

Austin Police Retirement System

Actuarial Experience Study

As of December 31, 2022





March 20, 2024

Board of Trustees
Austin Police Retirement System
252 South IH 35, Suite 100
Austin, TX 78704

Subject: Results of 2023 Actuarial Experience Study

Members of the Board:

We are pleased to present our report on the results of the 2023 Actuarial Experience Study for the Austin Police Retirement System (APRS). This report includes our recommendations for updated actuarial assumptions and methods to be effective for the December 31, 2023 actuarial valuation.

With the Board's approval of the recommendations in this report, we believe the actuarial condition of APRS will be more accurately portrayed. The Board's decisions should be based on the appropriateness of each recommendation, not on the collective effect on the contribution rate or the unfunded liability.

This study was conducted in accordance with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. The signing actuaries are independent of the plan sponsor. Paul Wood is an Associate of the Society of Actuaries, a Fellow of the Conference of Consulting Actuaries, and a Member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries. Finally, both of the undersigned are experienced in performing valuations for large public retirement systems. We wish to thank the APRS staff for their assistance in providing data for this study.

Respectfully submitted,

Gabriel, Roeder, Smith & Company

A handwritten signature in black ink that reads "Paul Wood". The signature is fluid and cursive, with the first name "Paul" being more prominent than the last name "Wood".

Paul Wood, ASA, FCA, MAAA
Senior Consultant & Actuary

A handwritten signature in black ink that reads "Lewis Ward". The signature is fluid and cursive, with the first name "Lewis" being more prominent than the last name "Ward".

Lewis Ward
Consultant

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SECTION A

EXECUTIVE SUMMARY

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 price inflation assumption of 2.50%.
2. We recommend no change to the investment return assumption of 7.25%. This assumption is comprised of 2.50% inflation and 4.75% real return and is stated net of investment-related expenses.
3. We recommend decreasing the wage inflation assumption from 3.0% to the price inflation assumption of 2.5%. In addition, we recommend updated service-based rates consistent with current step schedules (including the new 3% step at 23 years of service) plus an additional 0.5% at all steps to reflect promotional increases.
4. We recommend decreasing the payroll growth assumption from 3.00% to 2.50% to reflect the reduction in the wage inflation assumption. This is the rate amortization payments are anticipated to grow in the future.
5. We recommend increasing the explicit assumption for administrative expenses from 0.90% to 1.25% of payroll. This is an add on to the actuarially determined contribution rate (ADEC).

Mortality Assumptions

6. For the base mortality assumption, we recommend continued use of the healthy retiree mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report, for public safety personnel (PubS-2010). We recommend updating the rates of mortality improvement to the ultimate mortality improvement rates of the most recent MP tables (MP-2021).
7. Similarly, we recommend continued use of the mortality tables for disabled retirees and employees to the appropriate (disabled lives and employee) Pub-2010 mortality table for public safety personnel with an update to the assumption of future mortality improvements modeled using the ultimate mortality improvement rates of the most recent MP tables (MP-2021).

Other Demographic Assumptions

8. We recommend increases in the overall termination rates consistent with APRS member experience and future expectations.
9. We recommend increases in the overall retirement rates consistent with APRS member experience and future expectations. Retirement rates will reflect the member's expected departure from active service.



10. We recommend continued use of the DROP participation assumption that members only eligible for the 7-year Forward DROP are assumed not to participate in DROP.

Actuarial Methods and Policies

11. We recommend continued use of the current asset smoothing method that recognizes each year's gain or loss over a maximum closed five-year period. Current year's gains/(losses) are directly offset against prior years' gains/(losses) before amortization occurs.

SECTION B

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 Austin Police Retirement System (APRS). Use of outdated or inappropriate assumptions can result in: (1) understated costs which will lead to higher future contribution requirements or perhaps an inability to pay benefits when due; or, (2) 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. That asymmetric 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 a retirement plan 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 and compared to the actual experience of APRS and the general experience of other large public employee retirement systems. Changes in certain assumptions are suggested, based 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. Furthermore, the combined effect of the assumption set is expected to have no significant bias.

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

Summary of Process

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

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

APRS also has some plan specific assumptions:

- DROP participation
- PROP participation



For some of these assumptions, such as the mortality rates (when credibility is sufficient), past experience provides important evidence about the future. For others, such as the investment return assumption, the link between past experience and future expectation is much weaker. In either case, actuaries should review the retirement plan's assumptions periodically and determine whether these assumptions are consistent with actual past experience and with future expectation.

The most recent comprehensive assumption study was prepared 5 years ago. That study made significant changes to the investment return assumption and the mortality assumptions. For this experience study, we have reviewed APRS's experience for the five-year period from January 1, 2018 through December 31, 2022. While we are recommending some assumption changes as part of the analysis, the overall impact of the changes will be significantly less than in the prior study.

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

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 of "expected" decrements 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 hypothetical rate of retirement 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 new assumptions 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.

If the data leads the actuary to conclude that new tables are needed, the actuary may "graduate" or smooth the results, since the raw results can be quite uneven from age to age or from service to service.

Please bear in mind that, while the recommended assumption set represents our best estimate, there are other reasonable assumptions sets that could be supported. Some reasonable assumption sets would show higher or lower liabilities or costs.



Section E Exhibits

The exhibits in Section E should generally be self-explanatory. For example, on page E-1, we show an exhibit analyzing the termination rates by years of service. 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), labeled "Total Count" shows the total exposures of this group. This is the number of members who meet the criteria who could have terminated during any of the years. On 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 experience 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 (6) shows the new recommended termination rates. Column (8) shows the expected number of terminations based on the proposed termination assumptions. Column (10) shows the Actual-to-Expected ratios under the proposed termination assumptions.

Note that we have only shown the actual to expected analysis for the termination and retirement assumptions as well as the salary increase assumption. The other decrements do not have credible data and it would not provide useful information to show the same analysis for them.

SECTION C

ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

Analysis of Experience and Recommendations

We will begin by discussing the economic assumptions: inflation, the investment return rate, the general wage increase assumption, the salary increase assumption for individuals, cost-of-living increases if applicable, and the payroll growth rate used for projecting total contributions. Then we will discuss the demographic assumptions: mortality, disability, termination and retirement. Finally we will discuss the actuarial methods used.

Actuarial Standards of Practice for Setting 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 July 2020.

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:

1. appropriate for the purpose of the measurement,
2. reflects the actuary's professional judgment,
3. takes into account historical and current economic data that is relevant as of the measurement date,
4. an estimate of future experience; an observation of market data; or a combination thereof, and
5. 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.

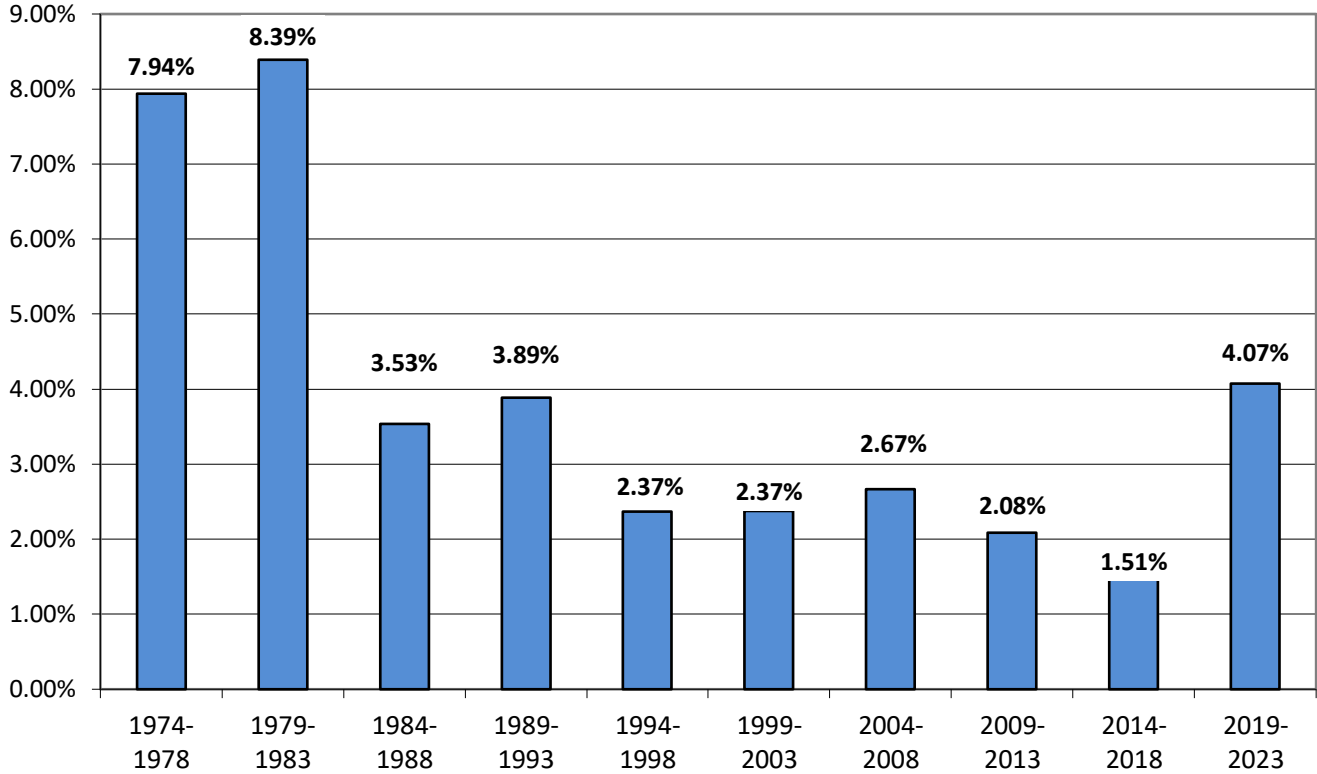
Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period. Generally, the economic assumptions are much more subjective in nature 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 can impact investment return, salary increases, and overall payroll growth. The current annual inflation assumption is 2.50%.

