

# **ARIZONA ELECTED OFFICIALS' RETIREMENT PLAN**

## **ACTUARIAL EXPERIENCE STUDY**

April 21, 2022



**FOSTER & FOSTER**  
ACTUARIES AND CONSULTANTS

April 21, 2022

Board of Trustees  
Arizona Elected Officials' Retirement Plan  
Phoenix, AZ

*Re: 2022 Actuarial Experience Study - Arizona Elected Officials' Retirement Plan*

Dear Members of the Board:

We are pleased to present to the Board this report of the results of an actuarial experience study analyzing the assumptions used for actuarial valuation purposes for the Arizona Elected Officials' Retirement Plan (EORP). We have compiled plan experience from July 1, 2016 through June 30, 2021. While we cannot verify the accuracy of all the information provided, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy of the information and believe it has produced appropriate results.

The report includes a review of demographic and economic experience, a comparison of this experience to current actuarial assumptions, our recommendations for consideration regarding changes in assumptions or methods to be effective for the June 30, 2022 actuarial valuation. We believe implementing the recommend changes will assist in achieving the objective of developing costs that are stable, predictable, and represent our best estimate of anticipated experience.

It is important to remember that the ultimate cost of the retirement plan is independent of any actuarial assumptions or methods used throughout the valuation process. This cost will be the sum of the benefits paid from the fund and the administrative expenses incurred, less any net investment gains received. Future actuarial measurements may differ significantly from current measurements due to such factors as: plan experience differing from that anticipated by assumptions; changes in assumptions; increases or decreases expected as part of the natural operation of the methodology used; changes in plan provisions or applicable law.

Foster & Foster does not provide legal, investment or accounting advice. Thus, the information in this report is not intended to supersede or supplant the advice or the interpretations of the plan or its affiliated legal, investing or accounting partners.

In performing the analysis, we used third-party software to model (calculate) the underlying liabilities and costs. These results are reviewed in the aggregate and for individual sample lives. The output from the software is either used directly or input into internally developed models to generate the costs. All internally developed models are reviewed as part of the process. As a result of this review, we believe that the models have produced reasonable results. We do not believe there are any material inconsistencies among assumptions or unreasonable output produced due to the aggregation of assumptions.


The undersigned are familiar with the immediate and long-term aspects of pension valuations and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. All sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no associate of Foster & Foster, Inc. working on valuations of the program has any direct financial interest or indirect material interest in the Arizona Public Safety Personnel Retirement System, nor does anyone at Foster & Foster, Inc. act as a member of the Board of Trustees of the Arizona Public Safety Personnel Retirement System. Thus, there is no relationship existing that might affect our capacity to prepare and certify this actuarial report.

If there are any questions, concerns, or comments about any of the items contained in this report, please contact us at 239-433-5500.


Respectfully submitted,

FOSTER & FOSTER INC.



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Bradley R. Heinrichs, FSA, EA, MAAA



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Paul M. Baugher, FSA, EA, MAAA

## TABLE OF CONTENTS

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<b>ACTUARIAL STANDARDS OF PRACTICE.....</b>	<b>5</b>
<b>RECOMMENDATIONS.....</b>	<b>6</b>
<b>IMPACT OF RECOMMENDED CHANGES .....</b>	<b>7</b>
<b>REVIEW OF ECONOMIC ASSUMPTIONS.....</b>	<b>7</b>
INVESTMENT RETURN .....	9
INFLATION (GENERAL) .....	13
INFLATION (PHOENIX-MESA AREA) .....	15
SALARY AND REAL WAGE GROWTH.....	16
<b>REVIEW OF DEMOGRAPHIC ASSUMPTIONS .....</b>	<b>19</b>
RETIREMENT RATES.....	20
TERMINATION RATES .....	27
DISABILITY INCIDENCE RATES .....	29
MORTALITY RATES .....	31
OTHER DEMOGRAPHIC ASSUMPTIONS .....	33
<b>RECOMMENDED ASSUMPTIONS.....</b>	<b>34</b>

## ACTUARIAL STANDARDS OF PRACTICE

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The Actuarial Standards Board (ASB) is responsible for determining which actuarial activities are the best representations of generally accepted actuarial principles and is also responsible for issuing guidance in the form of Actuarial Standards of Practice (ASOPs) to help actuaries in various practice areas deliver results and recommendations that are consistent with those representations. Generally speaking, ASOPs identify what the actuary should consider, document, and disclose when performing actuarial assignments.

The experience study and related measurements of benefit obligations for the plan are subject to the “coordinated guidance” provided in various ASOPs, including but not limited to:

- ❖ ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, which ties together the standards shown below, provides guidance on actuarial cost methods, and addresses overall considerations for measuring pension obligations and determining plan costs or contributions
- ❖ ASOP No. 23, *Data Quality*
- ❖ ASOP No. 25, *Credibility Procedures*
- ❖ ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*
- ❖ ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*
- ❖ ASOP No. 41, *Actuarial Communications*
- ❖ ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*
- ❖ ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*
- ❖ ASOP No. 56, *Modeling*

This report refers to ASOPs by number (e.g. ASOP No. 4) throughout. It is important to keep in mind that this experience study report only reflects the guidance provided in the final releases of the above-mentioned ASOPs issued by the ASB on or before the date of this report. The results provided in this report reflect the requirements of, and are consistent with, the applicable above-mentioned Actuarial Standards of Practice. When applicable, details from the relevant ASOP will be provided in the report section associated with a particular analysis or topic.

## RECOMMENDATIONS

Below is a summary of the recommended assumption changes resulting from the study. A detailed list of recommended assumptions is at the end of the report.

Assumption	Current	Recommendation
<b>Investment Return</b>	7.30%	To be determined after discussion with investment consultant / staff
<b>Inflation (General)</b>	2.50%	2.50%
<b>Inflation (COLA)</b>	1.75%	1.85%
<b>Salary Increases</b>	3.75%	3.25%
<b>Retirement Rates</b>	Primarily age-related rates	Experience overall in line but adjustments to tables to better reflect experience by eligibility group
<b>Termination Rates</b>	Service-related table	Similar table with increases to better reflect actual experience
<b>Disability Rates</b>	Age-related table	No change
<b>Mortality Rates</b>	PubG-2010 tables; annual update to latest MP-20xx improvement scale	Changes only to use above-median rates based on group

## IMPACT OF RECOMMENDED CHANGES

The table below shows the impact of the various assumption changes on key results had the change been included in the 6/30/2021 valuation. The impact of a 10 basis point decrease in the interest rate is also included for informational purposes.

The key results shown are the actuarial accrued liability (AAL), normal cost (NC), and employer contribution rate (for FYE 2023).

The results show a material increase in the AAL. This is driven by the COLA and mortality assumptions, which increased the liability by approximately 1.1% each. The normal cost increase was driven mainly by changes in the COLA (1.3%).

**Impact of Assumption Changes (\$ millions)**

	Valuation	All Changes (7.30%)	All Changes (7.20%)
<b>AAL</b>	955.0	979.5	988.4
<b>Change (\$)</b>		24.5	33.4
<b>Change (%)</b>		2.6%	3.5%
<b>NC</b>	10.1	10.2	10.4
<b>Change (\$)</b>		0.1	0.3
<b>Change (%)</b>		0.9%	2.9%
<b>ER Rate (% of pay)</b>	70.42%	74.60%	75.94%
<b>Change</b>		4.17%	5.52%

## REVIEW OF ECONOMIC ASSUMPTIONS

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ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries in selecting (including giving advice on selecting) economic assumptions – primarily investment return, discount rate, post-retirement benefit increases, inflation, and compensation increases – for measuring obligations under defined benefit pension plans.

Throughout the remainder of this section, we have used the standards set forth in ASOP No. 27 as a guideline for reviewing and if applicable, selecting recommended changes to the following economic actuarial assumptions and methods:

- ❖ Investment Return
- ❖ Inflation (General)
- ❖ Inflation (Phoenix-Mesa area)
- ❖ Salary Increases

Note that the payroll growth assumption could be included in this report, as it is an economic assumption. However, given our annual review of this assumption with the valuation and the Board's current approach to lower this assumption for pre-2020 amounts, we don't see a need to expound upon the assumption here.

Please keep in mind that ASOP No. 27 (and ASOP No. 35) recognizes a range of reasonable assumptions and states “the actuary should recognize the uncertain nature of the items for which assumptions are selected and, as a result, may consider several different assumptions reasonable for a given measurement. The actuary should also recognize that different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop both for an individual actuary and across actuarial practice.”



## INVESTMENT RETURN

The investment return assumption is critical in the actuarial valuation since it determines the portion of assets that will come from investment income rather than contributions from the plan sponsor and its participants. The investment return assumption is commonly determined based on the long-term rate of return (net of investment-related fees) the plan expects to earn over its lifetime. The current assumed rate of investment return is 7.30%. This rate is a per-year rate assuming annual compounding, net of both investment-related and administrative expenses.

We believe that the decision to set the investment return assumption shall be made based upon input from your investment professionals, reflecting any significant changes to the asset allocation, and their judgment of capital market returns. Keep in mind, however, that this assumption should reflect the best estimate of investment returns expected to be realized over the next several decades.

