City of Austin Employees' Retirement System

Actuarial Experience Study

As of December 31, 2018

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May 14, 2020

Board of Trustees
City of Austin Employees' Retirement System
252 South IH 35, Suite 100
Austin, TX 78704

Subject: Results of 2019 Actuarial Experience Study

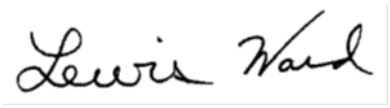
Members of the Board:

We are pleased to present our report on the results of the 2019 Actuarial Experience Study for the City of Austin Employees' Retirement System (COAERS). This report includes our recommendations for updated actuarial assumptions and methods to be effective for the December 31, 2019 actuarial valuation.

With the Board's approval of the recommendations in this report, we believe the actuarial condition of COAERS 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. Ryan Falls is an Enrolled Actuary, a Fellow of the Society of 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 COAERS staff for their assistance in providing data for this study.

Respectfully submitted,



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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 decreasing the price inflation assumption from 2.75% to 2.50%.

2. We recommend decreasing the real return on investments assumption from 4.75% to 4.50%.

3. The combined recommendations from items 1. and 2. above result in a recommendation of decreasing the nominal investment return assumption from 7.50% to 7.00%. This assumption is comprised of 2.50% inflation and 4.50% real return and is stated net of investment-related expenses.

4. We recommend leaving the wage inflation component of the salary scale assumption unchanged at 1.25%. This would result in a decrease in the ultimate salary scale assumption (made up of price inflation and wage inflation) used to project individual salary increases from 4.00% to 3.75% (due to the 0.25% decrease in price inflation). In addition, we recommend small decreases to the service-based rates consistent with experience. (***Note: the Board elected to decrease the wage inflation component of the salary scale to 1.00%, resulting in an ultimate salary scale assumption used to project individual salary increases of 3.50%)***.

5. We recommend decreasing the new hire wage growth assumption from 4.00% to 3.75%. The 0.25% recommended decrease in this assumption is consistent with the decrease in the core inflation recommendation. This assumption is used in the open group projection. It determines the rate at which the salaries for new hires grow versus the prior year's new hires. (***Note: the Board elected to decrease the new hire wage growth assumption by an additional 0.25% consistent with their recommendation on wage inflation, resulting in a new hire wage growth assumption of 3.50%).***

Mortality Assumptions

6. We recommend the use of the healthy retiree mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report, for general employees (PubG-2010) with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables.

7. We recommend using the same methodology as previously used for the morality rates for disabled retirees. This means adoption of the healthy mortality tables described above, but set forward 3 years for both males and females. In addition, a minimum mortality rate of 3.0% would apply at all ages for both males and females. The rates would be adjusted with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables.

8. We recommend adopting the employee mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report, for general employees (PubG-2010) with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables

Other Demographic Assumptions

9. We recommend increasing the select period for termination rates from 3 to 5 years. We also recommend adjustments in the overall termination rates consistent with COAERS member experience and future expectations.

10. We recommend adjustments in the overall retirement rates consistent with COAERS member experience and future expectations.

11. We recommend the DROP election rate be decreased to be more consistent with actual experience.

Actuarial Methods and Policies

12. We recommend continuing to use the asset smoothing method that recognizes each year's gain or loss over a closed five-year period. However, we recommend a small modification be compare the actual market value of assets to the expected market value of assets (rather than the expected actuarial value of assets) when determining the current year's excess or shortfall of investment income.

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 City of Austin Employees' Retirement System (COAERS). 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 COAERS and the general experience of other large public employee retirement systems. Changes in certain assumptions and methods 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.

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

For some of these assumptions, such as the mortality rates, 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.

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. For this experience study, we have reviewed COAERS's experience for the period ending on December 31, 2018.

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 rate of retirement of 15% at age 55. The number of exposures can only be those members who are age 55 and eligible for retirement at that time. Thus they are considered "exposed" to that assumption. Finally, we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were "perfect", the A/E ratio would be 100%. When it varies much from this figure, it is a sign that 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 F Exhibits

The exhibits in Section F should generally be self-explanatory. For example, on page F-2, we show an exhibit analyzing the termination rates (for members with more than five years of service) by years away from retirement eligibility. The second column shows the total number of members with more than five years of service who terminated during the study period. This excludes members who died, became disabled or retired. Column (3), labeled "Exposures" 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.

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 September 2013.

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

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.

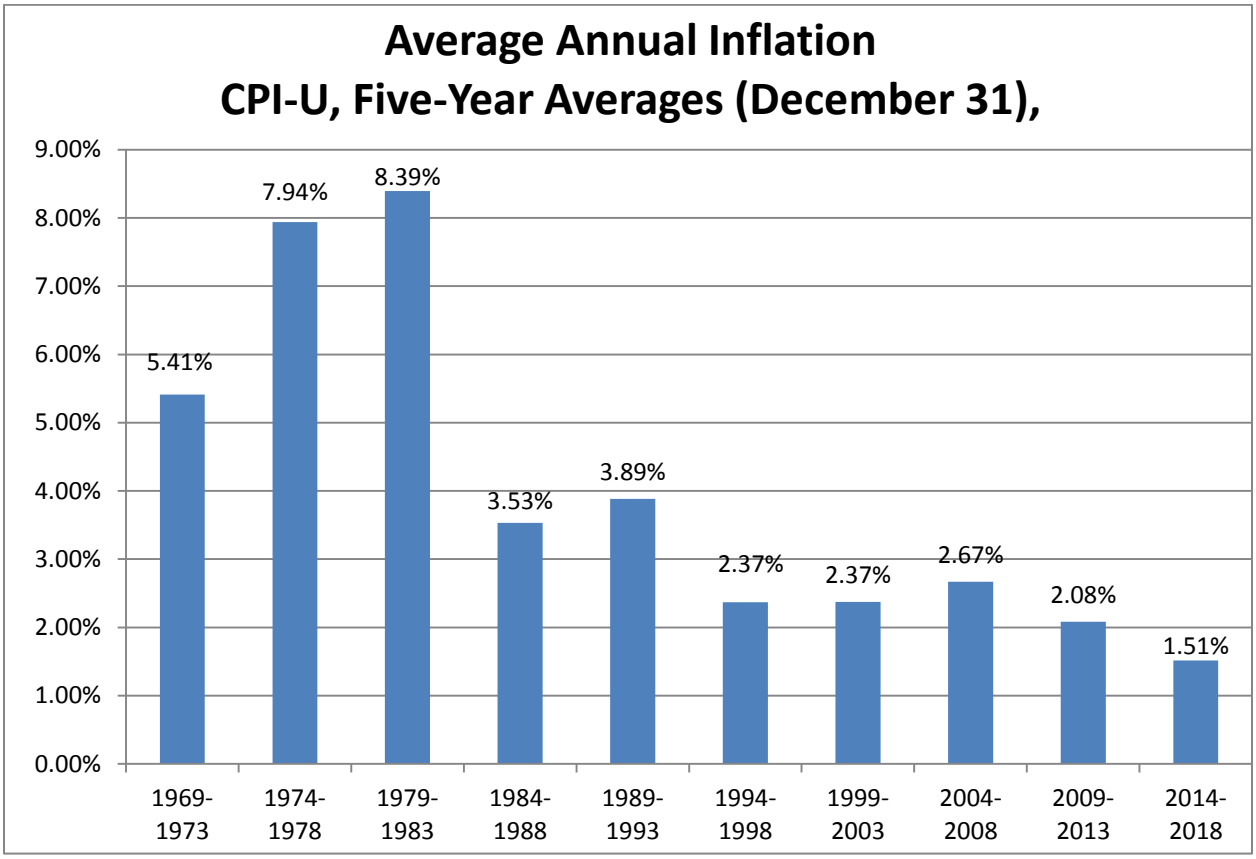
However, the standard explicitly advises an actuary not to give undue weight to recent experience.