The chart on the following page 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.

Average Annual Inflation CPI-U, Five-Year Averages (December 31),



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 2023.

Periods Ending Dec. 2023	Average Annual Increase in CPI-U
Last five (5) years	4.07%
Last ten (10) years	2.79%
Last fifteen (15) years	2.55%
Last twenty (20) years	2.58%
Last twenty-five (25) years	2.54%
Last thirty (30) years	2.51%
Since 1913 (first available year)	3.16%

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

As we are all aware, there has been a recent spike in inflation. However, after significant inflation in 2021 and 2022, inflation in 2023 was below 3.50%. However, even with the recent spike in inflation we can see in the chart above that inflation for longer periods of time (15, 20, and 20 years) is relatively close to our



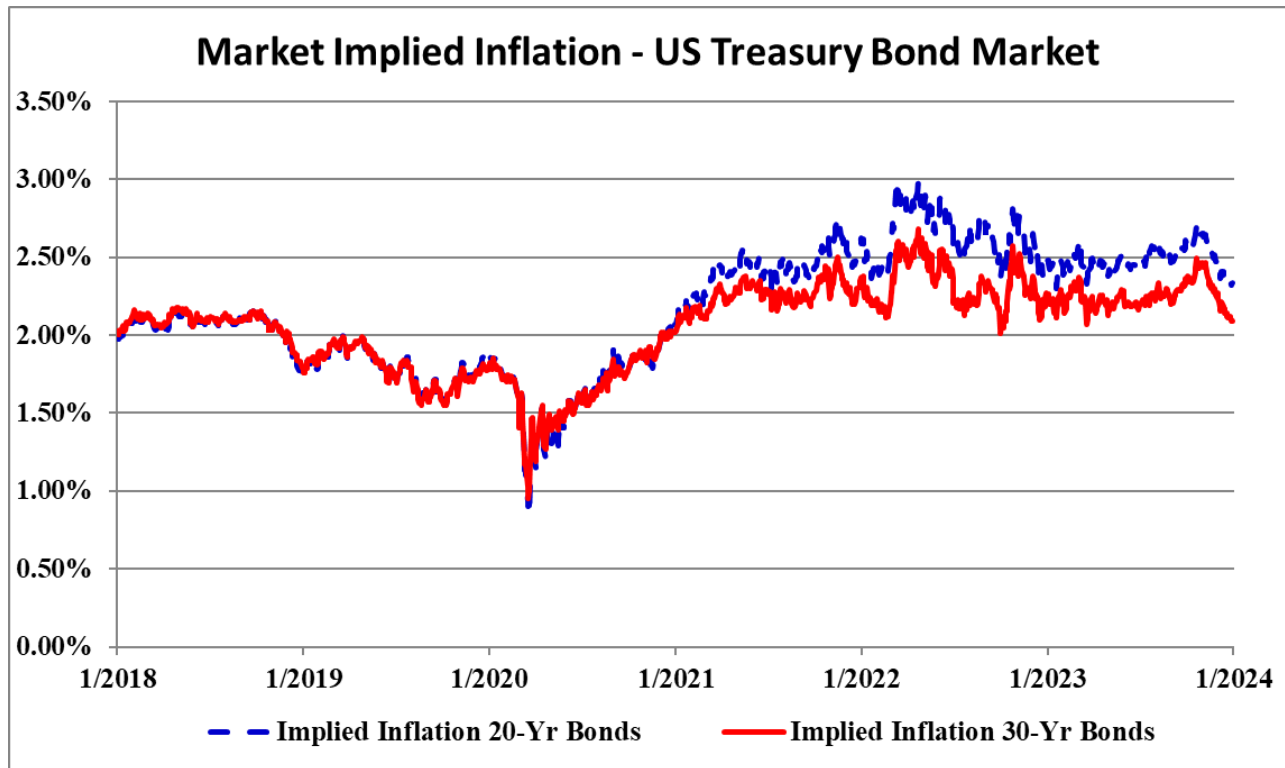
current assumption of 2.50%. In addition, most forward-looking indicators (see below) expect price inflation to be in line with our current assumption.

Forecasts from Investment Consulting Firms

We examined the 2023 capital market assumption sets for eleven investment consulting firms with short-term (approximately 10-year) forecasts and the average assumption for inflation was 2.52%, with a range of 2.26% to 2.90%. Similarly, we examined the 2023 capital market assumption sets for seven investment consulting firms with long-term (approximately 20-year) forecasts and the average assumption for inflation was very similar.

Expectations Implied in the Bond Market

Another source of information about future inflation is the market for US Treasury bonds. Simplistically, the difference in yield between non-indexed and indexed treasury bonds should be a reasonable estimate of what the bond market expects on a forward looking basis for inflation. As of the end of December 2023, the difference for 20-year bonds implies that inflation over the next twenty years would average 2.34%. The difference in yield for 30-year bonds implies 2.09% inflation over the next 30 years. The chart below shows the historical market implied inflation from January 1, 2017 through December 31, 2023.



However, this analysis is known to be imperfect as it ignores the inflation risk premium that buyers of US Treasury bonds often demand as well as possible differences in liquidity between US Treasury bonds and TIPS.

Forecasts from Social Security Administration

In the Social Security Administration’s 2023 Trustees Report, the Office of the Chief Actuary is projecting a long-term average annual inflation rate of 2.4% under the intermediate cost assumption. This remained unchanged from the prior three years (even with the recent increase in inflation).

Survey of Professional Forecasters and Fed Policy

The Philadelphia Federal Reserve conducts a quarterly survey of the Society of Professional Forecasters. A recent forecast (fourth quarter of 2023) was for inflation over the next ten years (2024 to 2033) to average 2.40%. Additionally, the Fed has openly stated that they have a target 2.00% inflation rate.

Recommendation

As a result, we are recommending no change to the current price inflation assumption of 2.50%.

Investment and Administrative Expenses

Since the trust fund pays expenses in addition to member benefits and refunds, we must develop an assumption about the level of future expenses. Almost all actuaries treat investment-related expenses as an offset to the investment return assumption (GRS included). That is, the investment return assumption represents the expected return after payment of investment-related expenses.

In regards to investment-related 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 an alternative asset class such as private equity and hedge funds are also net of investment expenses. Therefore, we did not make any explicit adjustments to account for investment-related expenses. Some retirement plans 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-related expenses, as passive management strategies.

On the other hand, there are a variety of acceptable approaches used to incorporate administrative expenses into the annual cost of a retirement plan. Some actuaries assume 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, normal cost, or payroll. And others treat administrative expenses like investment expenses, as an offset to the investment return assumption. For APRS, the current practice is to assume administrative expenses will be 0.90% of payroll and to add this to the ADEC.

The table below shows the dollar amount of the administrative expenses for the past five years, the administrative expenses as a as a percentage of the payroll for the year.

Year ending December 31st	2022	2021	2020	2019	2018
Prior year valuation payroll	157,820,000	164,961,691	168,732,391	166,564,996	162,490,560
Administrative Expenses (AE)	3,009,797	2,403,855	1,929,168	1,720,551	1,421,192
AE as percentage of payroll	1.91%	1.46%	1.14%	1.03%	0.87%



Over the past five-year period the administrative expenses have averaged 1.28% of payroll. However, the past two years have been significantly higher than that average. In looking at the expense analysis we see two separate trends. The first trend is a sharp increase in the amount of administrative expenses in dollars over the five-year period. However, we know the reason for a significant part of this increase. There was a substantial increase in expenses in 2020 and 2021 related to the passage of legislation in 2021 that impacted APRS. There is also a substantial expense in recent years due to the implementation of a new pension administration platform. Both of these events should be considered as one-time expenditures and not part of the long-term trend. The second trend is that payroll has not been increasing as expected. In fact, 2022 payroll was actually less than 2018 payroll. Since expenses would be expected to at least grow with the pace of inflation, payroll growing at less than inflation would lead to increases the expenses as a percentage of payroll. The reduction in payroll is due to a reduction in the number of active employees over the five-year period. While it is possible that there may be short-term continuation of this pattern, the nature of the workforce (public safety) and the growth of the area serviced by such workforce (Austin) make it untenable that this pattern could continue long-term. Therefore, we would expect payroll to once again begin growing once the workforce size stabilizes.

