortality experience independently.

FIRE AND POLICE PENSION ASSOCIATION OF COLORADO
TERMINATION EXPERIENCE

				Assumed Rate		Expected Withdrawal		Actual/Expected	
Service	Actual Withdrawal	Total Count	Actual Rate	Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	299	2,290	0.1306	0.1099	0.0985	252	225	119%	133%
2	371	3,932	0.0944	0.0807	0.0846	317	333	117%	112%
3	258	3,318	0.0778	0.0672	0.0723	223	240	116%	108%
4	178	3,085	0.0577	0.0508	0.0614	157	190	114%	94%
5	162	3,029	0.0535	0.0410	0.0519	124	157	130%	103%
6	137	3,016	0.0454	0.0346	0.0436	104	132	131%	104%
7	106	2,909	0.0364	0.0300	0.0365	87	106	122%	100%
8	81	2,743	0.0295	0.0266	0.0305	73	84	111%	97%
9	56	2,482	0.0226	0.0237	0.0255	59	63	95%	89%
10	60	2,279	0.0263	0.0212	0.0213	48	49	124%	124%
11	50	2,026	0.0247	0.0191	0.0179	39	36	129%	138%
12	31	1,885	0.0164	0.0172	0.0153	32	29	96%	108%
13	33	1,843	0.0179	0.0156	0.0133	29	24	115%	135%
14	25	1,691	0.0148	0.0143	0.0117	24	20	104%	126%
15	15	1,517	0.0099	0.0129	0.0107	19	16	77%	93%
16	9	1,336	0.0067	0.0121	0.0099	16	13	55%	68%
17	14	1,227	0.0114	0.0112	0.0094	14	12	102%	121%
18	13	1,103	0.0118	0.0102	0.0091	11	10	115%	130%
19	5	1,061	0.0047	0.0095	0.0088	10	9	50%	53%
20	10	1,047	0.0096	0.0086	0.0085	9	9	111%	112%
21	8	927	0.0086	0.0080	0.0081	7	8	108%	106%
22	4	860	0.0047	0.0073	0.0075	6	6	64%	62%
23	3	832	0.0036	0.0068	0.0065	6	5	53%	55%
24	2	772	0.0026	0.0063	0.0052	5	4	41%	50%
Totals	1,930	47,210				1,673	1,780	115%	108%

FIRE AND POLICE PENSION ASSOCIATION OF COLORADO
NORMAL RETIREMENT EXPERIENCE - AGE BASED (Members with at least 25 years of service)

				Assumed Rate		Expected Retirement		Actual/Expected	
Age	Actual Retirement	Total Count	Actual Rate	Current	Proposed	Current (3) * (5)	Proposed (3) * (6)	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
55	146	233	0.627	0.550	0.600	128	140	114%	104%
56	64	124	0.516	0.350	0.500	43	62	149%	103%
57	43	81	0.531	0.350	0.500	28	41	154%	105%
58	32	62	0.516	0.350	0.500	22	31	145%	103%
59	21	51	0.412	0.350	0.500	18	26	117%	81%
60	34	41	0.829	1.000	1.000	41	41	83%	83%
61	11	18	0.611	1.000	1.000	18	18	61%	61%
62	3	11	0.273	1.000	1.000	11	11	27%	27%
63	6	8	0.750	1.000	1.000	8	8	75%	75%
64	4	5	0.800	1.000	1.000	5	5	80%	80%
65	-	2	0.000	1.000	1.000	2	2	0%	0%
66	-	3	0.000	1.000	1.000	3	3	0%	0%
67	1	3	0.333	1.000	1.000	3	3	33%	33%
68	-	1	0.000	1.000	1.000	1	1	0%	0%
69	1	1	1.000	1.000	1.000	1	1	100%	100%
Subtotal	366	644	0.568			332	393	110%	93%
70-74	1	6	0.167	1.000	1.000	6	6	17%	17%
Subtotal	367	650	0.565			338	399	109%	92%

FIRE AND POLICE PENSION ASSOCIATION OF COLORADO
MALE AND FEMALE EARLY RETIREMENT EXPERIENCE - SERVICE BASED

				Assumed Rate		Expected Retirement		Actual/Expected	
Service	Actual Retirement	Total Count	Actual Rate	Current	Proposed	Current (3) * (5)	Proposed (3) * (6)	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
5	3	44	0.068	0.030	0.040	1	2	300%	150%
6	6	51	0.118	0.030	0.040	2	2	300%	300%
7	3	51	0.059	0.030	0.040	2	2	150%	150%
8	1	53	0.019	0.030	0.040	2	2	50%	50%
9	4	61	0.066	0.030	0.040	2	2	200%	200%
10	6	53	0.113	0.030	0.040	2	2	300%	300%
11	4	46	0.087	0.040	0.050	2	2	200%	200%
12	6	50	0.120	0.050	0.060	3	3	200%	200%
13	-	44	0.000	0.060	0.070	3	3	0%	0%
14	1	47	0.021	0.070	0.080	3	4	33%	25%
15	1	47	0.021	0.080	0.090	4	4	25%	25%
16	5	35	0.143	0.090	0.100	3	4	167%	125%
17	3	34	0.088	0.100	0.110	3	4	100%	75%
18	2	37	0.054	0.110	0.120	4	4	50%	50%
19	5	50	0.100	0.120	0.130	6	7	83%	71%
20	8	55	0.145	0.200	0.150	11	8	73%	100%
21	9	63	0.143	0.200	0.200	13	13	69%	69%
22	20	70	0.286	0.200	0.250	14	18	143%	111%
23	20	78	0.256	0.200	0.250	16	20	125%	100%
24	22	77	0.286	0.200	0.250	15	19	147%	116%
Totals	129	1,046	0.123			111	125	116%	103%