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 2.75%.

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



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

The table below shows the average inflation over various periods, ending December 2018.

Periods Ending Dec. 2018	Average Annual Increase in CPI-U
Last five (5) years	1.51%
Last ten (10) years	1.80%
Last fifteen (15) years	2.09%
Last twenty (20) years	2.16%
Last twenty-five (25) years	2.20%
Last thirty (30) years	2.48%
Since 1913 (first available year)	3.12%

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

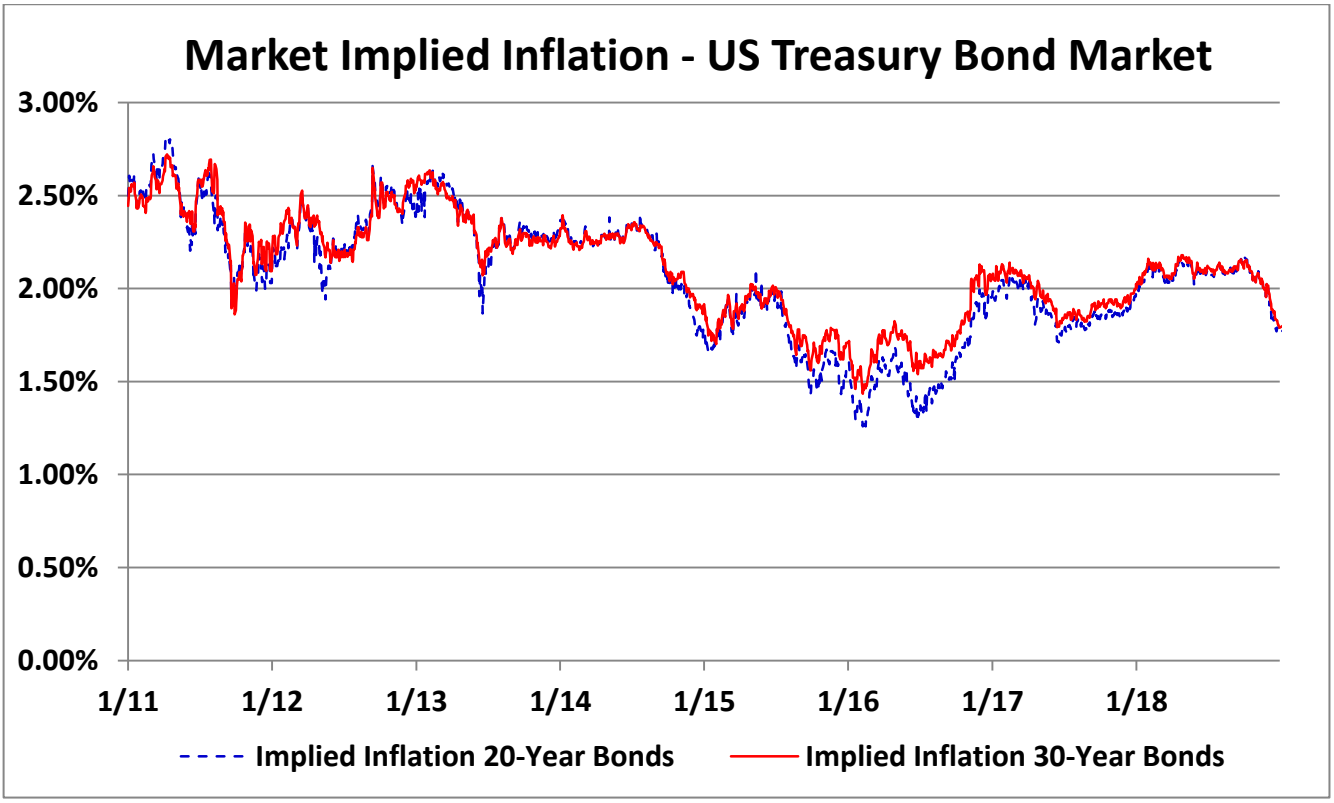
As you can see, inflation has been relatively low over the last twenty-five years and historically low over the past 10 years.

Forecasts from Investment Consulting Firms

We examined the 2019 capital market assumption sets for fourteen investment consulting firms with short-term (approximately 10-year) forecasts and the average assumption for inflation was 2.18%, with a range of 1.70% to 2.50%. Similarly, we examined the 2019 capital market assumption sets for six investment consulting firms with long-term (approximately 20-30 years) forecasts and the average assumption for inflation was 2.44%, with a range of 2.20% to 2.75%. All but two of the investment consulting firms in our survey, in setting their capital market assumptions, currently assume that inflation will be 2.50% or less.

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 2018, the difference for 20-year bonds implies that inflation over the next twenty years would average 1.76% (the average difference over calendar year 2018 was 2.06%). The difference in yields for 30-year bonds at the end of 2018 implies 1.79% inflation over the next 30 years. The chart below shows the historical market implied inflation from January 1, 2011 through December 31, 2018.



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 2018 Trustees Report, the Office of the Chief Actuary is projecting a long-term average annual inflation rate of 2.6% under the intermediate cost assumption. This remained unchanged from 2018 but four years prior, the Chief Actuary for the Social Security Administration reduced this assumption by 0.10% from the prior year and also narrowed the low cost and high cost scenarios to 2.0% and 3.2%, respectively.

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 2018) was for inflation over the next ten years (2019 to 2028) to average 2.21%.

Additionally, the Fed has openly stated that they have a target 2.00% inflation rate.

Recommendation

As a result, we are recommending lowering the assumption to 2.50%. This change will bring the assumption closer to recent inflation levels and closer to the levels expected in the financial markets. As you will see, this change also affects the expectation for all other economic assumptions. Please note that an argument could be made for lowering the assumption even further. We are comfortable with our recommendation, but we believe a 2.25% assumption would also be reasonable.

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. 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 of the 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 make an assumption that administrative expenses will be some fixed or increasing dollar amount. Others assume that the administrative expenses will be some percentage of the plan's actuarial liabilities or normal cost. And others treat administrative expenses like investment expenses, as an offset to the investment return assumption. For COAERS, the practice has been to add the anticipated administrative expenses to the normal cost of the plan. In other words the investment return assumption is net of investment expenses,

but is not reduced for administrative expenses.

The current assumption is that administrative expense will be equal to 0.51% of payroll.

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

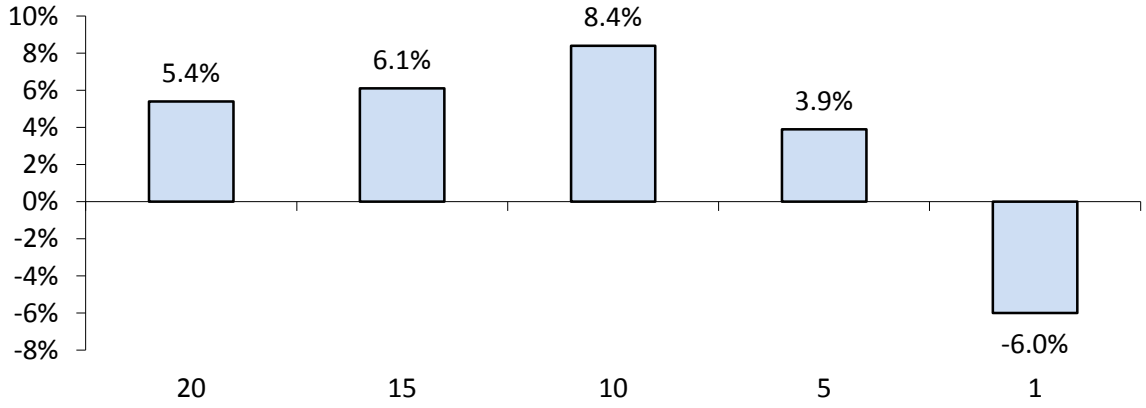
Year ending December 31st	2018	2017	2016	2015	2014
Administrative Expenses (AE)	4,024,367	2,778,290	2,700,917	2,421,331	2,631,218
Imputed payroll	647,143,050	615,814,344	579,293,296	558,248,298	518,508,233
AE as percentage of payroll	0.62%	0.45%	0.47%	0.43%	0.51%

It should be noted that the increase in administrative expenses in 2018 is primarily due to the implementation of a new pension administration system. This increase is expected to be short-term in nature and not be reflective of the long-term level of expenses. The administrative expenses have averaged 0.50% over the last five years (the average is 0.50% over the last ten years as well). Therefore, we are recommending no change to our 0.51% of payroll assumption.