Given, these two occurrences we explored what the administrative expenses assumption would have been expected to be if administrative expenses had grown with just inflation, but reflecting the current payroll. Based on this assumption administrative expenses for 2022 would have expected to increase to approximately \$1.9 million. If we divide this by the 2022 payroll of \$157,820,000 we get 1.21% as a percentage of payroll.

It is our preferred approach (and the current approach) to add in an explicit assumption for administrative expenses into the Actuarially Determined Employer Contribution (ADEC) rate for the upcoming year. Including the administrative expenses as an explicit element of the ADEC maximizes transparency, aligns better with the standards of the Governmental Accounting Standards Board, and maintains a parallel between the actual investment returns used by the investment consultant and the actuary.

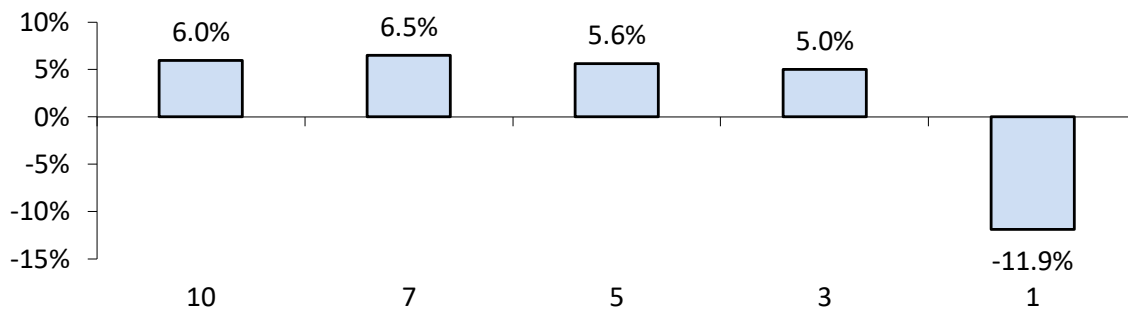
Our recommendation is to increase the explicit assumption for administrative expenses from 0.90% of payroll to 1.25% of payroll. This would then be added into the determination of the ADEC. Its important to note that if administrative expenses continue to be higher than assumed, the difference is recognized in the liability layer that is created each valuation. So, any shortfall will be paid for in future years.

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 7.25% per year, net of investment-related expenses.

The chart below shows the annualized history of APRS market returns for rolling periods ending December 31, 2022.



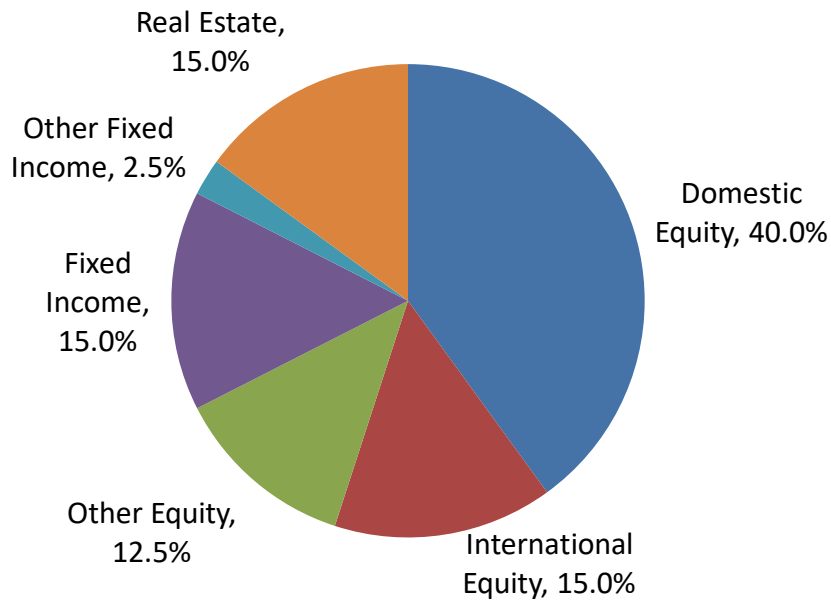


For this assumption, past performance, even averaged over a longer period, is not a reliable indicator of future performance. The current asset allocation of the trust fund will significantly impact the overall performance, so returns achieved under a different allocation are not as meaningful.

More importantly, the real rates of return for many asset classes, especially equities, vary so dramatically from year to year that even a longer period is not long enough to provide reasonable guidance.

Assumption Comparison to Peers

We do not recommend the selection of an investment return assumption based on comparison to other retirement systems. However, it is still informative to identify where the investment return assumption for APRS is compared to its peers. The chart below shows the distribution of the investment return assumptions in the National Association of State Retirement Administrators (NASRA) survey as of November 2022. It is important to note that variation among survey responses may result from differences in portfolio structures, investment policies, funding policies, and risk tolerance.



We have applied the APRS target asset allocation to the forward-looking return expectations developed by several investment consulting firms and industry surveys.

Most investment consultants provide return expectations with a 7 to 10 year time horizon, which we would describe as a “shorter time horizon” when discussing investing of pension plan assets. The first table below shows 11 sets of “shorter time horizon” expectations based on the APRS target asset allocation and our recommended 2.50% inflation assumption. As shown in the table, the average expected arithmetic return for the portfolio is 8.07%, with a range of outcomes from 7.00% to 8.96%.

However, the first table is showing a one-year expectation which ignores the impact of volatility. As a simple example of volatility, we can use a two-year period where in the first case the rate of return over each one-year period is 7.50%. Then the arithmetic return is 7.50% $[(7.50\% + 7.50\%)/2 = 7.50\%]$ as is the compound return $[(1.075 \times 1.075)^{(1/2)} - 1 = 7.50\%]$. In the second case we will subtract 7.50% from the first year and add 7.50% to the second year so that we still have a 7.50% arithmetic return $[(0.00\% + 15.00\%)/2 = 7.50\%]$. However, now the compound return changes to 7.24% $[(1.00 \times 1.15)^{(1/2)} - 1 = 7.24\%]$.

We know that the actual returns will not be smooth and will be volatile, which is why the geometric expectation is important. The 2nd table shows the expected geometric return over the next ten years based on the same expectations as the 1st table but now recognizing the volatility that can occur. As is shown on the table, we now see the average of the investment consultant’s expected return (50th percentile) over the 10-year period is 7.19%, with a range of outcomes from 6.16% to 8.10%.

We did receive return expectations based on a “longer time horizon” of 20-30 years from seven investment consultants. The average of the investment consultant’s expected returns (50th percentile) based on the longer investment horizon is 7.43%.

One-Year Expectation

GRS 2023 CMAM							
Capital Market Assumption Set (CMA)	CMA Expected Nominal Return	CMA Inflation Assumption	Expected Real Return (2)-(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	7.07%	2.50%	4.57%	2.50%	7.07%	7.07%	14.05%
2	7.40%	2.90%	4.50%	2.50%	7.00%	7.00%	13.05%
3	8.17%	2.90%	5.27%	2.50%	7.77%	7.77%	14.73%
4	8.08%	2.51%	5.57%	2.50%	8.07%	8.07%	14.62%
5	7.96%	2.50%	5.46%	2.50%	7.96%	7.96%	13.23%
6	8.01%	2.26%	5.75%	2.50%	8.25%	8.25%	14.35%
7	8.04%	2.31%	5.73%	2.50%	8.23%	8.23%	14.09%
8	8.10%	2.41%	5.69%	2.50%	8.19%	8.19%	13.39%
9	8.22%	2.28%	5.95%	2.50%	8.45%	8.45%	13.64%
10	9.00%	2.54%	6.46%	2.50%	8.96%	8.96%	14.69%
11	8.96%	2.62%	6.34%	2.50%	8.84%	8.84%	12.71%
Average	8.09%	2.52%	5.57%	2.50%	8.07%	8.07%	13.87%

Geometric Ten-Year Expectation

GRS 2023 CMAM				
Capital Market Assumption Set (CMA)	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of exceeding 7.25%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	5.06%	6.16%	7.28%	40.26%
2	5.19%	6.22%	7.26%	40.06%
3	5.62%	6.77%	7.94%	45.88%
4	5.94%	7.09%	8.25%	48.61%
5	6.12%	7.16%	8.21%	49.13%
6	6.18%	7.31%	8.45%	50.55%
7	6.21%	7.32%	8.44%	50.65%
8	6.32%	7.37%	8.44%	51.17%
9	6.53%	7.60%	8.69%	53.29%
10	6.83%	7.98%	9.15%	56.35%
11	7.10%	8.10%	9.12%	58.53%
Average	6.10%	7.19%	8.29%	49.50%



Recommendation

Based on this analysis, we recommend the Board maintain the current investment return assumption of 7.25%. This would be comprised of a 4.75% real return, net of investment-related expenses, and a 2.50% price inflation assumption.