ASOP No. 27 provides that in developing a reasonable assumption, the actuary may consider a broad range of data and other inputs, including the judgment of investment professionals. The data that may be considered includes: current yields to maturity of fixed income securities; forecasts of inflation, GDP growth, and total returns for each asset class; historical and current investment data (including real and nominal returns); the inflation and inflation risk components implicit in the yield of inflation-protected securities; dividend yields, earnings yields, and real estate capitalization rates; and historical plan performance.

For purposes of reviewing the investment return assumption, a building block approach is often used, whereby the actuary determines the weighted average expected real rate of return for the plan's target investment portfolio and then adjusts for inflation and expenses not reflected in the real rates of return. Foster & Foster is an actuarial firm, and we do not have the required expertise to produce our own capital market assumptions. For this reason, ASOP No. 27 addresses that the actuary will often collect capital market assumptions from external sources to determine the forward-looking expected geometric returns. The capital market assumptions can be broadly classified into the following categories: expected returns by asset class; standard deviation by asset class; and correlation coefficients between asset classes.

For this analysis, we relied on data collected as part of the "Survey of Capital Market Assumptions: 2021 Edition" released by Horizon Actuarial Services (Horizon). This survey collects the capital market assumptions from 39 different investment advisors from across the country. The purpose of this survey is to provide a broad range of opinions on future expectations rather than relying on a single source. This survey has been conducted annually since 2012. There has been a trend of declining expectations in most of the asset classes. For example, many of the long-term expectations (20-year horizon) decreased by more than 40 basis points in 2021 from where they were in 2020. This is driven by the expectation of increased inflation and lower equity returns.

As part of our analysis, we reviewed the target asset allocations adopted by the Board, as summarized in the table below.

	<b>Target Allocation</b>
US Public Equity	24%
International Public Equity	16%
Global Private Equity	27%
Core Bonds	2%
Private Credit	20%
Diversifying Strategies	10%
Cash	1%

Below, we have calculated various expected returns based on the target investment policy and the Horizon assumptions. We believe the 40<sup>th</sup> to 60<sup>th</sup> percentiles are a reasonable range for the assumption; however, we prefer the assumption to be within the 45<sup>th</sup> to 55<sup>th</sup> percentile range. The 50<sup>th</sup> percentile is the midpoint, with half of the results expected to exceed and half of the results expected to fall short of that level.

#### **Distribution of Geometric Returns**

	<b>10-Year</b>	<b>20-Year</b>
40 <sup>th</sup> Percentile	6.47%	7.38%
45 <sup>th</sup> Percentile	6.95%	7.72%
50 <sup>th</sup> Percentile	7.42%	8.06%
55 <sup>th</sup> Percentile	7.90%	8.39%
60 <sup>th</sup> Percentile	8.38%	8.73%

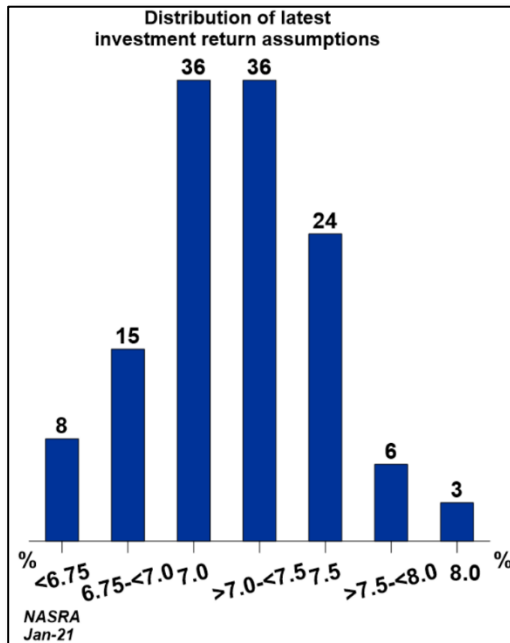
The following table provides the probability of exceeding various assumptions:

#### **Probability of Exceeding Assumption**

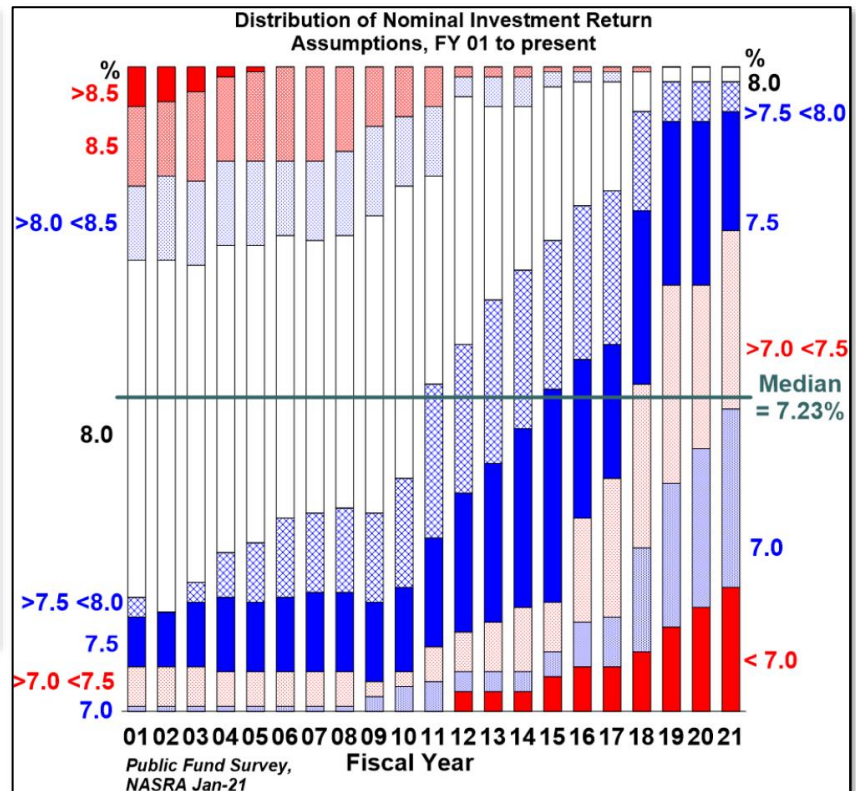
<b>Assumption</b>	<b>20-Year</b>
6.75%	69%
7.00%	65%
7.25%	62%
7.50%	58%

Finally, we should consider the trend in the investment return assumptions of other similarly situated pension plans across the country. Each year, the National Association of State Retirement Administrators (NASRA) releases a survey of the investment return assumptions used by about 130 of the largest public pension systems in the country. The most recent full survey was published in February 2021. This information is summarized below. Figure 1, taken from NASRA’s website, shows that an assumption of at least 7.00% but less than 7.50% is the most common range of assumptions among the respondents. Figure 2 shows how discount rates are trending down over the last 20 years, with the median assumption falling from 8.00% to 7.23% over that 20-year period.

**Figure 1**



**Figure 2**



NASRA has updated some survey information on their website to include information as of March 2022. If you compare these tables to the tables above, you can see the continued downward trend in rates. This is consistent with the downward trend observed in the investment advisor expectations by asset class in the “Survey of Capital Market Assumptions: 2021 Edition” performed by Horizon Actuarial Services where they state the following:

*“For illustration, this report also constructs an asset allocation for a hypothetical multiemployer pension plan and uses the results from the survey to develop a range of reasonably expected returns for the plan. Driven by lower expectations across most asset classes, the expected returns for this 2021 edition were 46 basis points lower over a 10-year horizon than they were last year, and 104 basis points lower than they were a mere five years ago. Over a 20-year horizon, the expected returns are 41 basis points lower than last year, and 118 basis points lower than they were five years ago in the 2016 edition of the survey.”*