Investment Return Rate

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

The chart below shows the annualized history of COAERS market returns for rolling periods ending December 31, 2018.

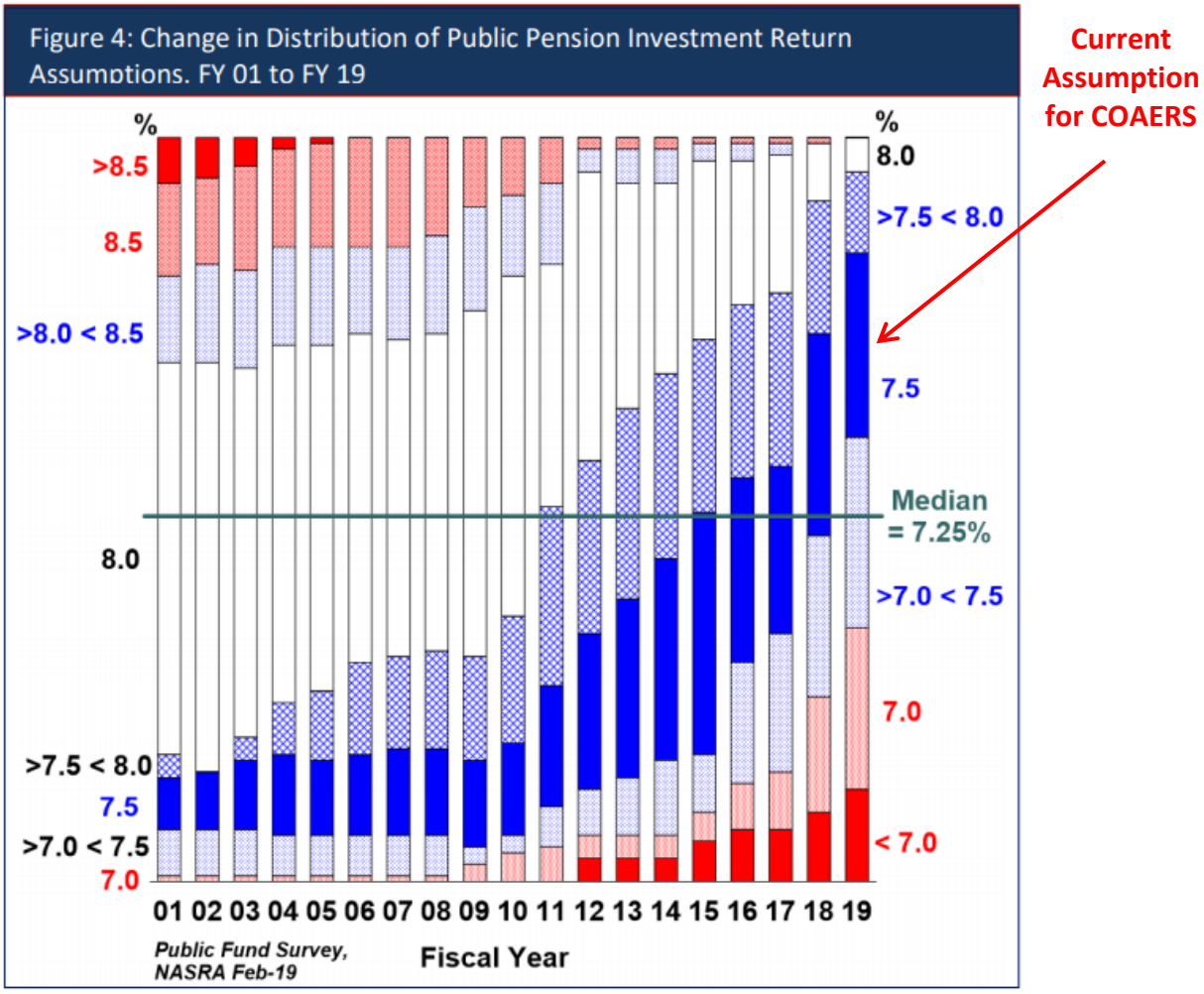


For this assumption, past performance, even averaged over a twenty-year period, is not a reliable indicator of future performance. The current asset allocation of the trust fund will significantly impact the overall performance, so returns achieved under a different allocation are not as meaningful.

More importantly, the real rates of return for many asset classes, especially equities, vary so dramatically from year to year that even a twenty-year period is not long enough to provide reasonable guidance. There are strong reasons to believe the next twenty years will be different than the last twenty, in large part because current bond yields are significantly lower than they were twenty years ago.

Assumption Comparison to Peers

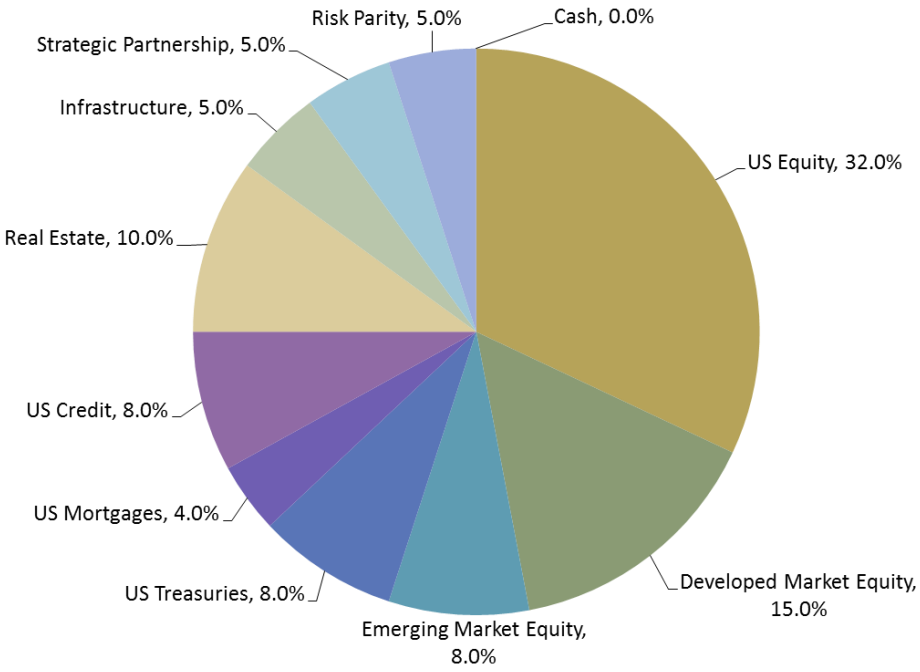
We do not recommend the selection of an investment return assumption based on prevalence information. However, it is still informative to identify where the investment return assumption for COAERS is compared to its peers. The chart below shows the distribution of the investment return assumptions in the National Association of State Retirement Administrators (NASRA) survey as of February 2019. It is important to note that variation among survey responses may result from differences in portfolio structures, investment policies, funding policies, and risk tolerance.