Salary Increase Rates for Individuals

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;
- Overtime;
- Bonuses, if available; or
- Merit increases, if available.

Our salary increase assumption is meant to reflect all of these kinds of increases to the extent that they are included in the pay used to determine contributions and/or plan benefits.

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 year and for each member who is active in two consecutive fiscal years.

We looked at the salaries provided for all members who were active at the start and the end of an experience year, for the experience study period.

Most actuaries recommend salary increase assumptions that include an element that depends on the member's age or service, especially for large retirement systems. They assume larger pay increases for younger or shorter-service employees. This is done in order to reflect pay increases that accompany changes in job responsibility, promotions, demonstrated merit, steps, etc. As would be expected with the service based step-rate salary schedules, the experience shows salaries continue to be more closely correlated to service (rather than age). For APRS, the salary increase rates are currently a one-dimensional table based on APRS service.

The salary scale is composed of four pieces: price inflation, a general productivity component, a merit piece, and a service-based step-rate. Our recommended price inflation assumption is 2.50%, as discussed earlier.



The productivity component represents the real wage growth over time in the general economy. The merit component is any additional salary increase of the longer-service employees (which could come from individual merit and promotions). The service-based component is the expected salary increase of the shorter-service members that is above this level. All four pieces are assessed independently and then added together to develop the ultimate salary schedule.

Productivity and Merit

The productivity component represents the real wage growth over time in the general economy, or, is the assumption on how much the payroll schedules themselves will change year to year, not necessarily how much the pay increases received by individuals are, or even necessarily how the payroll in total may change, which can be impacted by population changes, etc. This assumption should be applicable to a local economy, not necessarily one group inside a retirement plan. Nominally, the sum of price inflation and general productivity would be considered a General Wage Inflation (GWI).

Historically, GWI has almost always exceeded price inflation. This is because wage inflation is in theory the result of (a) price inflation, and (b) productivity gains being passed through to wages. Since 1951, for the national economy as a whole, wage inflation has been about 1.00% larger than price inflation each year. The current real productivity growth assumption for APRS is 0.50% in addition to the current price inflation assumption of 2.50%, or a nominal 3.00% GWI assumption.

However, if we look at APRS history, the change in the salary schedule year to year over the past decade has trailed inflation. The table below shows the change in the salary schedule from year to year over the past decade.

<u>Percentage Increase in Salary Schedule from Prior Fiscal Year</u>									
<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>
1.50%	1.00%	1.00%	2.00%	0.00%	1.00%	2.00%	2.00%	2.00%	4.00%

The average annual increase over the 10-year period was 1.65%. Inflation over the 10-year period ending December 31, 2023 exceeded 4%.

When we examine the average year to year increases for police officers covered by APRS we do see increases beyond the base increases in the salary schedule shown above for most years of service. This is most likely attributable to promotions. On average these increases appear to be approximately 0.50% each year of service.

Based on this experience, we are recommending a nominal ultimate 3.00% salary scale, made up of the 2.50% price inflation component, and a 0.50% promotional component.

The next step is to add in the actual service-based step-rate increases. We are recommending using the step-rate increases from the recently adopted bargaining agreement. While the bargaining agreement is not a long-term agreement, the step-rates in recent expired agreement and the step-rates in the prior agreement were the same and therefore we believe the proposed step-rates are a reasonable estimation for future agreements. Page E-3 includes a detailed summary of the salary increase experience.

Finally, as you are aware, there is a significant pay bump when a cadet graduates the academy and becomes an officer. The step rates discussed above only apply to officers (and higher ranks). These increases go into



effect on the anniversary of an officer’s graduation from the academy. For valuation purposes, we will assume that all anniversaries occur in the middle of the year. Since the step rates do not apply to a cadet in their 1st year of employment, we need an assumption about the pay increase for members who are cadets on the valuation date. Therefore, we will assume that all employees who are cadets on the valuation date will receive the pay for an officer who graduated the academy in the year following the valuation date and that the step rates will apply beginning in the 2nd year after the valuation date.

Recommendation

In addition to the nominal 3.00% ultimate salary scale assumption noted above (2.50% inflation and 0.50% promotional), we recommend the use of the service-based step-rates from the last negotiated agreement. The full schedule is shown in Section D of this report.

Payroll Growth Rate

The salary increase rates discussed above are assumptions applied to individuals. They are used in projecting future benefits. There also may be an overall payroll growth assumption, currently 3.00%, in projecting aggregate payroll growth for a specific retirement system. In theory, payroll growth in the absence of membership growth should approximate the GWI assumption. However, adjustments may be made based on the demographics of the individual population.

The payroll growth rate is used in determining the contributions needed to amortize the unfunded actuarial accrued liability. The amortization payments are calculated to be a level percentage of payroll, so as payroll increases over time, these contributions as a dollar amount also increase. Thus, the amortization percentage is dependent on the rate at which payroll is assumed to increase.

Total payroll for APRS has grown on average 2.1% over the last 10 years, net of population growth(decrease), during a time when inflation was 2.6%. Thus, payroll has grown slower than inflation if population growth(decrease) is factored out.

Period	Total Payroll Growth	Membership Growth	Net Growth	Actual Inflation*
Last 10 Years	1.6%	-0.5%	2.1%	2.6%
Last 5 Years	2.0%	-2.6%	4.6%	3.8%

*Inflation for period ending December 31, 2022

While we do not expect that trend to continue long term it does give us pause when selecting this assumption. Therefore, we are recommending that APRS decrease the payroll growth assumption of 3.00% to 2.50%, which is the current price inflation assumption. This assumption does not include a provision for membership growth (or decline). It should be noted that the payroll growth rate is only used determining the amortization of the new liability layers and does not impact the payments on the Legacy Liability.

Actuarial Standards of Practice for Setting Demographic Assumptions

Actuaries are guided by the Actuarial Standards of Practice (ASOP) adopted by the Actuarial Standards Board (ASB). One of these standards is ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*. This standard provides guidance to actuaries giving advice



on selecting noneconomic assumptions for measuring obligations under defined benefit plans. We believe the recommended assumptions in this report were developed in compliance with this standard.

Post-Retirement Mortality Rates

APRS' actuarial liabilities and necessary contribution rates depend in large part on how long retirees live. If members live longer than expected, benefits will be paid for a longer period of time and the liability and necessary contribution rates will be larger than expected.

The mortality table currently being used for healthy retirees is based on the Pub-2010 Mortality Tables for public safety professionals with fully generational mortality improvement projection based on the ultimate mortality improvement rates in the 2018 MP tables.

Credibility

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

We first measured the credibility of the dataset to determine whether standard, unadjusted tables should be used or if statistical analysis of APRS specific data was warranted. Based on a practice note issued by the American Academy of Actuaries in the Fall of 2011, a dataset needs 96 expected deaths for each gender to be within +/- 20% of the actual pattern with 95% confidence. We believe +/- 20% is a rather large range to be considered fully credible. Other sources state higher requirements, such as 1,000 deaths per gender which is generally our rule-of-thumb.

The following table gives the number of deaths needed by gender to have a given level of confidence that the data is +/- X% of the actual pattern.

Number of Deaths Needed for a Given Confidence Level					
Confidence	99%-101%	97-103%	95%-105%	90%-110%	80%-120%
75%	4,543	505	182	45	11
80%	16,435	1,826	657	164	41
90%	27,060	3,007	1,082	271	68
95%	38,416	4,268	1,537	384	96
99%	66,358	7,373	2,654	664	166

Using this information, 1,082 deaths are needed by gender to have 90% confidence that the data is within +/- 5% of the actual pattern. For the period January 1, 2018 through December 31, 2022, APRS experienced 70 male and 13 female healthy retiree deaths. As a result, the mortality experience for APRS has no credibility for setting a plan-specific mortality assumption. Even though we will not base our assumption on plan experience it is worth noting that the current assumption anticipated approximately 73 deaths during



the period which is almost 12% less than the actual number of deaths. Industry best practice is to use a benefit weighted approach as analysis has shown that longevity is strongly correlated with income and a benefit-weighted approach is a much better predictor of how liabilities will run off over time. It is also a best practice to assume future mortality improvement. Our current assumption reflects both of these best practices as will the recommended assumption.