Figure 3

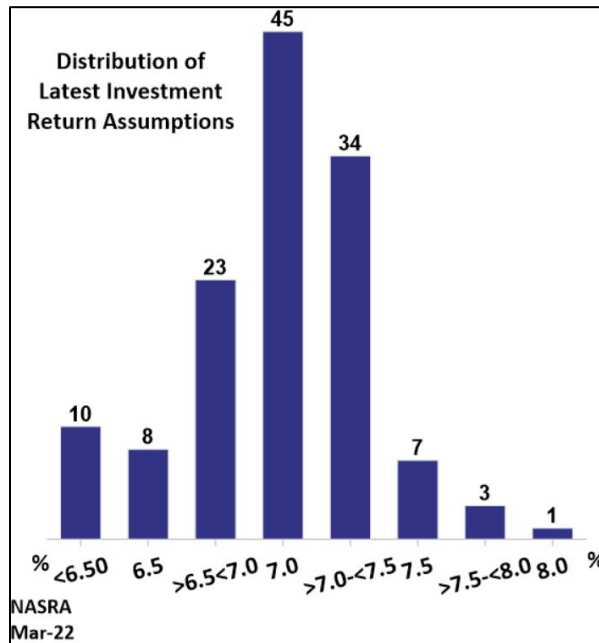
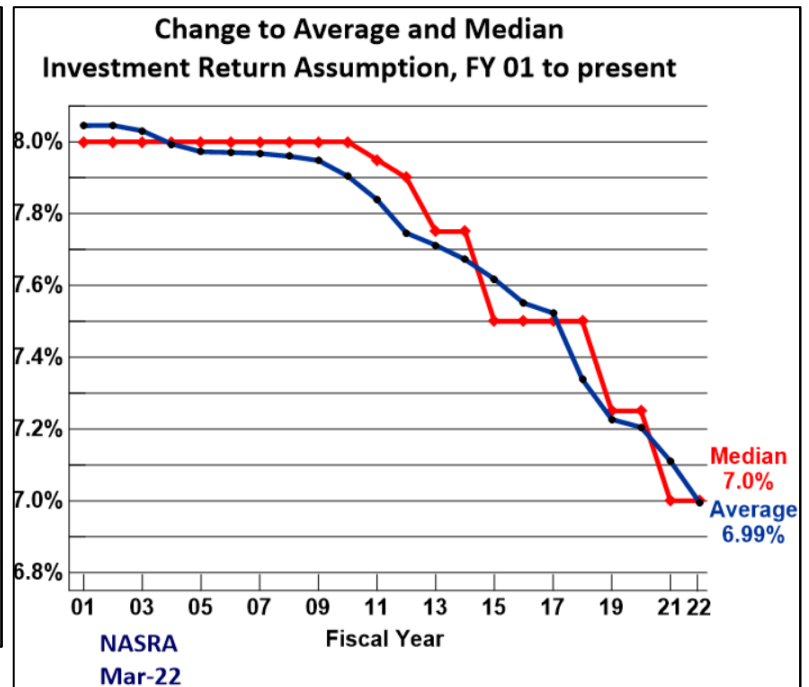


Figure 4



There are a few “details” that you will want to consider as you finalize an investment return assumption.

1. When setting any assumption, it is important to consider the concept of intergenerational equity. If you are too aggressive in your assumption setting, you are giving current taxpayers a break relative to their future counterparts. Similarly, if you are too conservative, you are asking current taxpayers to bear an unreasonable burden of the expense so that future taxpayers pay less. This is why it is so critical to set this assumption based actual expectations, given the data available. You want the burden to be shared equally among current and future taxpayers, and the best way to do this is to set an assumption that is the best expectation of future experience.
2. The assets of the fund are invested commonly, which could lead to a single rate for all plans and benefit tiers. Decisions could be made to utilize different assumptions due to the nature of a particular plan (e.g., EORP has been closed to new entrants for several years) or tier (Tier 1 is maturing while Tier 3 is still very new).
3. Historically your investment return assumption has been measured as net of both investment and administrative expenses. A more common approach that funds use is to reflect investment expenses only, and have an explicit administrative expense load in the calculation. The key here is to make sure that the administrative expenses are being incorporated somewhere, and to understand that your comparative investment return assumption would be greater if the administrative expenses were removed. Our review of PSPRS experience for the last three years show that administrative expenses have remained steady at 0.10% of market value.

### Recommendation

Revisit assumption with investment consultant and staff to determine best long-term approach.

## INFLATION (GENERAL)

Inflation refers to general economic inflation, defined as price changes over the whole of the economy. The assumed inflation rate is the basis for the other economic assumptions, such as assumed investment returns, the discount rate, and salary increase assumptions.

In order to assess the reasonableness of the inflation assumption, we review historical inflation, applicable inflation forecasts to the extent available, inflation assumptions used by the system's investment consultant and other investment consultants, and assumptions currently used by similar plans.

Following ASOP No. 27, which provides guidance on the selection of economic assumptions, such as inflation, our determination of an appropriate inflation assumption includes a review of recent and long-term historical inflation, without giving undue weight to recent experience. We note that, long-term historical experience, beyond 35 or so years, is less meaningful given that the Federal Reserve Board's monetary policy changed in the 1980's toward more vigilance in preventing high inflation.

### Historical Inflation

Inflation has been relatively low over the past 20 years, but we have seen a sharp increase in inflation over the last year. The table below shows the average historical change in the annual CPI-U, over various periods. The average increase shown reflects the annual average rates for the year.

<b>Periods Ending 2021</b>	<b>Average Annual Increase in CPI-U</b>
Last 1 year	4.7%
Last 5 years	2.5%
Last 10 years	1.9%
Last 20 years	2.1%
Last 30 years	2.3%
Last 40 years	2.8%

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

The current assumption of 2.50% appears to be supported by both short and long-term historical measures. The key to setting this assumption may be the Board's thoughts on how long the higher rates of inflation will continue.

### Yields on Government Securities of Various Maturities

The spread between the nominal yield on treasury securities and the inflation indexed nominal yield on inflation protected treasury bills (TIPS) of the same maturity is referred to as the "breakeven rate of inflation" and represents the bond market's expectation of inflation over the period to maturity. Current estimates reported at Bloomberg.com as of April 7, 2022 are as follows:

<b>Years to Maturity</b>	<b>Bond Nominal Yield</b>	<b>TIPS Nominal Yield</b>	<b>Breakeven Rate of Inflation</b>
10 Years	2.38%	-0.18%	2.56%
30 Years	2.74%	0.20%	2.54%

The current assumption is in line with the two market data points, which would lend support to the assumption being appropriate.

### Forecasts of Inflation

The Federal Reserve Bank of Philadelphia conducts a quarterly survey of the Society of Professional Forecasters and publishes a mid-term expectation. Their most recent forecast (first quarter of 2022) predicts average inflation over the next ten years (2022-2031) will be 2.50%. The Philadelphia Fed's Livingston Survey summarizes the forecasts of economists from industry, government, banking, and academia. The December 2021 report shows an average 10-year inflation expectation of 2.44%. The report does not provide a forecast beyond 10 years.

The Social Security Administration's 2021 Trustees Report includes the Office of the Chief Actuary's projection of ultimate long-term (75 year) average annual inflation. The intermediate cost assumption is 2.40%. The report provides a low-to-high range of 1.80% to 3.00%.

### Forecasts from Investment Consulting Firms

Horizon Actuarial Services, LLC, compiles and summarizes expected returns and volatility by asset class for 34 different investment advisors. The results of the survey are provided in a report titled "Survey of Capital Market Assumptions: 2021 Edition." The report defines the short-term horizon as 10 years and the long-term horizon as 20-years. All 39 advisors provided short-term assumptions, while only 24 provided both short-term and long-term assumptions. The average short-term (10-year) inflation assumption for all advisors is 2.12%, with a range of 2.0% to 2.8%. Of the 24 advisors providing both short-term and long-term assumptions, the short-term inflation assumption is 2.14% and the long-term inflation assumption is 2.23%, with a range from 1.8% to 2.9%. It should be noted that this study is based on capital market assumptions that were largely developed before recent significant increases in annual inflation rates.

### Recommendation

Based on the information shown above, which either supports the current assumption or was published before recent significant increases in annual inflation rates, we see no compelling factors to change the current assumption of 2.50% at this time. Given the recent increases, this assumption may need to be monitored more closely over the next few years to make sure that the hopefully short-term impacts are properly reflected in our long-term measurements. Based on these determinations, we recommend keeping the long-term inflation assumption at 2.50%.

## INFLATION (PHOENIX-MESA AREA)

Statute states that cost of living adjustments are to be “based on the average annual percentage change in the metropolitan Phoenix – Mesa consumer price index.”

Recent inflation in the Phoenix-Mesa area has actually exceeded national inflation. The table below shows the average historical change in the annual CPI-U, over various periods. The average increase shown reflects the annual average rates for the year.

Periods Ending 2021	Average Annual Increase in CPI-U
Last 1 year	5.0%
Last 5 years	3.3%
Last 9 years	2.3%

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

With a current assumption of 1.75%, it would appear that recent experience would support an increase in the rate. Actual experience in each of the last five years have exceeded that assumption, with annual rates exceeding 2% in four years. Prior to that five-year period, however, the annual rates were consistently below the 1.75% assumption. It is clear that recent experience is greater than our current assumption but it is not clear how long this trend will continue.

Statute limits the annual COLA increase to no more than 2.00%. We would recommend that the assumption be increased to 1.85% at this time. Further, we would recommend monitoring this assumption between formal experience studies in case the recent uptick in inflation should persist.



## SALARY AND REAL WAGE GROWTH

The salary increase assumption is used to project a member's annual salary each year from the valuation date through the assumed retirement age. This assumption plays an important role in measuring individual pension costs and obligations. The sum of inflation and the real wage growth components comprise the recommended salary increase assumption. The real rate of wage increase includes increases due to promotion and longevity, often called merit increases, which are generally service related.

We previously addressed the inflation assumption, which we recommend keeping at 2.50%. We address the real wage growth assumption below.

### Experience and Recommended Assumptions

To assess the current assumed annual increases and provide a basis for updated assumptions, we reviewed the actual salary experience over the study period. Salary increases across all service levels were slightly lower than expected. It is important to keep in mind that salary increase assumptions are used to project a member's salary from the valuation date until the assumed retirement age. For newly hired members, this projection could be for 40 or more years. Therefore, the recent past should not be considered in isolation. In addition to recent experience, we reviewed the experience from the two prior experience studies and long-term wage growth assumptions used by the Social Security Administration.