As indicated in the table, the most recent survey results indicate that the median investment return assumption is now 7.25%. The chart also indicates that the median investment return assumption was 8.00% just nine years earlier. The national trend has clearly been a shift to lower investment return assumptions over the past 10 years, consistent with the decline in the capital market expectations from investment professionals and economists.

Asset Allocation

We believe the most appropriate approach to selecting an investment return assumption is to identify expected returns given the funds' target asset allocation mapped to forward-looking capital market assumptions. Below is a summary of the current target asset allocations for COAERS.



We have applied the COAERS 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 table below shows 14 sets of "shorter time horizon" expectations based on the COAERS target asset allocation and our recommended 2.50% inflation assumption. As shown in the table, the average expected arithmetic return for the portfolio is 7.33%, with a range of outcomes from 5.97% to 8.34%.

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Proxy Inflation Assumption	Expected Nominal Return (4)+(5)
(1)	(2)	(3)	(4)	(5)	(6)
1	5.97%	2.50%	3.47%	2.50%	5.97%
2	5.87%	2.20%	3.67%	2.50%	6.17%
3	6.76%	2.50%	4.26%	2.50%	6.76%
4	6.30%	2.20%	4.10%	2.50%	6.60%
5	6.53%	2.00%	4.53%	2.50%	7.03%
6	7.02%	2.25%	4.77%	2.50%	7.27%
7	7.14%	2.26%	4.88%	2.50%	7.38%
8	7.31%	2.21%	5.10%	2.50%	7.60%
9	7.14%	2.30%	4.84%	2.50%	7.34%
10	7.05%	2.00%	5.05%	2.50%	7.55%
11	7.84%	2.31%	5.53%	2.50%	8.03%
12	7.85%	2.15%	5.70%	2.50%	8.20%
13	7.54%	1.70%	5.84%	2.50%	8.34%
14	7.84%	2.00%	5.84%	2.50%	8.34%
Average	**7.01%**	**2.18%**	**4.83%**	**2.50%**	**7.33%**

Volatility

Investment risk it typically illustrated based on absolute return. For example, "if the System actually earns 7.50% over time, the outcome would look like this…" This scenario typically assumes that the System will earn 7.50% each year in the future and therefore, both the arithmetic average and the geometric return at the end of the period are the same 7.50%.

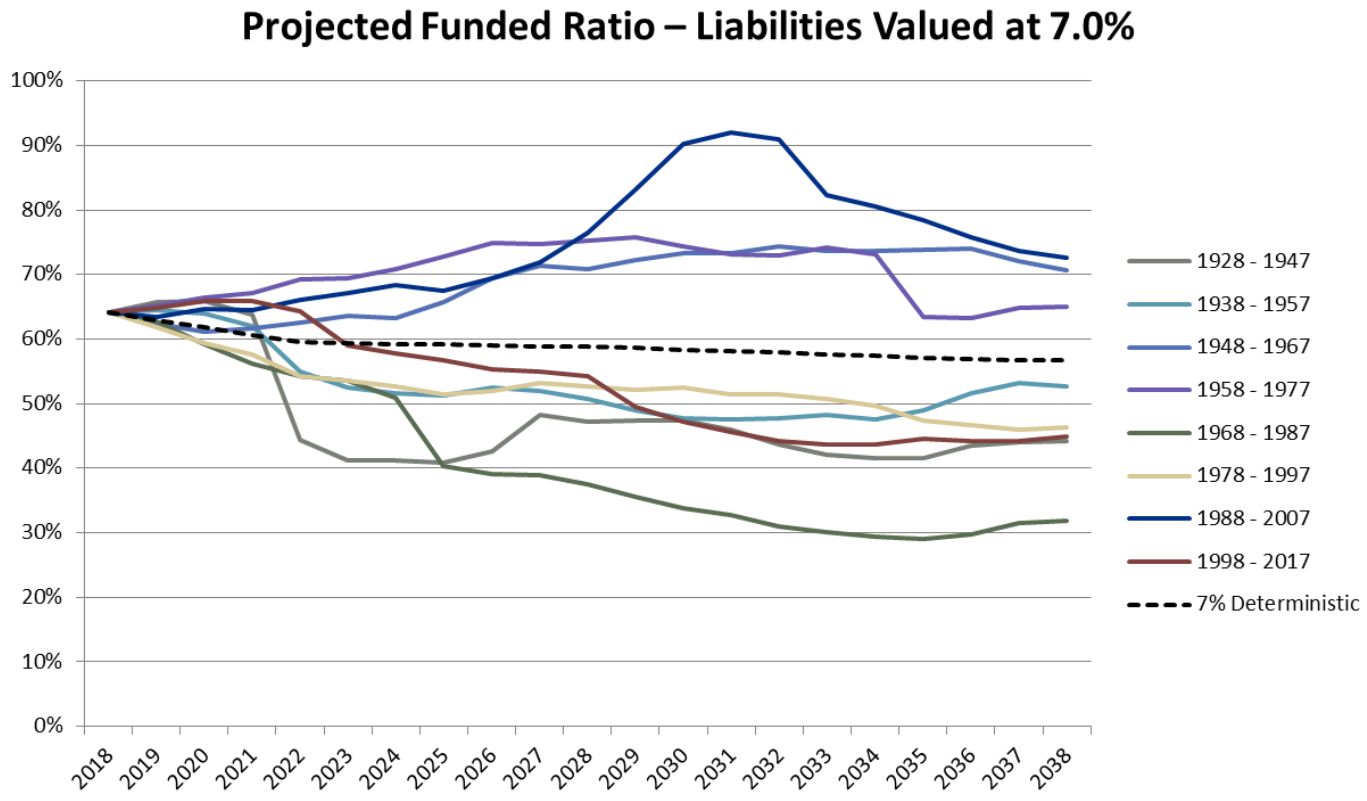
One must only look at the last ten years of actual returns of COAERS to see that returns on investments are not smooth from year to year and therefore volatility must be considered when selecting the assumption. So if we use the same capital market expectations that produce the arithmetic return of 7.33% shown above, and determine a compounded return over a 20-year time horizon, the average expected compound return is only 6.67% and the probability of exceeding a 7% return over that 20-year period is 45%.

However, there is another issue that complicates the expected future funding levels as well. This issue is negative cash flows. When discussing compound returns over a period of time, the volatility of the returns does not matter if there is no cash flow. In other words, if we start with a principal amount of $1 billion and we earn a compound return of 7.0% over the next 20 years the accumulated amount will be $3.9 billion at the end of the 20-year period no matter how volatile or in what order the returns occur.

However, when cash flows are introduced into the model, then the asset levels at the end of the period can vary significantly depending on how volatile the returns are and in what order they occur. When cash flows are negative (as they are for COAERS) this is especially true if the lower returns occur towards the beginning of the period. To illustrate this point the chart on the next page illustrates the impact on the

future funded status of COAERS if over the next 20 years, if eight different historical periods of volatility are repeated, and the System earns a compound return of 7% over that 20-year period.

We have taken the volatility from eight 20-year historical periods starting with the 20-year period beginning in 1928 and then the 20-year period beginning in 1938, 1948, etc. and ending with the just completed 20-year period of 1998-2017. We then calculated the returns for the 20-year period that would replicate the historical volatility of the 20-year periods but produce a 7% compound return over the 20-year period. In other words, the compound returns at the end of the 20-year period for all eight scenarios are 7%. In addition, to the volatility scenarios we have also shown the typical 7% every year scenario.



As can be seen on the chart, the funded ratios at the end of the 20-year period are vary significantly, from a low of 32% to a high of 73%, under the scenarios even though a compound return of 7.0% is achieved under each scenario. Those with lower funded ratios are those 20-year periods where poor returns occurred earlier in the 20-year periods versus the higher funded ratios where the poor returns occurred later in the period. The take away from the chart is that order matters.