Current Base Mortality Assumption

In January, 2019, the Society of Actuaries (SOA) published a report titled Pub-2010 Public Retirement Plans Mortality Tables. With this report, the SOA published a new set of mortality tables for U.S. public pension plans, referred to as the Pub-2010 Mortality Tables, which marked the first time the SOA has studied public retirement plan mortality separately from the private sector. These new tables include the individual mortality experience for teachers, public safety professionals and general employees and were specifically constructed for public employee pension plans.

Although not fully credible, applying the Pub-2010 Mortality Tables for public safety professionals (with projected mortality improvement to 2020) produces a benefit-weighted A/E ratio of 1.16 for APRS over the experience period studied.

We recommend the continued use of the healthy retiree mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report for public safety personnel (PubS-2010) with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables (see discussion below).

Recommended Mortality Improvement Assumption

The current mortality assumption uses fully generational projected mortality improvement. Because of this strategy of building in continuous improvement, life expectancies for today's younger active members are expected to be materially longer than those of today's retirees. Further, this fully generational projection approach provides a gradual and consistent improvement over time which is incorporated into the valuation process.

In October 2014, RPEC issued final reports of the mortality study that was originally initiated in 2010. These final reports included the release of another mortality improvement assumption, Scale MP-2014. A significant difference between the MP-2014 improvement scales and the prior improvement scales is that the MP tables are a two-dimensional improvement assumption that is a function of the age and calendar year, whereas prior scales were only a function of age.

Each year from 2015 through 2018, the RPEC issued updates to the mortality improvement assumption called Scale MP-2015, Scale MP-2016, etc. MP-2015 reflected an additional two years of mortality experience, MP-2016 reflected an additional three years of mortality experience, and so on. In each update, rates of projection were decreased (materially decreased in certain years), meaning the original MP-2014 table was found to be too conservative. In addition, it has been stated that new projection scales are going to be published each year.

After approximately 10 years into the projection of the mortality rates, all five MP mortality projection tables reflect the same improvement rate at each future calendar year (the ultimate mortality improvement rates). In order to balance the two objectives of reflecting the most recent data available, while maintaining



stability of results from year to year, GRS recommended the use of the ultimate mortality improvement rates in the MP tables for all years.

However, when RPEC released the MP-2020 table they modified the ultimate mortality rates for the first time. When they issued MP-2021 they contained the same ultimate mortality rates as MP-2020. Then for the first time RPEC did not issue a new table for 2022 (nor did they issue a table for 2023). Therefore, while we are still recommending the use of the ultimate mortality rates in the MP tables we are recommending that we use the ultimate rates from the most recent table MP-2021.

Life Expectancy for an Age 65 Retiree in Years				
Gender	Year of Retirement			
	2022	2027	2032	2037
Males Current	21.59	22.00	22.40	22.80
Females Current	23.57	23.98	24.39	24.80
Males Proposed	21.38	21.75	22.11	22.47
Females Proposed	23.26	23.62	23.98	24.33

Disabled Mortality Rates

There are even fewer disabled retiree deaths than healthy retiree deaths. For the period January 1, 2018 through December 31, 2022, APRS experienced no disabled retiree deaths. As a result, the mortality experience for APRS has no credibility for setting a plan-specific mortality assumption.

The current assumption is the disability mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report for public safety officers (PubS-2010) with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables. We recommend continued use of the base table with the update to the mortality improvement rates as described for the healthy mortality assumption.

Active Mortality Rates

For the period January 1, 2018 through December 31, 2022, APRS experienced twelve total active member deaths. As a result, the mortality experience for APRS has no credibility for setting a plan-specific mortality assumption.

The current assumption is the employee mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report for public safety officers (PubS-2010) with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables. We recommend continued use of the base table with the update to the mortality improvement rates as described for the healthy mortality assumption.

Disability Rates

Disability incidence is a minor assumption with a relatively small impact on the actuarial valuation as the occurrence of disability is significantly less frequent than termination and retirement. Even though the



occurrence is somewhat infrequent, many times the value of the benefit for the disabled member can be significant. However, in the history of APRS there have been very few disabilities. There were a total of four disabilities during the study period. Without actual experience to evaluate the assumption, it is difficult to develop disability rates to accurately predict the experience.

The current rates are those used by the Texas Municipal Retirement System (TMRS) (whose data set is large enough to provide credible disability rates) at the beginning of the study period (2018). The total number of actual disabilities were very close to the expected number of disabilities. Therefore, we are recommending no change in the assumption.

With very little experience to suggest otherwise, we will continue to assume that 55% of disabilities are duty related.

Retirement Rates

The valuation currently uses two different sets of retirement rates. The first set is based on service and applies to members who first become eligible to retire at age 55 or earlier. The second set of rates is age based and applies to members who first became eligible to retire after age 55. For this experience study, retirement rates were studied based on the rate that members left active service, regardless of whether the member participated in DROP prior to retirement. This approach results in retirement rates that most accurately reflect the working career of the members.

As indicated by the following table, members who became eligible to retire prior to age 55 retired faster and earlier than predicted by the current assumptions. However, when looking at the assumption by years of service, almost all of the increase came in the first 2 years of retirement eligibility.

Period Studied	Expected Retirements	Actual Retirements	A/E Ratio
2018-2023	285	322	1.13
Years of Service 23-24	115	163	1.42
Years of Service 25+	170	159	1.07

As shown below, the assumption for members who become eligible to retire at age 55 and later showed a different pattern. The expected number of retirements was significantly higher than the actual number of retirements. However, this is somewhat distorted by the current assumption that 100% of members age 62 and older will retire. Therefore, if a member is age 62 and retires at age 65 then there will only be 1 actual retirement but 4 expected retirements because they are at a 100% expectation of retirement each year. If we examine the ages prior to age 62, we need to reduce the age 55 rate and increase the rates at the other ages to better match the experience.

Period Studied	Expected Retirements	Actual Retirements	A/E Ratio
2018-2023	72	44	0.61
Ages 55-61	35	31	0.89
Ages 62+	37	13	0.35

Therefore, we recommend increasing both sets of retirement rates (at most svc and ages) to produce a number of expected retirements considerably closer to the number of actual retirements during the period. In order to provide a reasonable margin for conservatism, we generally recommend retirement rates that would result in an A/E ratio of around 90%. However, we also want to provide some credibility to the current retirement rate assumption, which are based on past plan experience. Therefore, for the service-based rates we recommend moving the rates significantly but not all the way to where the experience might have indicated. The proposed rates produce an A/E ratio of 1.00. The proposed age-based rates for ages under age 62 produce an A/E ratio of 0.88.

Page E-2 includes a detailed summary of the retirement rate experience. The final schedules are shown in Section D of this report.

Termination Rates

Termination rates reflect members who leave for any reason other than death, disability or service retirement. They apply whether the termination is voluntary or involuntary, and whether the member takes a refund or keeps his/her account balance on deposit in APRS. The current termination rates are based on years of service. For this analysis, we used 10 years of historical data.

The current assumptions produce an A/E ratio of 144%. In other words, the number of actual terminations is 44% greater than the number of expected terminations.

In order to provide a reasonable margin for conservatism, we generally recommend termination rates that would result in an A/E ratio of 100% to 110%. Therefore, we are recommending increasing the rates of termination to bring the A/E ratio more in line with that level. Note this is after a significant increase in the termination rates in the prior study. However, it should be pointed out that the rates of termination by themselves are not large. So even small changes in the numerical value (for example increasing the 11th year of service rate by 0.25% produces a 33% increase in the rate, from 0.75% to 1.00%). Page E-1 includes a detailed summary of the termination rate experience. The final schedules are shown in Section D of this report.

DROP Participation

Active members who have completed 23 years of service may elect to participate in the Deferred Retirement Option Plan (DROP). Members electing DROP essentially receive a smaller monthly benefit and a lump sum at retirement in lieu of a larger monthly benefit (and no lump sum). There are a small handful of members who are eligible for the grandfathered DROP programs (either the Back DROP or the 5-year Forward DROP).

All members are eligible for the newer 7-year forward DROP. However, this DROP was designed to be cost neutral to APRS and is much less generous than the grandfathered DROP programs. Only 22 members entered the 7-year forward DROP during the study period. This compares to 117 members who retired at 23 years of service, which indicates a very low DROP participation rate.

We have also determined that in most cases the 7-year Forward DROP provides less value than the standard annuity. That is, a member would need to participate in all 7 years of DROP and have approximately 90+ years combined of age and service for the 7-year Forward DROP to provide more value and then the increase in value is only marginal.



Given the small number of members eligible for the grandfathered DROP programs, we are recommending the continued use of the greatest economic value approach. In other words, the decision on whether a member will participate in DROP and the length of time they participate will be based on which ever option provides them the greatest economic value (based on the actuarial assumptions). For members only eligible for the new 7-year Forward DROP, we recommend continuing the current assumption that no one will participate. Member participation in the 7-year Forward DROP should most often provide actuarial gains to APRS. We will continue to monitor future experience of the 7-year Forward DROP to make sure that this assumption is reasonable.