<b>Actual Aggregate Salary Increase Experience</b>			
	<b>Actual Inflation</b>	<b>Real</b>	<b>Total</b>
2016-2021	2.55%	-1.93%	0.62%

<b>Salary Increase Assumptions – Current and Proposed</b>			
	<b>Assumed Inflation</b>	<b>Real</b>	<b>Total</b>
Current Aggregate Assumed Annual Increase	2.50%	1.25%	3.75%
Proposed Aggregate Assumed Annual Increase	2.50%	0.75%	3.25%

### Social Security Administration

The Social Security Administration's (SSA) 2021 Trustees Report includes the Office of the Chief Actuary's projections of real wage inflation, which are used in their 75-year projections. These assumptions are based on data derived predominantly from the private sector and should therefore not be considered in isolation. However, this can provide a basis to help determine the reasonableness of the recommended long-term real increases shown above.

The annual increase in the National Average Wage Index under the intermediate cost assumption (best estimate) was 3.55%, with a range from 2.33% to 4.77%. After netting the SSA's inflation assumptions, the SSA's best estimate of the current long-term real wage inflation is 1.15%, with a range of 0.53% to 1.77% per year.

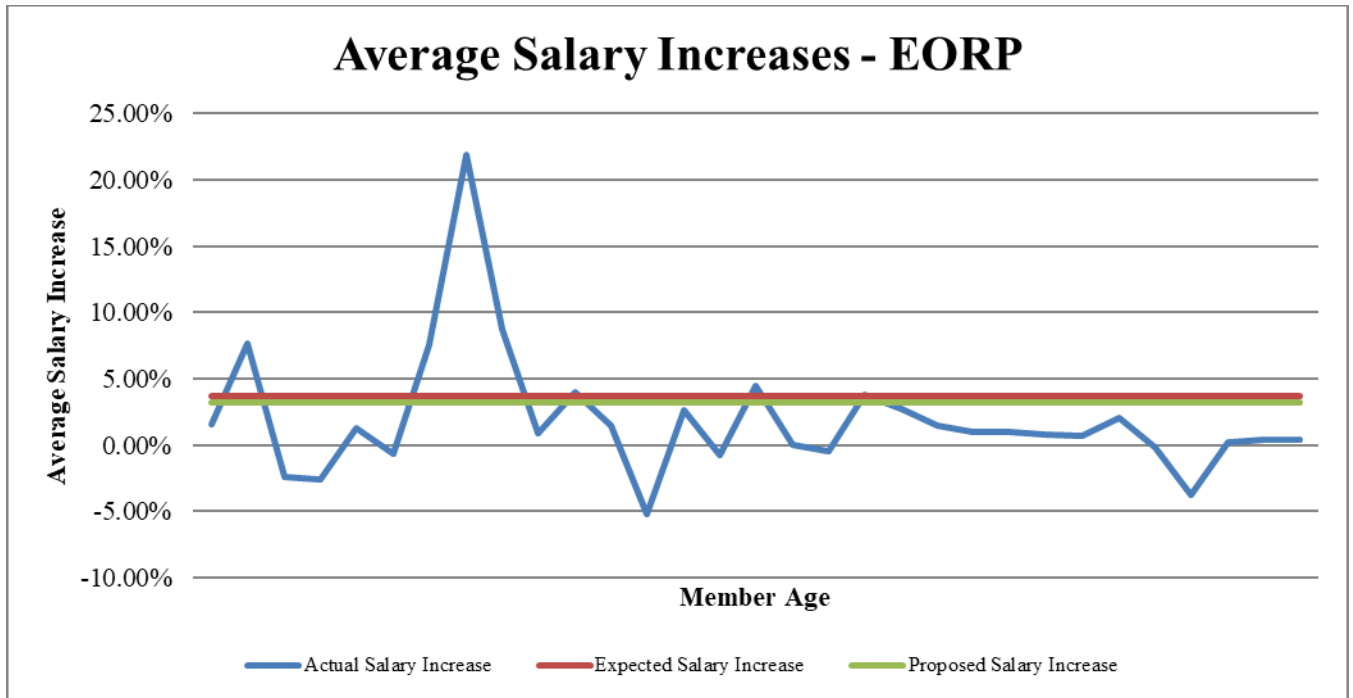


The following table and graph summarize the salary increase experience by age. Based on this information, we recommend lowering the salary increase assumption to 3.25% per year for all members, down from the current 3.75% per year assumption.

12

Arizona Elected Officials' Retirement Plan 2016 - 2021 Salary Increase Experience EORP								
Age	Eligible Members	Prior Year Salaries	Actual Salaries	Expected Salaries Current Assumption	Expected Salaries Proposed Assumption	Actual Salary Increase	Expected Salary Increase	Proposed Salary Increase <sup>1</sup>
<30	7	249,414	253,236	258,767	257,520	1.53%	3.75%	3.25%
31	5	218,750	235,525	226,954	225,859	7.67%	3.75%	3.25%
32	5	275,325	268,767	285,651	284,273	-2.38%	3.75%	3.25%
33	7	291,630	284,160	302,567	301,108	-2.56%	3.75%	3.25%
34	9	369,760	374,461	383,627	381,777	1.27%	3.75%	3.25%
35	9	323,277	321,246	335,401	333,784	-0.63%	3.75%	3.25%
36	11	437,526	470,666	453,936	451,746	7.57%	3.75%	3.25%
37	12	486,153	592,432	504,384	501,953	21.86%	3.75%	3.25%
38	16	695,432	756,067	721,511	718,034	8.72%	3.75%	3.25%
39	20	1,092,663	1,102,514	1,133,639	1,128,175	0.90%	3.75%	3.25%
40	21	1,125,197	1,169,698	1,167,391	1,161,766	3.95%	3.75%	3.25%
41	27	1,548,668	1,572,013	1,606,743	1,599,000	1.51%	3.75%	3.25%
42	29	1,859,371	1,762,330	1,929,097	1,919,801	-5.22%	3.75%	3.25%
43	34	2,755,050	2,827,693	2,858,364	2,844,589	2.64%	3.75%	3.25%
44	40	3,507,978	3,482,856	3,639,527	3,621,987	-0.72%	3.75%	3.25%
45	47	4,401,078	4,599,548	4,566,118	4,544,113	4.51%	3.75%	3.25%
46	57	5,498,460	5,498,132	5,704,652	5,677,160	-0.01%	3.75%	3.25%
47	67	6,375,720	6,348,939	6,614,807	6,582,931	-0.42%	3.75%	3.25%
48	67	6,380,203	6,621,531	6,619,460	6,587,560	3.78%	3.75%	3.25%
49	59	5,787,275	5,943,642	6,004,297	5,975,361	2.70%	3.75%	3.25%
50	69	7,138,318	7,242,591	7,406,005	7,370,313	1.46%	3.75%	3.25%
51	72	7,550,976	7,624,455	7,834,136	7,796,383	0.97%	3.75%	3.25%
52	84	9,051,153	9,139,175	9,390,571	9,345,315	0.97%	3.75%	3.25%
53	86	9,687,815	9,765,030	10,051,107	10,002,669	0.80%	3.75%	3.25%
54	111	12,201,837	12,289,365	12,659,407	12,598,397	0.72%	3.75%	3.25%
55	105	11,094,922	11,323,020	11,510,982	11,455,507	2.06%	3.75%	3.25%
56	112	11,812,316	11,796,573	12,255,279	12,196,216	-0.13%	3.75%	3.25%
57	117	11,748,203	11,310,008	12,188,762	12,130,020	-3.73%	3.75%	3.25%
58	120	11,775,727	11,803,327	12,217,319	12,158,438	0.23%	3.75%	3.25%
59	122	12,540,854	12,598,420	13,011,136	12,948,432	0.46%	3.75%	3.25%
60+	946	78,547,609	78,852,648	81,493,144	81,100,406	0.39%	3.75%	3.25%
<b>Total</b>	<b>2,493</b>	<b>226,828,660</b>	<b>228,230,068</b>	<b>235,334,741</b>	<b>234,200,593</b>	<b>0.62%</b>	<b>3.75%</b>	<b>3.25%</b>

<sup>1</sup> Inclusive of 2.50% inflation assumption.



## REVIEW OF DEMOGRAPHIC ASSUMPTIONS

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ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries in selecting (including giving advice on selecting) demographic and other noneconomic assumptions for measuring obligations under defined benefit pension plans.

Over the following pages, the following demographic assumptions will be reviewed:

- Retirement Rates
- Withdrawal/Termination Rates
- Disability Incidence Rates
- Mortality Rates
- Other Demographic Assumptions

Generally, demographic assumptions are based on actual plan experience with additional considerations for current trends. ASOP No. 35 states “the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment.” ASOP No. 35 also states that “a reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses...the actuary should not give undue weight to past experience when selecting demographic assumptions.”

Demographic assumptions generally remain consistent over time, absent significant changes in plan provisions or economic conditions. Therefore, the best true indicator of future experience is often past experience. For each assumption, the study compares actual experience for that time period to assumptions used in the valuations.

Note that actuarial assumptions reflect average experience over long periods of time. A change in actuarial assumptions generally results when experience over a period of years indicates a consistent pattern. Proposed changes to the demographic assumptions are made to better reflect actual plan experience over the studied time period. The proposed changes also meet the objective of developing costs that are stable, predictable, and represent the best estimate of anticipated future experience.