We did receive return expectations based on a "longer time horizon" of 20-30 years from six investment consultants. As expected the average expected arithmetic return for the portfolio are higher under the longer-term expectations. However, as discussed above, the short-term outlook cannot be ignored in favor of the longer term investment horizon.

Recommendation

Based on this analysis, we recommend the Board reduce the investment return assumption to 7.00%. This is in between the average arithmetic expectation and the average geometric mean of the portfolio for the shorter-term capital market expectations. This would be comprised of a 4.50% real return, net of investment-related expenses, and a 2.50% 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, if available;
- 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 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 COAERS, the salary increase rates are currently a one-dimensional table based on COAERS 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. For the last 10 years, for the national economy as a whole, wage inflation has been 2.67%, outpacing price inflation by about 0.61%. The current real productivity growth assumption for COAERS is 1.25% in addition to the current price inflation assumption of 2.75%, or a nominal 4.00% GWI assumption.

To determine the merit component, we first calculated the average increase over the study period for members grouped by service. Members with approximately 20 or more years of service were selected because after that point the salary increase did not vary significantly with additional service.

The current assumption for pay increases for members with 20+ years of service is currently 4.00%, meaning no allowance for merit. Using data from 2009-2018, the average actual increase for COAERS members with 20+ years of service is summarized in the table below. With the understanding that actual inflation during that period has been 1.76%, the actual productivity and merit for this group was closer to 1.85%.

	Increases for 20+ Years of Service	Inflation	Net Productivity and Merit
Active Employees	3.61%	1.76%	1.85%

As can be seen wage inflation over the 10-year period was significantly higher than the national average. However, we believe it is unlikely that the City of Austin can continue to grant salary increases so far above national averages over the long term. To complicate the issue further, the 2019 Texas legislature enacted a property tax cap which could limit the growth of the City of Austin's future budgets which may put a dampening effect on future salary increases. Therefore, even though the experience supports a higher wage inflation assumption, we are recommending a nominal ultimate 3.75% salary scale, made up of the proposed 2.50% inflation component, and the 1.25% general productivity component.

The next step is to add in the actual service-based component of the salary scale assumption. While the experience has shown that the wage inflation component of the salary increase assumption has been higher than assumed, it has also shown that many of the service-based salary increase assumptions have been too high. The table on page F-8 of this report shows the analysis of the salary increase experience over the prior

ten-year period. As indicated on the table we are proposing lowering the service-based component of the salary scale assumption for most years of service.

Recommendation

In addition to the nominal 3.75% ultimate salary scale assumption noted above, we recommend the use of the service-based rates outlined on page F-8.

Note: the Board of Trustees elected to lower the general productivity component of the salary scale to 1.00% thereby reducing the total nominal ultimate salary assumption to 3.50%.

The full adopted rates of salary increases can be found in Section E of this report.

Payroll Growth Rate, New Hire Salary Growth and Open Group Projections

In a typical public sector retirement system the actuarially determined contribution rate (or the funding period in a fixed rate plan) are determined as a level percentage of payroll that is assumed to be constant throughout the funding period. In this arrangement, the normal cost of the system and the amortization payment to eliminate any unfunded liabilities of the system are each calculated to be a level percentage of payroll. There also may be an overall payroll growth assumption in projecting aggregate payroll growth for a specific retirement system.

However, as you are aware COAERS is a two tier system with significantly different benefits for members hired prior to (Group A) and on or after January 1, 2012 (Group B). Since we use the Individual Entry Age Normal cost method, the normal cost for a given year is the average normal cost of the current covered employees which is comprised of members in both tiers. As we move forward in time the average normal cost is expected to decrease as the Group A members terminate and/or retire and our replaced with Group B members. Since we receive the same contribution rate from Group A and Group B members and the same fixed contribution rate from the City on behalf of these members, as we move forward in time and the normal cost percentage a larger and larger share of the contribution rate will go towards paying off the System's UAAL. In other words, the contribution towards the UAAL will be growing as a percentage of payroll. For this reason, the standard approach of determining the funding period using an algebraic approach with a constant payroll growth rate does not work. For that reason we use an open group projection model to determine the funding period and to solve for any actuarially determined contribution rates such as the rate necessary to meet the Board's funding policy.

When using open group projections decisions must be made that impact how the payroll is projected to grow in the model. The first assumption is the rate at which New Hire Salaries are expected to grow year over year. The table below shows the average salary for new hires and the percentage increase year over year.

Average New Hire Salary Growth Year Over Year

Year	2011	2012	2013	2014	2015	2016	2017	2018
Average Salary	42,303	42,018	45,600	46,801	48,197	49,196	50,991	54,891
% Change	N/A	-0.67%	8.53%	2.63%	2.98%	2.07%	3.65%	7.65%

Note that average salary for new hires can be impacted by the positions being filled. For example the average salary may increase more significantly in a year if several positions with large salaries are filled with new employees. This is why we look at the average over a period of time which should even out any short-term variances.

Recommendation

The increase in the average salary for new hires over the period averaged 3.79%. CPI Inflation over the same period averaged 1.58% so the average salary for new hires was outpacing inflation during the period by approximately 2.2%. This is similar to what we saw with the salary wage growth assumption. Therefore, we are recommending that the assumption for new hire pay growth be set equal to the rate of salary increase for long service employees of 3.75% (CPI + wage inflation).

Note: because the Board elected to use 3.50% which is consistent with their decision to lower the wage inflation component of the salary increase assumption to 1.00%.

The other assumption that is important to the open group projection is active membership growth. The table below shows the average percentage change in active membership over different periods of time ending in 2018.

Average Membership Growth Over Periods Ending in 2018					
Time Period	Last 5 Years	Last 10 Years	Last 15 Years	Last 20 Years	Since 1990
Average % Increase	2.75%	1.30%	1.89%	2.24%	1.42%

As seen in the table there is a pattern of membership growth over all time periods examined. This is to be expected since over the last three decades Austin has been one of the fastest growing cities in the United States. However, we have two comments about these results.

1. These are long term projections. While the City has certainly experienced significant population growth over the past 30 years, it is no guarantee that the growth will continue over the next several decades. Also, even if the population grows it is possible that increases in productivity will allow the City to provide services on a lower per capita basis in the future which may dampen membership growth even if the City continues to see population growth.
2. As previously stated, the 2019 Texas Legislature enacted property tax caps which could put strains on future City budgets hampering the ability of the City to add new positions.

Recommendation

The funding of the System is currently expected to be back loaded. As stated earlier, the percentage of the fixed contribution rate being contributed towards the UAAL will increase in the future as we have more and more Group B employees. Assuming membership growth would only further back load the funding as we would be assuming larger future contribution dollars due to both growth in payroll and future membership growth. For that reason, we are recommending assuming no future membership growth (or an assumption of 0% growth). If membership growth continues to occur, this will only benefit the System. However, assuming membership growth and the growth not occurring could be harmful to the anticipated funding progress of the System.

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

COAERS' 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 RP-2014 Combined Healthy Mortality Table with generational mortality improvement using mortality improvement Scale BB.

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 COAERS 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, 2014 through December 31, 2018, COAERS experienced 348 male and 168 female healthy retiree deaths. As a result, the mortality experience for COAERS does not have a high confidence of 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 assumptions anticipated approximately 343 male deaths and 173 female deaths during the period which is very close to the number of expected deaths under the current assumptions. However, these results are on a count weighted basis.