PROP Participation

The Post Retirement Option Program (PROP) allows retired members to roll their DROP account into a notional account maintained by APRS. Interest is credited on this account and the member is not taxed until they take distributions from the account. A retired member may also defer a portion of their monthly annuity into the PROP account, as well.

Currently we assume that a member exiting DROP will not transfer their money to the PROP account. We also assume that no current retirees will defer a portion of their monthly annuity into PROP (even if they are currently doing so). Both of these assumptions are conservative as explained below.

A member who has money in the PROP account can expect to receive an interest credit based on the lesser of the average of the 10-year treasury for the 12-month period ending in October of the prior year or the assumed rate of return less 3%. This means the maximum interest credit a member can receive on their PROP account is 4.25%. Since APRS is assumed to earn 7.25% on the money being held in the PROP accounts, APRS would expect over the long term to earn at least 3% more than the amount credited to the account. Any year the System earns more than the credited return the System will incur a net gain on the monies in the PROP accounts. Of course, it is possible that the System could lose money and still credit interest to the PROP accounts. This is one of the reasons the interest credit rate is purposely set lower than the assumed rate of return.

229 retirees received an interest credit on their PROP accounts in 2022. Of these 229 retirees, 215 of them still had at least some funds in their PROP account at the end of 2022. Approximately, 40% of these retirees are deferring a portion of their annuity into their PROP account. Currently, we assume that a retiree with monies in a PROP account will not withdraw those funds until they are age 60. If they are age 60 or older we assume they will take their PROP accounts on the first day of the plan year. The average length of time since retirement for the current PROP participants is 8.5 years. The average age at which members are retiring is age 52. Therefore, we believe assuming retiring members will leave their monies in PROP until age 60 continues to be a reasonable, if conservative, assumption. While more than 50% of members who participate in DROP roll at least some portion of their DROP account into a PROP account, we continue to recommend that no assumption about future PROP additions be made, and that only PROP accounts as of the valuation date be valued as described above. This is a conservative assumption.

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 husbands and wives, the likelihood that a terminating employee



will take a refund, etc. We have recommended what we believe to be the most reasonable assumption and have noted if these are a new recommendation or a continuation of the current assumption.

Withdrawal of Employee Contributions

Members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination: withdrawal of contributions or deferred annuity. Non-vested members are assumed to receive an immediate refund of their contributions. We recommend continuing these assumptions.

In Line of Duty Disability

55% of disablements are assumed to be line of Duty. Given the lack of experience, we believe this is a reasonable assumption and we recommend maintaining this assumption.

Marital Assumptions

The current assumed age difference between spouses is that the male spouse will be 3 years older than their spouse. This is based on national statistics. However, as part of the valuation we examined the retiree data for members who have elected a Joint and Survivor option at retirement. The average age difference between the male retiree and their joint annuitant was indeed the same 3 years. Since more than 90% of the retiree with joint options are male we recommend continuing this assumption. We recommend maintaining the current assumption for age differences.

We currently assume 85% of members are married. This assumption is only used in the valuing of the active member death benefit. Approximately 386 retirees as of December 31, 2022 retired during the study period (this includes deferred vested members who commenced their annuities). Of these 259 elected a joint option form of payment which implies that approximately 67% projected a beneficiary with an optional form of payment. Now it is certainly possible that some married members elected a life only form of payment or a 15 years certain and life form of payment. However, we think the likelihood that 20% of the retirees would do this is remote. Therefore, we are recommending decreasing our marriage assumption to 75%.

Decrement Timing

Currently all decrements – mortality, service retirement, disability, and termination of employment for reasons other than death disability or retirement – are assumed to occur at the middle of the valuation year. While there can be plan design features that result in retirement (and sometimes) termination occurring during specific times of the year, it does not appear to be the case with APRS. While December and January are the most common months of retirement the average calendar month of retirement occurs in July. Furthermore, disability and death are almost always random in nature which is best represented by middle of the year decrement timing. Therefore, we continue to recommend the decrement timing to middle of the year.

Actuarial Methods

Actuarial Cost Method

We recommend continuing the use of the Individual Entry Age Normal (IEAN) actuarial cost method. IEAN will generally produce level contribution amounts for each member as a percentage of salary from year to year and allocate costs among various generations of taxpayers in a reasonable manner. It is by far the



most commonly used actuarial cost method for large public retirement systems and the method used for accounting disclosures under GASB Statement No. 67.

Asset Valuation (Smoothing) Method

The purpose of asset smoothing is to reduce short-term volatility in actuarial valuation results which are intended for long-term decision making and funding. Periods of poor returns are often followed by some amount of recovery or vice versa, and a market value (unsmoothed) approach, may result in overreaction to short-term market volatility.

Currently, 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 on the market value of assets. We continue to believe this method is appropriate. It does not distinguish between types of return (interest, dividends, realized gains/losses, and unrealized gains/losses) like some other methods. It treats different asset classes and different investment styles the same. We do not believe the method has a bias relative to market. In other words, we expect the ratio of the AVA to MVA to average about 100% over the long term. We believe this method does a good job of smoothing asset gains and losses, and reduces fluctuations in the actuarial metrics.

The current method has one enhancement over other similar commonly used methods. Specifically, if an offsetting gain or loss occurs in a future valuation, the proposed method would accelerate the recognition of offsetting gains or losses so that all offsetting gains and losses are immediately recognized. This method has the benefit of ensuring that any individual gain or loss is recognized in a reasonable timeframe, while eliminating the artificial volatility that is introduced from the more traditional asset smoothing methods.

Let's look at the following illustration where bases are not offset against each other.

Year	Deferred Gain or (Loss)
Valuation - 4	(\$90,000,000)
Valuation - 3	\$20,000,000
Valuation - 2	\$30,000,000
Valuation - 1	\$40,000,000

Based on this scenario the market value of assets and the actuarial value asset are equal because the total deferred Gain/(Loss) is \$0. Now suppose in the current year the System earns the assumed rate of return on the market value of assets so the new gain/(loss) is \$0. Then the deferred gains and losses for this year's valuation would like this.

Year	Deferred Gain or (Loss)
Valuation - 4	\$10,000,000
Valuation - 3	\$20,000,000
Valuation - 2	\$30,000,000
Valuation - 1	\$0

The total deferred gain/(loss) would now be a deferred gain of \$60 million. This means the actuarial value of assets would be \$60 million lower than the market value of assets even though they were exactly the

same at the beginning of the year and the System earned the assumed rate of return on the market value of assets. The asset method is causing volatility in the actuarial value of assets.

In the method we currently use (and continue to recommend) all of the bases would have been offset against each other and there would be no deferred gains or losses since the bases net to \$0. The next year's market value and actuarial value of assets would still be equal after earning the assumed rate of return on the market value of assets.

SECTION D

SUMMARY OF ACTUARIAL ASSUMPTIONS AND METHODS

Summary of Actuarial Assumptions and Methods Incorporating the Recommended Assumptions

I. Valuation Date

The valuation date is December 31 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 actuarial valuation is used to determine the adequacy of the current City contribution rate, describe the current financial condition of APRS, analyze changes in the condition of APRS, and provide various summaries of the data.

The actuarial valuation uses the Individual Entry Age Normal (IEAN) actuarial cost method. Under this method, the first step is to determine the contribution rate (level as a percentage of pay) required to provide the benefits to each member, or the normal cost rate. The normal cost rate consists of two pieces: (i) the member's contribution rate, and (ii) the remaining portion of the normal cost rate which is the employer's normal cost rate. The total normal cost rate is based on the benefits payable to each individual active member.

The Unfunded Actuarial Accrued Liability (UAAL) is the liability for future benefits which is in excess of (i) the actuarial value of assets, and (ii) the present value of future normal costs. The employer contribution provided in excess of the employer normal cost is applied to amortize the UAAL.

The funding period is calculated as the number of years required to fully amortize the UAAL, and is calculated assuming: (a) future earnings on actuarial value of assets, net of investment-related expenses, will equal 7.25% per year, (b) there will be no changes in assumptions, (c) the number of active members will remain unchanged, (d) payroll for covered employees will grow at 3.00% each year, and (e) City contributions will remain the same percentage of payroll as described in Section D of the valuation report.

The Individual Entry Age actuarial cost method is an "immediate gain" method (i.e., experience gains and losses are separately identified as part of the UAAL). However, they are amortized over the same period applied to all other components of the UAAL.

III. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment returns in excess of (less than) expected investment income. Offsetting unrecognized gains and losses are immediately recognized, with the shortest remaining bases recognized first and the net remaining bases continuing to be recognized on their original timeframe. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year).