## RETIREMENT RATES

Retirement rates represent the probability that a member will retire at a given age and/or service level if they have attained the eligibility requirements. Higher rates of retirement at earlier ages generally result in higher costs to the plan but may be offset by the impacts of actuarially equivalent early retirement reductions.

The current retirement eligibility requirements are as follows:

Tier	Normal Retirement	Early Retirement
Tier 1	1) Age 62 and 10 years of service, 2) age 65 and 5 years of service, or 3) 20 years of service.	5 years of service.
Tier 2	1) Age 62 and 10 years of service, or 2) age 65 and 5 years of service.	Not applicable

### Experience and Proposed Assumptions

The tables and graphs on the following pages illustrate the actual retirement experience over the last five years. The rates illustrated are unisex and represent the probability of retirement, given the member had met the eligibility requirements. If the member did not meet the eligibility requirements at a given age, the member's exposure was excluded for that age.

The current retirement rate assumptions reflect age-related rates for Tier 2 and for Tier 1 members who retire with 20 years of service before age 62. For Tier 1 members who retire with 20 years of service after age 62, the current assumptions reflect service-related rates. For Tier 1 members eligible for early retirement, a flat rate of 3.5% per year is used.

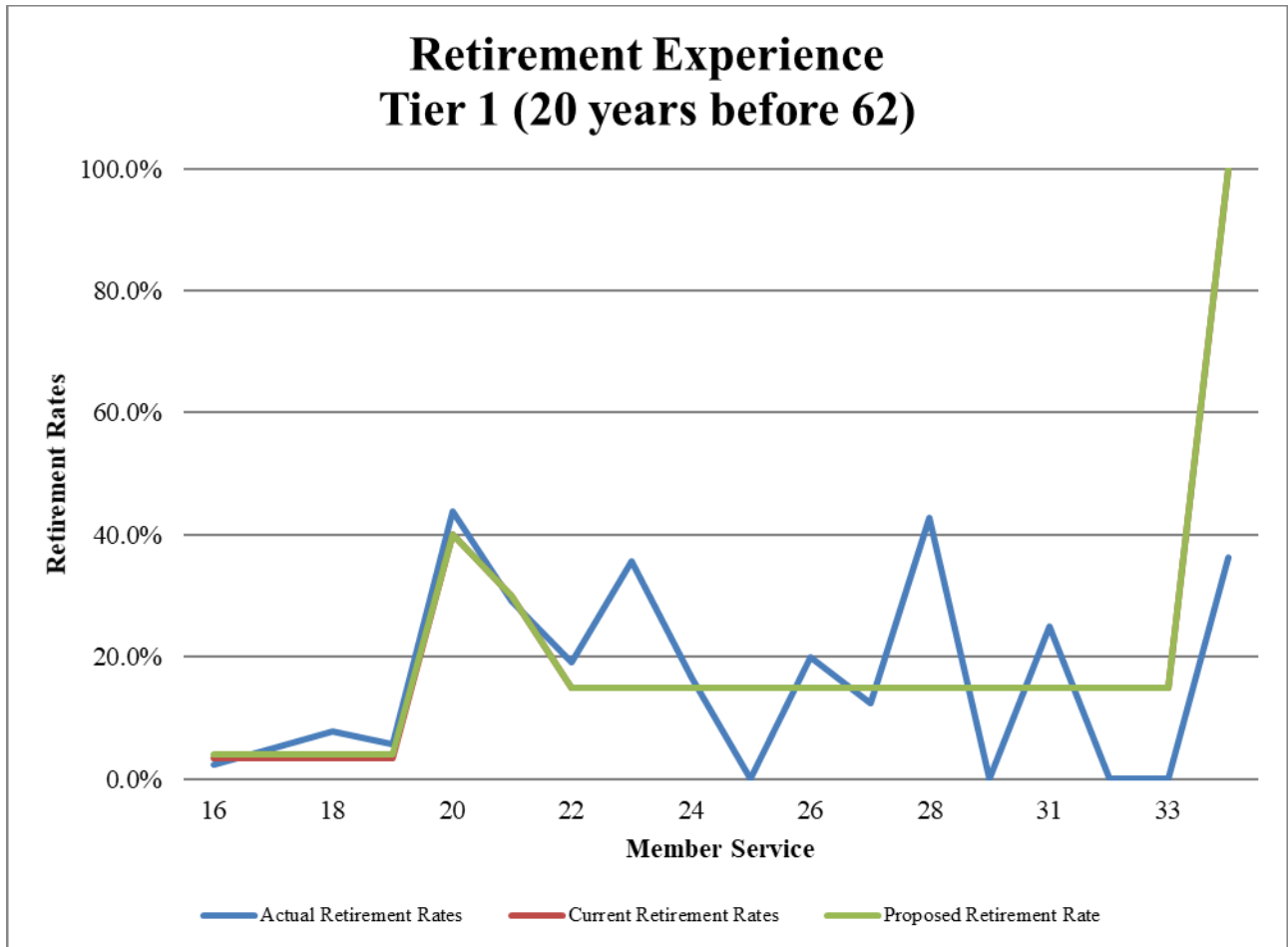
Most of the plan experience is for Tier 1 members who retire with 20 years of service after age 62. In general, actual retirement rates were heavier than expected. The proposed rates reflect an increase to the flat rate at all ages to reflect that experience.

For Tier 1 members who retire with 20 years of service before age 62, actual retirement rates were in line with expectation. The proposed rates reflect minor changes in rates at various service levels.

Tier 2 experience is minimal, but showed much lower experience than expected. We simplified the assumption while reducing rates to better fit experience.

Actual, expected, and proposed retirement rates by age are displayed in the following tables. Following the tables are graphs which provide visual representations of the actual and proposed retirement rates compared to the current assumptions.

Arizona Elected Officials' Retirement Plan 2016-2021 Retirement Experience Tier 1 Service-based Rates (Tier 1 with 20 Years of Service Before Age 62)							
Tier 1							
Service	Eligible	Actual	Expected	Actual Retirement Rates	Expected Current Rates	Actual / Expected	Proposed Rates
16	44	1	2	2.3%	3.5%	0.649	4.0%
17	39	2	1	5.1%	3.5%	1.465	4.0%
18	38	3	1	7.9%	3.5%	2.256	4.0%
19	35	2	1	5.7%	3.5%	1.633	4.0%
20	41	18	16	43.9%	40.0%	1.098	40.0%
21	24	7	7	29.2%	30.0%	0.972	30.0%
22	21	4	3	19.0%	15.0%	1.270	15.0%
23	14	5	2	35.7%	15.0%	2.381	15.0%
24	12	2	2	16.7%	15.0%	1.111	15.0%
25	9	0	1	0.0%	15.0%	0.000	15.0%
26	10	2	2	20.0%	15.0%	1.333	15.0%
27	8	1	1	12.5%	15.0%	0.833	15.0%
28	7	3	1	42.9%	15.0%	2.857	15.0%
29	3	0	0	0.0%	15.0%	0.000	15.0%
30	4	0	1	0.0%	15.0%	0.000	15.0%
31	4	1	1	25.0%	15.0%	1.667	15.0%
32	4	0	1	0.0%	15.0%	0.000	15.0%
33	3	0	0	0.0%	15.0%	0.000	15.0%
34+	11	4	8	36.4%	100.0%	0.364	100.0%
<b>Total</b>	<b>331</b>	<b>55</b>	<b>52</b>	<b>16.6%</b>	<b>16.6%</b>	<b>1.002</b>	<b>16.8%</b>