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. Selecting an assumption based on a headcount-weighting is consistent with estimating expected deaths. However, selecting an assumption based on benefit-weighting is consistent with minimizing gains and losses associated with expected deaths. By weighting the data by annuity amounts, more weight is given to members who have larger annuities (and thus have larger liabilities). In fact, the rates of mortality in the current mortality tables were designed on a benefit weighted basis. On a benefit weighted basis the A/E ratio for males was 93% and for females was 99%. It is also a best practice to assume future mortality improvement. Our current assumptions reflect both of these best practices as will our recommended assumptions.

Recommended 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.

While there is no requirement for COAERS to update to these new tables, best practice is to give serious consideration to the newest published tables unless there is a compelling reason to not do so. Consideration of the new Pub-2010 tables is further reinforced by the fact that these new tables were specifically constructed for public employee pension plans.

Applying the Pub-2010 Mortality Tables for general employees produces a benefit-weighted A/E ratio of 114% for males and 122% for females for COAERS retirees over the experience period studied. Although this assumption appears to be conservative, due to the lack of credibility of the data, we are not recommending any adjustment to these mortality rates.

We recommend the healthy retiree mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report for general employees (PubG-2010) with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables.

Recommended Mortality Improvement Assumption

The current mortality assumption incorporates generational 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 15 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 is recommending the use of the ultimate mortality improvement rates in the MP tables for all years.

Disabled Mortality Rates

There are even fewer disabled retiree deaths than healthy retiree deaths. For the period January 1, 2014 through December 31, 2018, COAERS experienced a total of twenty-five disabled retiree deaths. As a result, the disabled mortality experience for COAERS has no credibility for setting a plan-specific mortality assumption.

Because of the lack of credibility, we use actuarial techniques to develop our assumptions. Disabled retirees have significantly higher rates of mortality at younger ages when compared to healthy retirees. As the members age, these higher rates of mortality persist but the difference in the mortality rates between healthy and disabled lives declines. We have found that using the combination of a 3-year age set forward of the healthy lives mortality tables and a minimum mortality rate of 3.0% does a good job of predicting the rates of mortality for disabled lives. This is the procedure used for the current disabled mortality rates assumption.

It is our recommendation to continue this process for the disabled lives mortality assumption for COAERS, which means the adoption of the PubG-2010 tables for general employees, and with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables, except a three year set-forward will be applied; meaning a member who is age 60 will be valued as if they are 63. In addition, a 3% minimum mortality rate will be applied to reflect the impairment for younger members that become disabled where the mortality rates would otherwise produce a rate of less than 3%.

Active Mortality Rates

For the period January 1, 2014 through December 31, 2018, COAERS experienced fifty-five total active member deaths. As a result, the mortality experience for COAERS has no credibility for setting a plan-specific mortality assumption.

We recommend the adoption of the employee mortality tables published in the Pub-2010 Public Retirement Plans Mortality Tables Report for general employees (PubG-2010) with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables.

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. Over the five year period ending December 31, 2018 there were a total of 33 disabilities. Once again, the number of actual disabilities is relatively small making it difficult to develop disability rates to accurately predict the experience. The current assumptions are based on the disability rates adopted by the Texas Municipal Retirement System (TMRS) whose data set is large enough to provide credible disability rates. TMRS is comprised of general employees and public safety employees of municipalities throughout the State of Texas. The number of disabilities a plan incurs is a function of both plan design (eligibility) and workforce composition. We believe the similarity between the employee groups of TMRS and COAERS make the TMRS assumptions appropriate.

Duty disability and ordinary disability benefits are identical. However, a member must have five years of service to be eligible for ordinary disability benefits. Because of the lack of distinction between the benefits the underlying data makes no distinction between duty and ordinary disabilities. Due to the lack of data we will continue to assume that 10% of disabilities are duty related.

Retirement Rates

For COAERS employees, we currently assume that retirement rates for members eligible for retirement vary by age and the member's gender. This approach results in retirement rates that most accurately reflect the working career of the members.

The experience shows that fewer members retired than expected (for both males and females). However, the current rates of retirement are set in such a manner that we expect fewer retirements than actually assumed to provide some margin for adverse experience and the impact of service purchases which allow members not eligible for retirement to retire. As shown in Section F on pages F-3 and F-4, for male members under age 75 we expected 935 retirements over the five-year period, compared to the 815 actual retirements, and for females we expected 562 compared to the actual 500 retirements. This produced overall A/E ratios of 87% for males and 89% for females. (There were also eleven retirements after the age of 74 not included in these counts and ratios.) Overall, this is a good fit for where we want the expectations to be. We are making small adjustments to the rates at certain ages to better reflect past and anticipated future experience.

Note that all of the experience is for members eligible for unreduced retirement. Group A members do not have any eligibility conditions except unreduced retirement. However, Group B members do have reduced retirement provisions. However, due to the fact that Group B has been around less than ten years, there is no experience yet for reduced retirement. Therefore, we will continue to assume the same rates of

retirement for those Group B members eligible for reduced retirement as in prior years until such time that actual experience indicates the assumptions should be revised.

Pages F-3 and F-4 includes a detailed summary of the retirement rate experience. The proposed assumptions are shown in Section E 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 their account balance on deposit in COAERS. The current termination rates reflect the member's age and/or service, but are different for each gender.

For the termination analysis we prefer to use a longer period than five years to try and dampen the effect of any individual economic cycle. For this study we used a ten year period of experience. The current assumptions are set up such that the termination rates are based on service only for the first three years of employment. This first three-year period is referred to as the "select period". After the first three years of service, termination rates are based on the number of years until normal retirement eligibility. The termination rates are also split based on gender.

For the select period, the current assumptions produce an A/E ratio of 98% for males and 98% for females during the three-year select period. These ratios are lower than we would like and we are therefore recommending that the termination rates during the select period be decreased. In addition, we are recommending that the select period be extended to five years. The A/E ratios based on the recommended assumptions are 104% for males and 106% for females.

After the end of the select period, the termination rates are based on the number of years until normal retirement eligibility. These termination rates will also continue to be split based on gender. The current assumptions produced an A/E ratio of 105% for males and 108% for females. While the overall, A/E ratios are satisfactory, the individual assumptions have a wide variance in their A/E ratios. Therefore, we are proposing new assumptions to better match past and anticipated future experience. The proposed assumptions produce an A/E ratio of 101% for males and 102% for females.

Pages F-1 and F-2 includes a detailed summary of the termination rate experience. The proposed assumptions are shown in Section E of this report.

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. Terminated members assumed to choose a deferred benefit are assumed to commence receipt at age 62 for Group A and age 65 for Group B.

DROP Participation
The current assumption is that 20% of retiring members will participate in "Back-DROP". This is not a material assumption due to the design of the DROP feature. However, experience indicates that the average DROP participation rate during the prior five years was 12.5%. Therefore, we are recommending lowering the DROP participation rate to 15%.

Marital Assumptions
We recommend maintaining the current assumption that 100% of members are married. This assumption is only used in the valuing of the death benefit for active members who are eligible for retirement. The liability associated with this assumption is small and the assumption is conservative. While the experience shows that members of either gender appear to be on average almost four years older than their spouses, there are more than twice as many male retirees as female retirees. Therefore, we recommend maintaining the spousal age difference assumption that male spouses are three years older than female spouses.

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 mid-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 COAERS. While January and February are the most common months of retirement with over 44% of retirements over the past five years commencing their payments in these months, the average calendar month of retirement occurs in May. Furthermore, disability and death are almost always random in nature which is best represented by middle of the year decrement timing. Therefore, we are recommending continuing the decrement timing at the 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 actuarial value of

assets. If an offsetting gain or loss occurs in a future valuation, the method accelerates the recognition of offsetting gains or losses so that all offsetting gains and losses are immediately recognized. We continue to believe this type of method is appropriate. The method 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.