IV. Actuarial Assumptions

Investment Return: 7.25% per year, net of investment-related expenses (composed of an assumed 2.50% inflation rate and a 4.75% real rate of return)

Mortality Decrements:

Pre-retirement

PubS-2010 Employee Mortality Table for males and females. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates in the MP-2021 tables.

Healthy Annuitants

PubS-2010 Healthy Retiree Mortality Table for males and females. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates in the MP-2021 tables.

Disabled Annuitants

PubS-2010 Disability Mortality Table for males and females. Generational mortality improvements projected from the year 2010 using the ultimate mortality improvement rates in the MP-2021 tables.

Service Retirement Decrements:

Members Who Have 23 Years of Service on or before Age 55

The following rates reflect the members expected departure from active service and are applied based on years of service:

Years of Service	Probability of Retirement
23	40%
24	20
25	20
26	20
27	20
28	20
29	30
30+	30

100% probability of retirement at age 62.

Members Who Do Not Have 23 Years of Service by Age 55

The following rates reflect the members expected departure from active service and are applied based on the member's age:

Age	Probability of Retirement
55	30%
56	30
57	30
58	30
59	30
60	30
61	30
62+	100

Deferred Retirement Option Program (DROP)

Members eligible for either the Back DROP or 5-year Forward DROP (or both) are assumed to select the most valuable option based on their individual situation at each possible retirement age. Members eligible for only the 7-year Forward DROP are assumed to not participate in DROP.

Post-Retirement Option Plan (PROP) Investment Accounts

75% of members with a PROP account at the valuation date will elect to leave their lump sum in APRS until age 60 and 25% of members will elect to receive their PROP balance at the valuation date. No future PROP deferrals are assumed and current active members are not assumed to enter PROP. Average annual rate credited to the PROP accounts is the average yield of the 10-year treasuries for the 12-month period ending October 31st of the prior calendar year. For valuation purposes we will assume the rate that applies to the calendar



year following the valuation date will apply to all future years.

Withdrawal of Employee Contributions

Members that terminate with a vested benefit are assumed to choose the most valuable option available to them at the time of termination: withdrawal of contributions or deferred annuity. Non-vested members are assumed to receive an immediate refund of accumulated contributions.

Members who elect to defer their annuity are assumed to retire on the date they are first eligible.

Disability Retirement Decrements:

Disability Rates

Rates for males and females at selected ages are shown below:

Age	Rate
20	0.0004%
25	0.0025
30	0.0099
35	0.0259
40	0.0494
45	0.0804
50	0.1188
55	0.1647
60	0.2180

Disability rates are set to zero when members become eligible for retirement

In Line of Duty Disability

55% of disability retirements assumed to be in the line of duty.

Termination Decrements for Reasons Other Than Death or Retirement:

Withdrawal Rates

The following service-based rates apply:

Years of Service	Probability of Termination
0	13.00%
1	6.00
2-5	3.50
6-9	2.00
10-22	1.00
23+	0.00

Termination rates are set to zero when members become eligible for retirement



Salary Increases: Increases are assumed to vary based on years since academy graduation. Salary increases include an underlying price inflation component of 2.50% and a 0.5% promotional increase is included in all steps. The table below shows the total percentage increase for the year the indicated anniversary of the officer’s academy graduation occurs.

Anniversary of Academy Graduation	Percentage Increase
1	15.20%
2	13.40
3	3.00
4	3.00
5	3.00
6	10.00
7	3.00
8	3.00
9	3.00
10	10.00
11	3.00
12	3.00
13	3.00
14	10.00
15	3.00
16	10.00
17-22	3.00
23	6.00
24+	3.00

If a member is a cadet on the valuation date their pay for the following year is assume to be the starting pay of a graduated officer. The 1st increase in the able above would apply to the following year.

Cost-of-Living Adjustments (COLA): Cost of living adjustments are granted on an ad hoc basis. No future COLAs are assumed.

Administrative Expenses: 1.25% of payroll. Included in this assumption would be any administrative expenses associated with the proportionate retirement program, which is currently assumed to be 0.017% of payroll.

Payroll Growth: Member Payroll is assumed to grow at 2.50% per year.

Marital Assumptions: 75% of active members are assumed to be married. Male spouses are assumed to be three years older than female spouses.



Decrement Timing: All decrements – mortality, service retirement, disability retirement, and termination of employment for reasons other than death or retirement – are assumed to occur at the middle of the valuation year.

Census Data and Assets

- The valuation was based on members of APRS as of December 31, 2022 and does not take into account future members.
- All census data was supplied by APRS and was subject to reasonable consistency checks.
- There were data elements that were modified for some members as part of the valuation in order to make the data complete. However, the number of missing data items was immaterial.
- Asset data was supplied by APRS.

Other Actuarial Valuation Procedures

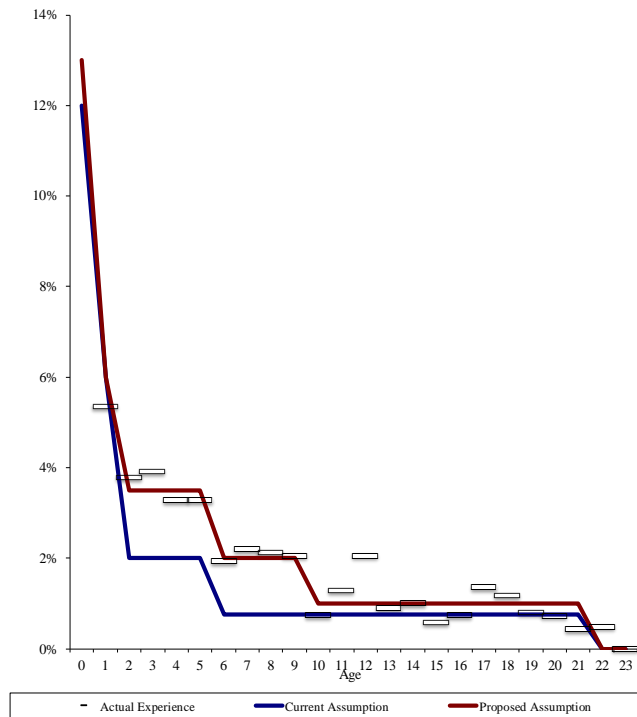
- No provision was made in this actuarial valuation for the limitations of Internal Revenue Code Sections 415 or 401(a)17.
- Annualized Payroll on Valuation Date is the annualized payroll of active members on the valuation date. Projected Contributory Payroll for the upcoming fiscal year (used in determining the amortization period) is the estimated pensionable earnings received by all plan members for the just completed calendar year (including earnings for members who are no longer active employees on the valuation date) increased by the assumed payroll growth rate.

SECTION E

SUMMARY OF DATA AND EXPERIENCE

**Austin Police Retirement System
Termination Experience**

Service	Actual Terminations	Total Exposures	Actual Rate	Assumed Rate		Expected Terminations		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	93	656	0.1418	0.1200	0.1300	78.7	85.3	118%	109%
1	43	804	0.0535	0.0600	0.0600	48.2	48.2	89%	89%
2	29	768	0.0378	0.0200	0.0350	15.4	26.9	189%	108%
3	31	793	0.0391	0.0200	0.0350	15.9	27.8	195%	112%
4	26	793	0.0328	0.0200	0.0350	15.9	27.8	164%	94%
5	27	824	0.0328	0.0200	0.0350	16.5	28.8	164%	94%
6	15	778	0.0193	0.0075	0.0200	5.8	15.6	257%	96%
7	16	728	0.0220	0.0075	0.0200	5.5	14.6	293%	110%
8	15	706	0.0212	0.0075	0.0200	5.3	14.1	283%	106%
9	14	685	0.0204	0.0075	0.0200	5.1	13.7	273%	102%
10	5	686	0.0073	0.0075	0.0100	5.1	6.9	97%	73%
11	9	705	0.0128	0.0075	0.0100	5.3	7.1	170%	128%
12	15	732	0.0205	0.0075	0.0100	5.5	7.3	273%	205%
13	6	684	0.0088	0.0075	0.0100	5.1	6.8	117%	88%
14	7	701	0.0100	0.0075	0.0100	5.3	7.0	133%	100%
15	4	709	0.0056	0.0075	0.0100	5.3	7.1	75%	56%
16	5	685	0.0073	0.0075	0.0100	5.1	6.9	97%	73%
17	9	664	0.0136	0.0075	0.0100	5.0	6.6	181%	136%
18	8	688	0.0116	0.0075	0.0100	5.2	6.9	155%	116%
19	5	633	0.0079	0.0075	0.0100	4.7	6.3	105%	79%
20	4	559	0.0072	0.0075	0.0100	4.2	5.6	95%	72%
21	2	469	0.0043	0.0075	0.0100	3.5	4.7	57%	43%
22	1	212	0.0047	0.0075	0.0100	1.6	2.1	63%	47%
23	3	0	N/A	0.0000	0.0000	0.0	0.0	N/A	N/A
Totals	392	15662	0.0250	0.0174	0.0245	273.2	384.0	143%	102%