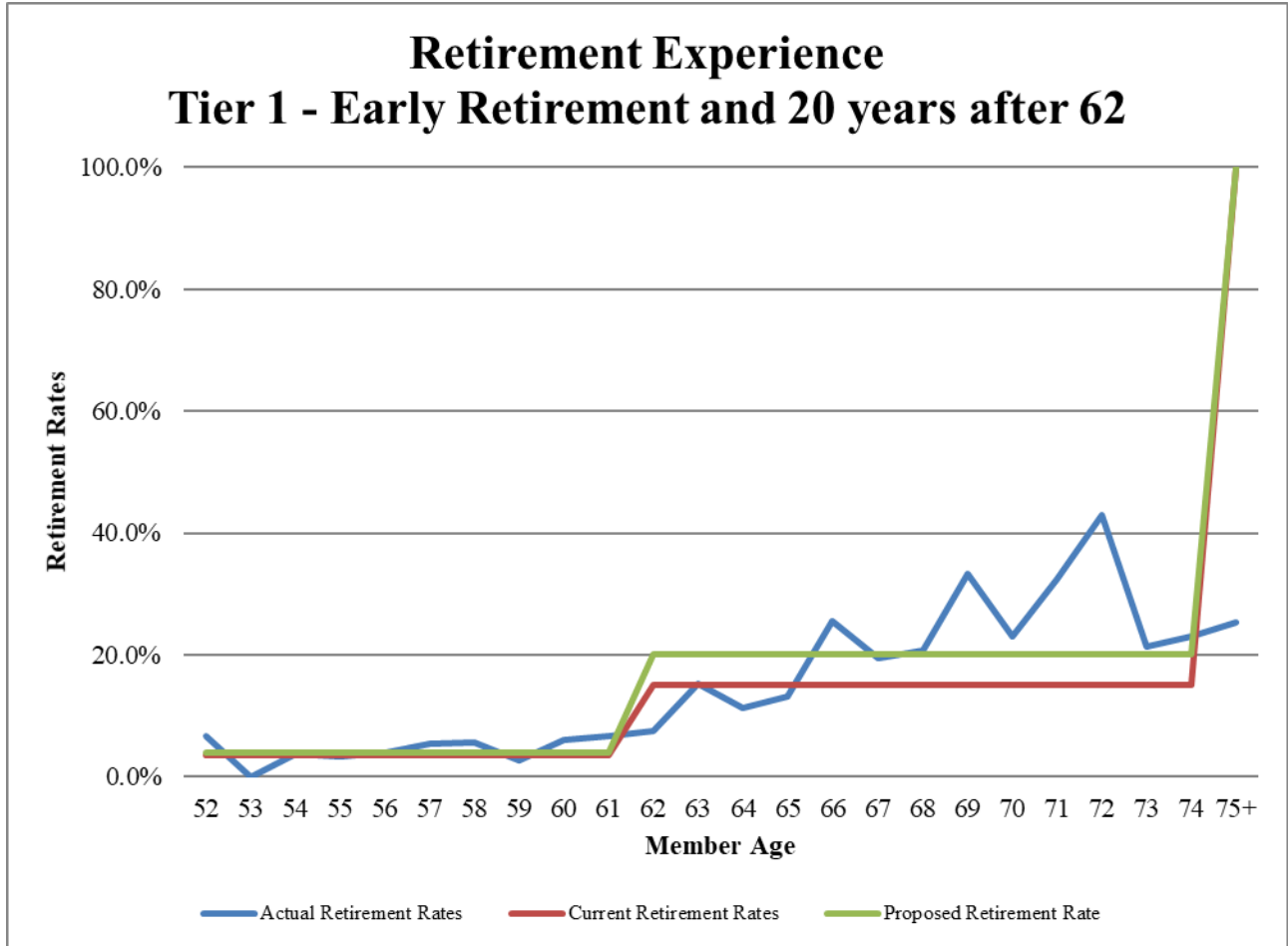


Arizona Elected Officials' Retirement Plan 2016-2021 Retirement Experience Tier 1 Early Retirement and Tier 1 with 20 Years of Service After Age 62 <sup>1</sup>							
Age	Eligible	Actual	Expected	Actual Retirement Rates	Expected Current Rates	Actual / Expected	Proposed Rates
52	399	27	14.0	6.8%	3.5%	1.933	4.0%
53	44	0	1.5	0.0%	3.5%	0.000	4.0%
54	54	2	1.9	3.7%	3.5%	1.058	4.0%
55	60	2	2.1	3.3%	3.5%	0.952	4.0%
56	76	3	2.7	3.9%	3.5%	1.128	4.0%
57	75	4	2.6	5.3%	3.5%	1.524	4.0%
58	71	4	2.5	5.6%	3.5%	1.610	4.0%
59	74	2	2.6	2.7%	3.5%	0.772	4.0%
60	83	5	2.9	6.0%	3.5%	1.721	4.0%
61	89	6	3.1	6.7%	3.5%	1.926	4.0%
62	93	7	6.8	7.5%	7.3%	1.026	20.0%
63	98	15	7.8	15.3%	8.0%	1.923	20.0%
64	88	10	7.0	11.4%	7.9%	1.431	20.0%
65	83	11	12.5	13.3%	15.0%	0.884	20.0%
66	82	21	12.3	25.6%	15.0%	1.707	20.0%
67	72	14	10.8	19.4%	15.0%	1.296	20.0%
68	58	12	8.7	20.7%	15.0%	1.379	20.0%
69	54	18	8.1	33.3%	15.0%	2.222	20.0%
70	39	9	5.9	23.1%	15.0%	1.538	20.0%
71	37	12	5.6	32.4%	15.0%	2.162	20.0%
72	28	12	4.2	42.9%	15.0%	2.857	20.0%
73	28	6	4.2	21.4%	15.0%	1.429	20.0%
74	26	6	3.9	23.1%	15.0%	1.538	20.0%
75+	99	25	99.0	25.3%	100.0%	0.253	100.0%
<b>Total</b>	<b>1,910</b>	<b>233</b>	<b>232.5</b>	<b>10.9%</b>	<b>7.0%</b>	<b>1.558</b>	<b>10.4%</b>

1

<sup>1</sup> Experience shown for ages 62 – 64 includes some blending of early and normal retirement eligible members.

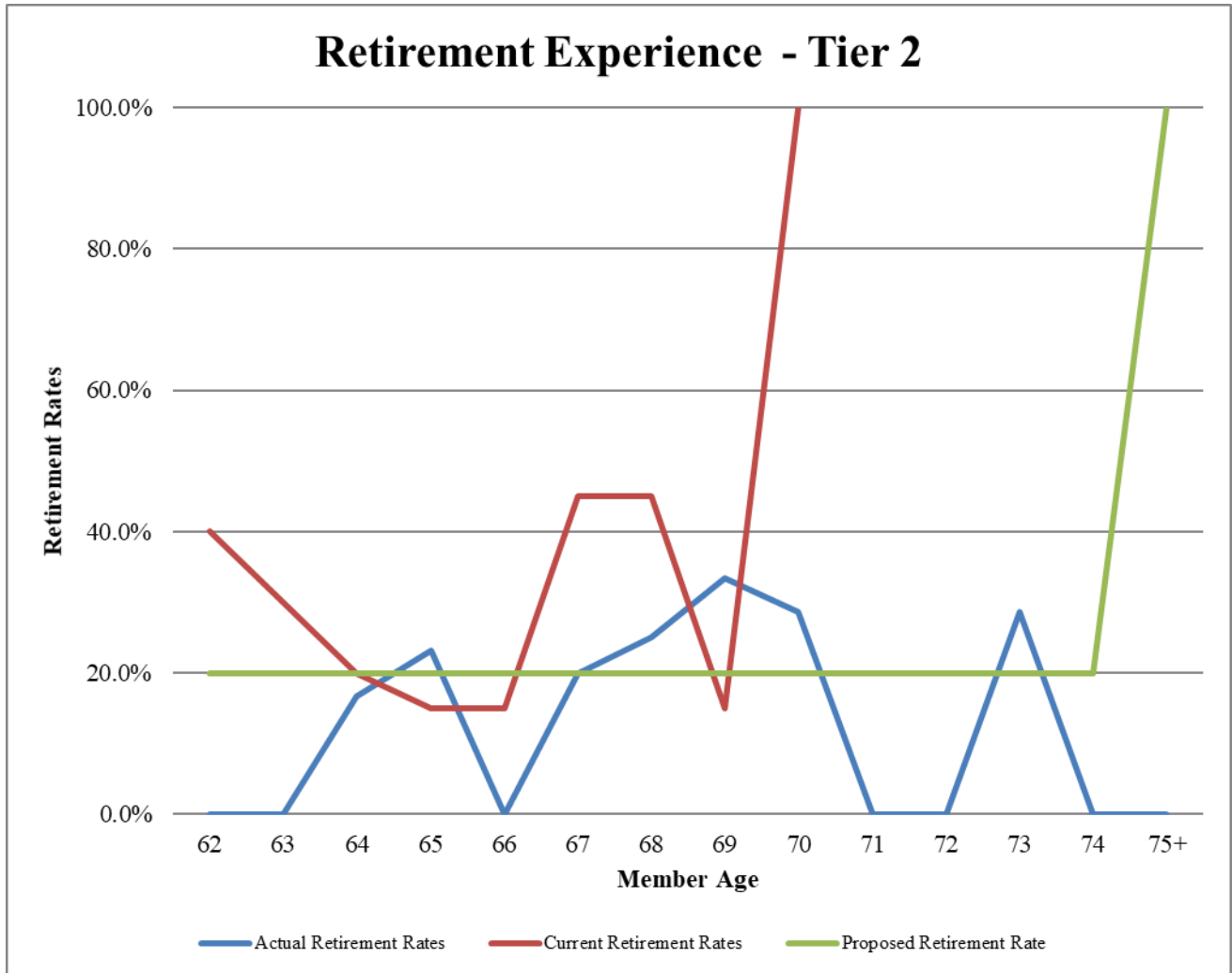






Arizona Elected Officials' Retirement Plan 2016-2021 Retirement Experience Tier 2							
Age	Eligible	Actual	Expected	Actual Retirement Rates	Expected Current Rates	Actual/Expected	Proposed Rates
62	0	0	0	0.0%	40%	0.000	20%
63	0	0	0.0	0.0%	30%	0.000	20%
64	12	2	2.4	16.7%	20%	0.833	20%
65	13	3	2.0	23.1%	15%	1.538	20%
66	9	0	1.4	0.0%	15%	0.000	20%
67	10	2	4.5	20.0%	45%	0.444	20%
68	8	2	3.6	25.0%	45%	0.556	20%
69	6	2	0.9	33.3%	15%	2.222	20%
70	7	2	7.0	28.6%	100%	0.286	20%
71	8	0	8.0	0.0%	100%	0.000	20%
72	8	0	8.0	0.0%	100%	0.000	20%
73	7	2	7.0	28.6%	100%	0.286	20%
74	2	0	2.0	0.0%	100%	0.000	20%
75+	6	0	6.0	0.0%	100%	0.000	100%
<b>Total</b>	<b>96</b>	<b>15</b>	<b>52.7</b>	<b>15.6%</b>	<b>54.9%</b>	<b>0.285</b>	<b>25.0%</b>





## TERMINATION RATES

The termination rate is the probability that a member will separate employment from a cause other than disability, death, or retirement.