We recommend one change to the current five-year smoothing method. Specifically, we are recommending that the basis on which the expected investment income is determined be changed from the actuarial value of assets to the market value of assets. We believe the methodology is easier to understand when actual market returns are compared to expected market returns, versus comparing actual market returns to expected actuarial returns. This change is not expected to have a material change in the future actuarial asset values.

SECTION D

ACTUARIAL IMPACT OF RECOMMENDED ASSUMPTIONS

City of Austin Employees' Retirement System

Actuarial Cost Impact of Recommended and Adopted Assumptions ($ in billions)

Cost Item	Valuation Results as of December 31, 2018		
	Old Assumptions	Recommended Assumptions	Adopted Assumptions
Normal Cost %	17.46%	18.08%	17.64%
Actuarial Accrued Liability			
Actives	$1.805	$1.951	$1.934
Inactives	$2.185	$2.321	$2.321
Total	$3.990	$4.272	$4.255
Unfunded Actuarial Accrued Liability	$1.294	$1.576	$1.559
Funded Ratio	67.6%	63.1%	63.3%
Funding Period	32 years	51 years	52 years
Funding Policy Rate (Employer Rate for 25-Year Funding Period)	19.37%	22.21%	22.05%

SECTION E

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 Funding Method*

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

The actuarial accrued liability is determined using the Entry Age Normal Cost method. This method assigns the System's total actuarial present value of future benefits to various periods. The actuarial accrued liability is assigned to years prior to the valuation and the normal cost is assigned to the year following the valuation. The remaining costs are assigned to future years.

The normal cost is determined on an individual basis using the Individual Entry Age Normal Cost method. The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs where future normal costs are based on the benefit provisions that are applicable to each individual member. The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over the actuarial value of assets.

III. *Funding Period*

The funding period is determined using an open group projection. In the open group projection, the demographic assumptions are applied to the current active employees and any employees that are assumed to leave employment are replaced one for one with a new employee. Over time this results in the change of the employee group from mostly Group A members to Group B members. The projection is built to assume no gains or losses on the actuarial accrued liability or the actuarial value of assets. The funding period is the length of time it takes in the open group projection for the actuarial value of assets to exceed the actuarial accrued liability.

In the projection, new members' pay are assumed to increase at 3.50% year over year (i.e. a new employee in 2020 is assumed to be hired at a salary that is 3.50% greater than a new employee hired in 2019). The 3.50% growth rate is equal to our wage inflation assumption of 3.50% (ultimate salary increase assumption shown in Item A.6.). Note that this is not an assumption that payroll will grow at 3.50% per year. Payroll could grow more slowly in the near-term due to membership demographics.

Summary of Actuarial Assumptions and Methods (continued)

IV. *Actuarial Value of Assets*

The actuarial value of assets is equal to the market value of assets less a five-year phase in of the Excess (Shortfall) between expected investment return and actual income. The expected investment return each year is calculated based on the market value of assets with the difference from actual income smoothed in over five years in 20% increments. If the current year's difference is opposite sign of the prior years' deferred excesses/(shortfalls), then the prior years' bases (starting with the oldest) are reduced dollar for dollar along with the current year's base. Any remaining bases are then recognized over five years (20% per year) from their initial creation. This can and will result in some bases being recognized in a period shorter than five years.

If the resulting preliminary asset value is less than 80% or more than 120% of the market value of assets, then 1/3 of the amount outside of the 80% to 120% corridor is recognized in the final actuarial value of assets. In extreme market conditions, this could result in an actuarial value of assets outside of the 80% to 120% market value of assets corridor.

V. *Actuarial Assumptions*

1. Investment Return Rate (adopted effective December 31, 2019)

   7.00% per annum, compounded annually, composed of an assumed inflation rate of 2.50% and a real rate of return of 4.50%, net of investment expenses.

2. Mortality

   a. Nondisabled annuitants (adopted effective December 31, 2019)

      Healthy retirees and beneficiaries – The PubG-2010 Healthy Retiree Mortality Table (for general employees) for males and females with full generational projection assuming immediate convergence of rates in the mortality projection scale MP-2018, two-dimensional for male and female. Mortality improvement is projected from the mortality table's base year of 2010 (see Item 20 for further discussion of mortality improvement).

   b. Disabled annuitants (adopted effective December 31, 2019)

      Disabled annuitants – The PubG-2010 Healthy Retiree Mortality Table (for general employees) for males and females, set forward three years with full generational projection assuming immediate convergence of rates in the mortality projection scale MP-2018, two-dimensional for male and female. Mortality improvement is projected from the mortality table's base year of 2010 (see Item 20 for further discussion of mortality improvement). A minimum 3% rate of mortality applies at all ages.

Summary of Actuarial Assumptions and Methods (continued)

c. Active members (adopted effective December 31, 2019)

Active employees – The PubG-2010 Employee Mortality Table (for general employees) for males and females with full generational projection assuming immediate convergence of rates in the mortality projection scale MP-2018, two-dimensional for male and female. Mortality improvement is projected from the mortality table's base year of 2010 (see Item 20 for further discussion).

Note regarding mortality table extensions:

Pub-2010 mortality tables are not inclusive of all ages. Mortality rates for active members were extended above age 80 by a constant exponential rate to the Healthy Retiree rate at age 100. Mortality rates for nondisabled annuitants below age 50 were extended using a constant exponential rate to the Juvenile rates.

Summary of Actuarial Assumptions and Methods (continued)

3. Retirement Rates: (adopted effective December 31, 2019)
The following rates of retirement are assumed for members eligible for normal retirement.

Age	Rates of Retirement	
	Males	Females
44 & under	22.0%	25.0%
45	20.0%	20.0%
46	20.0%	20.0%
47	20.0%	20.0%
48	20.0%	20.0%
49	20.0%	20.0%
50	22.0%	24.0%
51	22.0%	24.0%
52	22.0%	24.0%
53	22.0%	24.0%
54	22.0%	24.0%
55	21.0%	26.0%
56	21.0%	26.0%
57	21.0%	26.0%
58	21.0%	26.0%
59	21.0%	26.0%
60	22.0%	21.0%
61	22.0%	21.0%
62	27.0%	24.0%
63	18.0%	16.0%
64	18.0%	16.0%
65	18.0%	24.0%
66	30.0%	24.0%
67	30.0%	26.0%
68	22.0%	26.0%
69	22.0%	26.0%
70	30.0%	26.0%
71	22.0%	24.0%
72	22.0%	24.0%
73	22.0%	24.0%
74 & older	100.0%	100.0%

Group B members are assumed to retire at twice the applicable rate upon the first year they attain eligibility for normal retirement. Early retirement rates (of 1% at age 55 increasing by 1% every two years to 5% at ages 63 and 64) apply for Group B members.

Summary of Actuarial Assumptions and Methods (continued)

4. Rates of Decrement Due to Withdrawal (adopted effective December 31, 2019)

Rates of withdrawal are comprised of a select period for the first 5 years of employment and ultimate rates based on years of service from retirement after the end of the select period. The following rates during the select period apply at all ages during the applicable year of employment:

Years of Employment	Males	Females
1	0.1100	0.1600
2	0.1050	0.1500
3	0.0925	0.1275
4	0.0675	0.1000
5	0.0600	0.0850

After the select period ends, rates of withdrawal are based on the number of years from retirement. The rates are shown below for males and females:

Years from Eligibility for Unreduced Retirement	Rates of Withdrawal After Select Period	
	Males	Females
1	0.0120	0.0080
2	0.0120	0.0175
3	0.0120	0.0175
4	0.0120	0.0200
5	0.0150	0.0200
6	0.0200	0.0200
7	0.0200	0.0250
8	0.0200	0.0250
9	0.0200	0.0250
10	0.0250	0.0300
11	0.0300	0.0350
12	0.0350	0.0375
13	0.0400	0.0400
14	0.0450	0.0700
15+	0.0560	0.0825

Summary of Actuarial Assumptions and Methods (continued)

5. Disability Rates* (adopted effective December 31, 2015)

Sample rates are shown below:

Age	Rates of Decrement Due to Disability Males and Females
20	0.000004
25	0.000025
30	0.000099
35	0.000259
40	0.000494
45	0.000804
50	0.001188
55	0.001647
60	0.002180

* Rates are for disability due to all causes. Occupational disability rates are assumed to be 10% of all causes.