Austin Police Retirement System
Retirement Experience for Employees with 23 or More Years of Service Prior to Age 55

Service	Actual Retirements	Total Exposures	Actual Rate	Assumed Rate		Expected Retirements		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
23	116	292	0.3973	0.2800	0.4000	81.8	116.8	142%	99%
24	42	183	0.2295	0.1800	0.2000	32.9	36.6	128%	110%
25	26	145	0.1793	0.1800	0.2000	26.1	29.0	100%	115%
26	28	134	0.2090	0.1800	0.2000	24.1	26.8	116%	81%
27	17	112	0.1518	0.2500	0.2000	28.0	22.4	61%	101%
28	22	98	0.2245	0.2500	0.2000	24.5	19.6	90%	95%
29	23	73	0.3151	0.2500	0.3000	18.3	21.9	126%	99%
30+	47	166	0.2831	0.3000	0.3000	49.8	49.8	94%	0%
Totals	321	1,203	0.2668	0.2373	0.2684	285.5	322.9	112%	99%

Austin Police Retirement System
Retirement Experience for Employees with Fewer than 23 of Service at Age 55

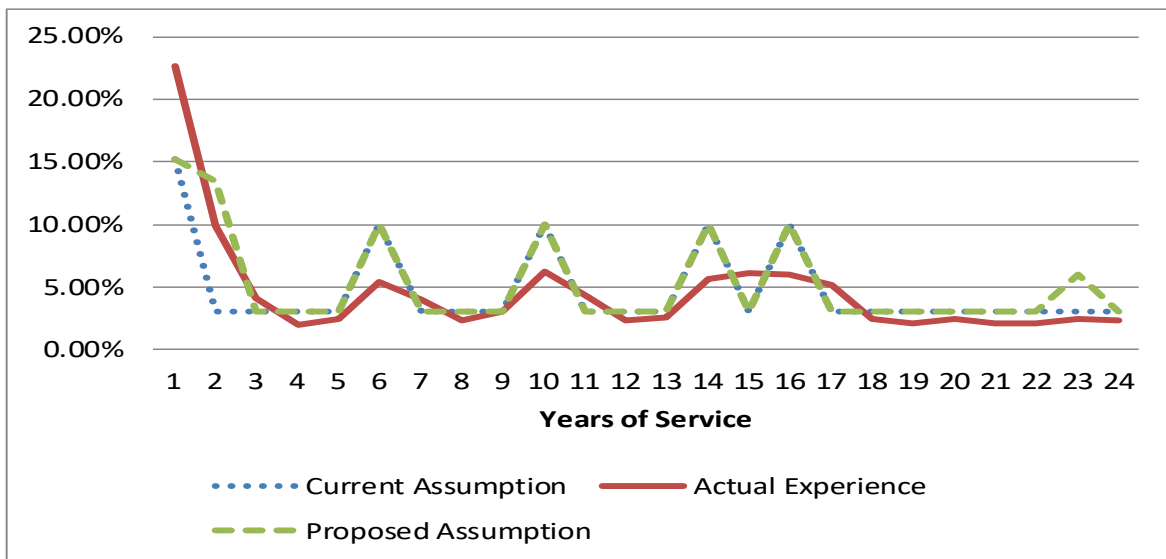
Age	Actual Retirements	Total Exposures	Actual Rate	Assumed Rate		Expected Retirements		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
55	4	23	0.1739	0.5000	0.3000	11.5	6.9	35%	58%
56	10	24	0.4167	0.2500	0.3000	6.0	7.2	167%	139%
57	3	16	0.1875	0.2500	0.3000	4.0	4.8	75%	63%
58	4	13	0.3077	0.2500	0.3000	3.3	3.9	123%	103%
59	6	13	0.4615	0.2500	0.3000	3.3	3.9	185%	154%
60	1	14	0.0714	0.2500	0.3000	3.5	4.2	29%	24%
61	3	14	0.2143	0.2500	0.3000	3.5	4.2	86%	71%
62+	13	37	0.3514	1.0000	1.0000	37.0	37.0	35%	35%
Totals	44	154	0.2857	0.4675	0.4682	72.0	72.1	61%	61%



**Austin Police Retirement System
Salary Experience**

Current Salary Scale			Actual Experience (5 Years)			Proposed Salary Scale	
Service	Total	Step Rate/ Promotional	Total	Above Inflation	Step Rate/ Promotional	Total	Step Rate/ Promotional
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	15.20%	12.20%	22.59%	18.34%	21.12%	15.20%	12.70%
2	3.00%	0.00%	9.89%	5.64%	8.42%	13.40%	10.90%
3	3.00%	0.00%	4.17%	-0.09%	2.70%	3.00%	0.50%
4	3.00%	0.00%	1.97%	-2.29%	0.49%	3.00%	0.50%
5	3.00%	0.00%	2.46%	-1.79%	0.99%	3.00%	0.50%
6	10.00%	7.00%	5.47%	1.21%	3.99%	10.00%	7.50%
7	3.00%	0.00%	4.02%	-0.23%	2.55%	3.00%	0.50%
8	3.00%	0.00%	2.35%	-1.90%	0.88%	3.00%	0.50%
9	3.00%	0.00%	3.01%	-1.25%	1.54%	3.00%	0.50%
10	10.00%	7.00%	6.29%	2.03%	4.82%	10.00%	7.50%
11	3.00%	0.00%	4.38%	0.13%	2.91%	3.00%	0.50%
12	3.00%	0.00%	2.40%	-1.86%	0.92%	3.00%	0.50%
13	3.00%	0.00%	2.64%	-1.62%	1.16%	3.00%	0.50%
14	10.00%	7.00%	5.65%	1.39%	4.18%	10.00%	7.50%
15	3.00%	0.00%	6.11%	1.85%	4.64%	3.00%	0.50%
16	10.00%	7.00%	5.97%	1.72%	4.50%	10.00%	7.50%
17	3.00%	0.00%	5.16%	0.90%	3.69%	3.00%	0.50%
18	3.00%	0.00%	2.44%	-1.82%	0.97%	3.00%	0.50%
19	3.00%	0.00%	2.17%	-2.09%	0.69%	3.00%	0.50%
20	3.00%	0.00%	2.44%	-1.82%	0.97%	3.00%	0.50%
21	3.00%	0.00%	2.11%	-2.14%	0.64%	3.00%	0.50%
22	3.00%	0.00%	2.10%	-2.15%	0.63%	3.00%	0.50%
23	3.00%	0.00%	2.45%	-1.81%	0.97%	6.00%	3.50%
24+	3.00%	0.00%	2.34%	-1.91%	0.87%	3.00%	0.50%

Current Inflation Assumption	2.50%	Proposed Inflation Assumption	2.50%
Current Productivity Component	0.50%	Proposed Productivity Component	0.00%
Actual CPI-U Inflation for Dec/17 - Dec/22	4.25%		
Apparent Productivity Component	-2.78%		



SECTION F

ACTUARIAL IMPACT OF RECOMMENDED ASSUMPTIONS

Actuarial Impact of Recommended Assumptions

The following table shows the impact on the actuarial liabilities of APRS as of the December 31, 2022 valuation date, if the recommended assumptions had been implemented at that time.

Actuarial Cost Items	Experience Study December 31, 2022	Valuation December 31, 2022	Increase/ (Decrease)
1. Present Value Future Benefits			
a. Active Employees	\$ 977,667,208	\$ 984,149,461	\$ (6,482,253)
b. Active DROP Members	35,599,560	35,652,874	(53,314)
c. Inactive Members	11,337,799	11,308,055	29,744
d. Annuitants	995,794,302	997,116,702	(1,322,400)
e. Total	<u>\$ 2,020,398,869</u>	<u>\$ 2,028,227,092</u>	<u>\$ (7,828,223)</u>
2. Actuarial Accrued Liability	\$ 1,702,545,425	\$ 1,688,755,684	\$ 13,789,741
3. Normal Cost as Percent of Pay			
a. Service Retirement	21.37%	22.25%	-0.88%
b. Disability Benefits	0.28%	0.29%	-0.01%
c. Death Before Retirement	0.19%	0.21%	-0.02%
d. Termination	1.88%	1.20%	0.68%
e. Normal Cost of Benefits	<u>23.72%</u>	<u>23.95%</u>	<u>-0.23%</u>
f. Administrative Expenses as Percent of Pay	<u>1.25%</u>	<u>0.90%</u>	<u>0.35%</u>
g. Total Normal Cost	24.97%	24.85%	0.12%
4. Increase in Contribution Rate due to \$13.8 million layer using 2.5% PGR	0.55%	N/A	0.55%
5. Total Increase in Actuarially Determined Contribution Rate			0.67%