Members who terminate before earning 5 years of service are eligible for a refund of member contributions. Members who terminate after earning 5 years are eligible to receive a deferred vested retirement benefit upon reaching the age-requirements for retirement.

### Current Assumption

The current termination assumptions are service-based tables with higher rates at lower service levels grading to lower rates at higher service levels.

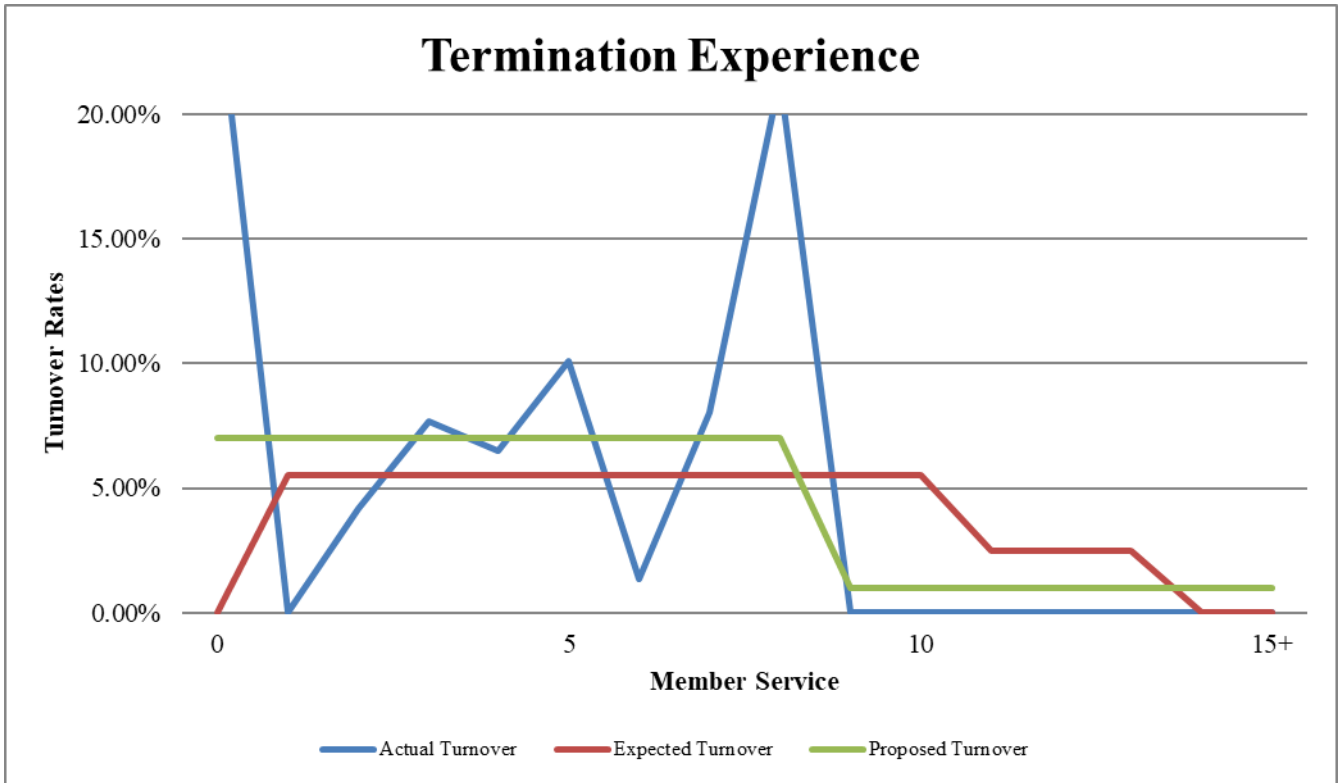
### Experience and Proposed Assumptions

All active members during the observation period were included in the exposures unless the member had met the retirement eligibility requirements. If a member was eligible for retirement at a given age, the member's exposure was excluded for that age. Note that given the long period in which the plan has been closed to new entrants, the termination assumption will become less important over time.

Actual termination experience was greater than expected, but mostly in the lower service rates that might no longer be applicable for this closed group. We propose adjusting the current rates to better reflect the actual experience.

The actual, expected, and proposed termination rates by service are provided on the following page. Following the table is a graph which provides visual representations of the actual and proposed withdrawal rates compared to the current assumptions.

Arizona Elected Officials' Retirement Plan							
2016 - 2021 Termination Experience							
EORP							
Service	Exposures	Actual Terminations	Expected Terminations	Actual Termination Rates	Expected Termination Rates	Actual / Expected	Proposed Termination Rates
0	4	1	0	25.00%	0.00%	0.000	7.00%
1	1	0	0	0.00%	5.50%	0.000	7.00%
2	24	1	1	4.17%	5.50%	0.758	7.00%
3	117	9	6	7.69%	5.50%	1.399	7.00%
4	108	7	6	6.48%	5.50%	1.178	7.00%
5	89	9	5	10.11%	5.50%	1.839	7.00%
6	74	1	4	1.35%	5.50%	0.246	7.00%
7	62	5	3	8.06%	5.50%	1.466	7.00%
8	14	3	1	21.43%	5.50%	3.896	7.00%
9	4	0	0	0.00%	5.50%	0.000	1.00%
10	2	0	0	0.00%	5.50%	0.000	1.00%
11	2	0	0	0.00%	2.50%	0.000	1.00%
12	1	0	0	0.00%	2.50%	0.000	1.00%
13	1	0	0	0.00%	2.50%	0.000	1.00%
14	0	0	0	0.00%	0.00%	0.000	1.00%
15+	0	0	0	0.00%	0.00%	0.000	1.00%
<b>Total</b>	<b>503</b>	<b>36</b>	<b>27</b>	<b>7.16%</b>	<b>5.43%</b>	<b>1.317</b>	<b>6.88%</b>



## **DISABILITY INCIDENCE RATES**

The disability incidence assumption is the probability that a member will become disabled while actively participating in the plan. A review of past experience compared to the current assumption will provide the basis for examining the assumption.

### Current Assumptions

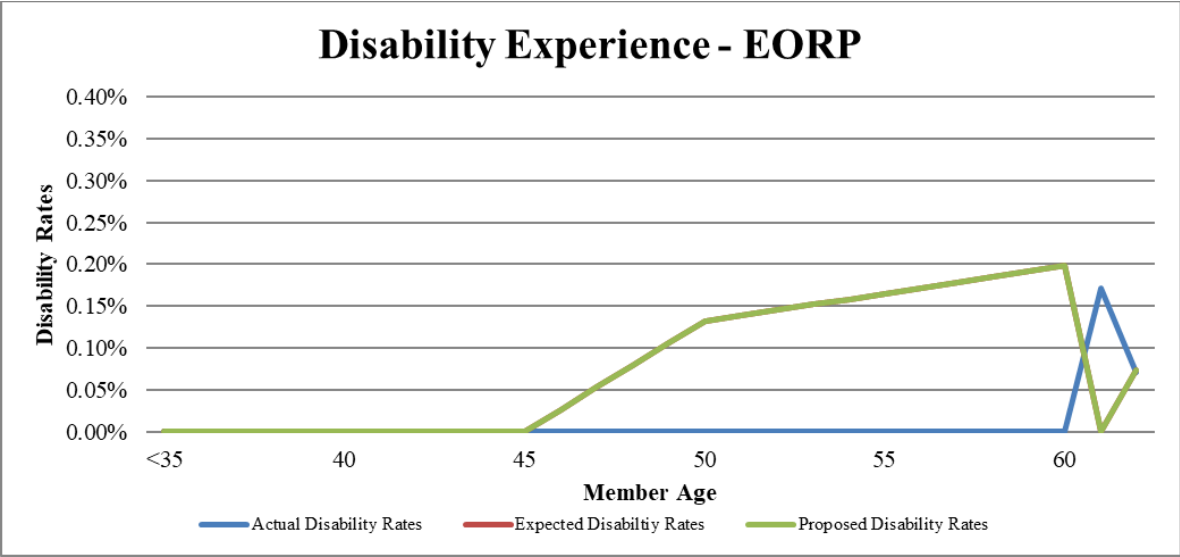
The current disability incidence assumption is a unisex age-related table with rates that increase with age.

### Experience and Proposed Assumptions

In total, disablement experience was in line with expectation. The disablements experienced occurred after normal retirement eligibility. We propose no change to the current rates.

The actual, expected, and proposed disability rates by age are provided on the following page. Following the table is a graph which provides visual representations of the actual and proposed withdrawal rates compared to the current assumptions.

Arizona Elected Officials' Retirement Plan							
2016 - 2021 Disability Experience							
EORP							
Age	Exposures	Actual Disabilities	Expected Disabilities Current Rates	Actual Disability Rates	Expected Disability Rates	Actual / Expected	Proposed Disability Rates
<35	38	0	0.0	0.000%	0.000%	0.000	0.000%
36	11	0	0.0	0.000%	0.000%	0.000	0.000%
37	14	0	0.0	0.000%	0.000%	0.000	0.000%
38	15	0	0.0	0.000%	0.000%	0.000	0.000%
39	16	0	0.0	0.000%	0.000%	0.000	0.000%
40	21	0	0.0	0.000%	0.000%	0.000	0.000%
41	25	0	0.0	0.000%	0.000%	0.000	0.000%
42	30	0	0.0	0.000%	0.000%	0.000	0.000%
43	31	0	0.0	0.000%	0.000%	0.000	0.000%
44	38	0	0.0	0.000%	0.000%	0.000	0.000%
45	44	0	0.0	0.000%	0.000%	0.000	0.000%
46	48	0	0.0	0.000%	0.026%	0.000	0.026%
47	60	0	0.0	0.000%	0.053%	0.000	0.053%
48	70	0	0.1	0.000%	0.079%	0.000	0.079%
49	71	0	0.1	0.000%	0.106%	0.000	0.106%
50	63	0	0.1	0.000%	0.132%	0.000	0.132%
51	75	0	0.1	0.000%	0.139%	0.000	0.139%
52	75	0	0.1	0.000%	0.145%	0.000	0.145%
53	88	0	0.1	0.000%	0.152%	0.000	0.152%
54	94	0	0.1	0.000%	0.158%	0.000	0.158%
55	119	0	0.2	0.000%	0.165%	0.000	0.165%
56	113	0	0.2	0.000%	0.172%	0.000	0.172%
57	120	0	0.2	0.000%	0.178%	0.000	0.178%
58	122	0	0.2	0.000%	0.185%	0.000	0.185%
59	134	0	0.3	0.000%	0.191%	0.000	0.191%
60	135	0	0.3	0.000%	0.198%	0.000	0.198%
61+	1,171	2	0.0	0.171%	0.000%	0.000	0.000%
<b>Total</b>	<b>2,841</b>	<b>2</b>	<b>2.1</b>	<b>0.070%</b>	<b>0.074%</b>	<b>0.949</b>	<b>0.074%</b>



## MORTALITY RATES

A plan's normal cost and actuarial accrued liabilities depend in part on how long retirees will live. If retirees live longer than anticipated by the assumptions, benefits will be paid longer than expected and experience losses will develop. If retirees do not live as long as anticipated by the assumptions, experience gains will develop. Mortality rates represent the probability of death at a given age. The choice of mortality rates impacts active member and retiree costs and liabilities and has the greatest impact on the liabilities for retirees.

The actuarial profession has increasingly become more focused on the issue of future mortality improvement. Mortality rates have declined over time as advances in medical care have evolved. The extent of future mortality improvement will impact the magnitude of pension costs and liabilities for future benefit commitments. ASOP No. 35 discusses the importance of actuaries considering mortality improvements when measuring pension obligations. Specifically, an actuary should make and disclose a specific recommendation with respect to future mortality improvement after the measurement date. Mortality improvement can be accounted for with static or generational mortality tables. A static table includes a projection of the base mortality rates to a specific date or equivalently for a specific number of years. The same mortality rates at any given age apply to everyone. A generational table anticipates future improvements in mortality by using a different static mortality table for each year of birth, with the tables for later years of birth assuming lower mortality than the tables of earlier years of birth.

Our analysis employs a credibility procedure which uses a statistical approach to combine actual mortality experience with standard mortality tables to improve the estimate of future mortality.

### Current Assumption

#### *Active Lives:*

PubG-2010 Employee mortality, projected with future mortality improvements reflected generationally using 75% of scale MP-2020.

#### *Inactive Lives*

PubS-2010 Healthy Retiree mortality, projected with future mortality improvements reflected generationally using 75% of scale MP-2020.

#### *Beneficiaries:*

PubS-2010 Survivor mortality, projected with future mortality improvements reflected generationally using 75% of scale MP-2020.

#### *Disabled Lives:*

PubS-2010 Disabled mortality, projected with future mortality improvements reflected generationally using 75% of scale MP-2020.

### Standard Mortality Tables

In 2019, the Society of Actuaries (SOA) released its report of a comprehensive study of public sector mortality experience. Included in this report are gender-specific mortality tables for general public sector employees, including separate tables for active members, retirees, disabled members and contingent survivor tables for beneficiaries. These tables are collectively named the Pub-2010 Mortality Tables. The plan reflected these tables beginning with the 2019 valuation.

In preparing this study, we compared the funds' actual plan experience to the current assumption.

Given the size of the plan, there is not enough credible experience to customize a mortality table for the membership. However, the SOA analysis did provide mortality table variations based on socioeconomic status. EORP members have above-average salaries and benefits. We would recommend that we continue to use the PubG-2010 mortality tables for EORP but move to the above-median rates.

*Future Mortality Improvement:*

Currently, the mortality tables reflect generational improvements using 75% of the most current improvement scale (MP-2020 for the June 30, 2021 valuation). This was appropriate at the time given the sharp increase in mortality improvement associated with the original MP table (MP-2014). Over time, the expected mortality improvement has been tapered through the annual updates of these scales. We still believe the ultimate approach to mortality improvement is too conservative, but it is less so than originally. As such, we recommend closing the gap between the scale we have been using and the full scale by increasing the load to 85%. This load will apply to the most current projection scale available (currently MP-2021). This scale would be updated with each valuation using the projection scale available as of July 1 of the valuation year.



## OTHER DEMOGRAPHIC ASSUMPTIONS

**Dependent/minor children:** The funds do provide temporary dependent/minor child benefits. However, because the benefits are immaterial, no assumptions are made with regard to dependent minor children.

**Spouse's age:** Male spouses are assumed to be 3 years older. Correspondingly, female spouses are assumed to be three years younger. Based on available spousal data for current retirees, male spouses are approximately 3.4 years older and female spouses are approximately 2.3 years younger. We recommend no change to this assumption based on this experience.

**Marital status:** The current valuation assumes that 80% of male active members are married and 70% of female active members are married. This statistic is used to determine the probability that spousal benefits will be payable in the event of an active member's death. Based on the spousal data for current retirees, 83% of male members are married and 64% of female retirees are married. We recommend no change to this assumption based on this experience.

**Health utilization percentage:** Currently 70% of active members are assumed to elect healthcare. Based on actual elections (64%), we recommend keeping this assumption.

## RECOMMENDED ASSUMPTIONS

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<u>Interest Rate</u>	To be determined.
<u>Salary Increases</u>	3.25%. This is an annual increase for individual member's salary.
<u>Inflation</u>	2.50%.
<u>Cost-of-Living Adjustment</u>	2.00%.
<u>Mortality Rate</u>	These rates are used to project future decrements from the population due to death.

***Active Lives:***

PubG-2010 (Above Median) Employee mortality, projected with future mortality improvements reflected generationally using 85% of the most recent projection scale (currently Scale MP-2021).

***Inactive Lives:***

PubG-2010 (Above Median) Healthy Retiree mortality, projected with future mortality improvements reflected generationally using 85% of the most recent projection scale (currently Scale MP-2021).

***Beneficiaries:***

PubG-2010 (Above Median) Survivor mortality, projected with future mortality improvements reflected generationally using 85% of the most recent projection scale (currently Scale MP-2021).

***Disabled Lives:***

PubNS-2010 Disabled mortality, projected with future mortality improvements reflected generationally using 85% of the most recent projection scale (currently Scale MP-2021).

The mortality assumptions sufficiently accommodate anticipated future mortality improvements.

Retirement / DROP Rates

These rates are used to project future decrements from the active population due to retirement.

***Tier 1 (reaching age 62 before attaining 20 years of service) & Tier 2:***

Service-related rates based on service at retirement: 40% per year with 20 years of service, 30% per year with 21 years of service, 15% per year with 22-34 years of service, and 100% assumed with 35+ years of service.

***Tier 1 - reaching age 62 after attaining 20 years of service:***

Age-related rates based on age at retirement: 20% per year from age 62 - 74 and 100% assumed at age 75.

***Tier 1 - eligible for early retirement:***

4.0% per year for each year of eligibility.

Termination Rate

These rates are used to project future decrements from the active population due to termination. Service-related rates based on service at termination: 7.0% per year for up to 8 years of service and 1.0% per year for 9+ years of service.

Disability Rate

These rates are used to project future decrements from the active population due to disability. Sample age-related rates based on age at disability are provided below.

<u>Age</u>	<u>Rate</u>
30	0.00%
35	0.00%
40	0.00%
45	0.00%
50	0.13%
55	0.17%

Marital Status

For active members, 80% of males and 70% of females are assumed to be married. Actual marital status is used, where applicable, for inactive members.

Spouse's Age

Male are assumed to be three years older than females.

Health Care Utilization

For active members, 70% of retirees are expected to utilize retiree health care. Actual utilization is used for inactive members.