6. Rates of Salary Increase (adopted effective December 31, 2019)

Years of Service	Promotional Rate of Increase	Total Annual Rate of Increase Including 2.50% Inflation Component and 1.00% Productivity Component
1 – 3	2.25%	5.75%
4 – 5	2.00%	5.50%
6	1.75%	5.25%
7	1.50%	5.00%
8	1.25%	4.75%
9 – 10	1.00%	4.50%
11 – 12	0.75%	4.25%
13 – 14	0.50%	4.00%
15 – 16	0.25%	3.75%
17 or more	0.00%	3.50%

7. DROP Participation: (adopted effective December 31, 2019)

It was assumed that 15% of retiring active members with at least 20 years of service would elect a "Backward" DROP. Additionally, it was assumed that all members who "Backward" DROP would elect to DROP back to the date that would provide the greatest actuarial value to the member.

Summary of Actuarial Assumptions and Methods (continued)

8. Married Percentage: (adopted effective December 31, 1997)

   100% of the active members are assumed to be married.

9. There will be no recoveries once disabled: (adopted effective December 31, 1997)

10. Spousal Age Difference: (adopted effective December 31, 2012)

    Males are assumed to be three years older than females.

11. Normal Form of Payment: (adopted effective December 31, 1997)

    It is assumed that all retiring members will elect the Life only form of payment with a guaranteed return of accumulated employee contributions.

12. Crediting Rate on Employee Contributions: (adopted effective December 31, 2002)

    It is assumed that the interest credit rate on employee contributions will be 6.0%.

13. Individual salaries used to project benefits: (adopted effective December 31, 1997)

    Rates of pay as of the valuation date are reported for all employees.

14. Pay increase timing: (adopted effective December 31, 1997)

    Middle of calendar year.

15. Decrement timing: (adopted effective December 31, 1997)

    Decrements of all types are assumed to occur mid-year.

16. Eligibility testing: (adopted effective December 31, 2002)

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

17. Decrement relativity: (adopted effective December 31, 2002)

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

Summary of Actuarial Assumptions and Methods (continued)

18. Incidence of Contributions: (adopted effective December 31, 2002)

    Contributions are assumed to be received continuously throughout the year based upon the contribution rates as a percent of payroll (established in statute or agreed upon under the Supplemental Funding Plan) shown in this report and the actual payroll payable at the time contributions are made.

19. Benefit Service: (adopted December 31, 1997)

    All members are assumed to accrue one year of eligibility service each year.

20. Mortality Improvement:

    The base mortality tables are anchored at the year 2010. To account for future mortality improvement, the base mortality rates shown in Item 2 are projected forward assuming immediate convergence of rates in the mortality projection scale MP-2018, two-dimensional for males and females.

21. Service Purchases (military, permissive, and sick leave conversion):

    No service purchases of any type are assumed. Any gains or losses due to these purchases are recognized in the valuation following the purchase.

22. Cost of Living Adjustments and One-time Payments:

    No future cost of living adjustments are assumed. In addition, no one-time payments (13th checks) are assumed.

23. 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. Terminated members assumed to choose a deferred benefit are assumed to commence receipt at age 62 for Group A and age 65 for Group B.

SECTION F

SUMMARY OF DATA AND EXPERIENCE

City of Austin Employees' Retirement System
Termination Experience for Males (5-year Select Period)

				Assumed Rates		Expected Terminations		Actual/Expected	
Service	Actual Terminations	Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	213	1,811	0.1176	0.1250	0.1100	226.5	199.2	94.0%	106.9%
2	400	3,611	0.1108	0.1150	0.1050	416.2	379.2	96.1%	105.5%
3	297	3,167	0.0938	0.0900	0.0925	289.1	292.9	102.7%	101.4%
4	185	2,687	0.0689	0.0000	0.0675	0.0	181.4	N/A	102.0%
5	151	2,411	0.0626	0.0000	0.0600	0.0	144.7	N/A	104.4%
Totals								97.7%	104.1%

City of Austin Employees' Retirement System
Termination Experience for Females (5-year Select Period)

				Assumed Rates		Expected Terminations		Actual/Expected	
Service	Actual Terminations	Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	210	1,171	0.1793	0.1750	0.1600	206.0	187.4	101.9%	112.1%
2	357	2,299	0.1553	0.1600	0.1500	369.0	344.9	96.7%	103.5%
3	277	2,030	0.1365	0.1400	0.1275	285.0	258.8	97.2%	107.0%
4	189	1,747	0.1082	0.0000	0.1000	0.0	174.7	N/A	108.2%
5	131	1,522	0.0861	0.0000	0.0850	0.0	129.4	N/A	101.2%
Totals								98.1%	106.3%

City of Austin Employees' Retirement System
Termination Experience for Males (Years to Retirement)

Years to Retirement	Actual Terminations	Exposures	Actual Rate	Assumed Rates		Expected Terminations		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	20	1,362	0.0147	0.0090	0.0120	12.3	16.3	163.2%	122.4%
2	18	1,421	0.0127	0.0122	0.0120	17.3	17.1	103.8%	105.6%
3	18	1,492	0.0121	0.0146	0.0120	21.8	17.9	82.6%	100.6%
4	18	1,541	0.0117	0.0166	0.0120	25.6	18.5	70.4%	97.3%
5	24	1,545	0.0155	0.0182	0.0150	28.1	23.2	85.4%	103.5%
6	34	1,610	0.0211	0.0198	0.0200	31.9	32.2	106.7%	105.6%
7	26	1,619	0.0161	0.0212	0.0200	34.3	32.4	75.8%	80.3%
8	34	1,600	0.0213	0.0225	0.0200	36.0	32.0	94.4%	106.3%
9	31	1,617	0.0192	0.0237	0.0200	38.3	32.3	80.9%	95.9%
10	43	1,592	0.0270	0.0248	0.0250	39.5	39.8	108.9%	108.0%
11	48	1,582	0.0303	0.0323	0.0300	51.1	47.5	93.9%	101.1%
12	56	1,542	0.0363	0.0348	0.0350	53.7	54.0	104.4%	103.8%
13	60	1,530	0.0392	0.0399	0.0400	61.0	61.2	98.3%	98.0%
14	69	1,482	0.0466	0.0401	0.0450	59.4	66.7	116.1%	103.5%
15	53	1,225	0.0433	0.0430	0.0560	52.7	68.6	100.6%	77.3%
16	56	939	0.0596	0.0430	0.0560	40.4	52.6	138.7%	106.5%
17	53	840	0.0631	0.0430	0.0560	36.1	47.0	146.7%	112.7%
18	33	452	0.0730	0.0430	0.0560	19.4	25.3	169.8%	130.4%
Totals	694	24,991	0.0278	0.0264	0.0274	658.9	684.5	105.3%	101.4%

City of Austin Employees' Retirement System
Termination Experience for Females (5-year Select Period)

Years to Retirement	Actual Terminations	Exposures	Actual Rate	Assumed Rates		Expected Terminations		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	7	870	0.0080	0.0086	0.0080	7.5	7.0	93.3%	100.0%
2	18	889	0.0202	0.0160	0.0175	14.2	15.6	126.8%	115.4%
3	16	931	0.0172	0.0201	0.0175	18.7	16.3	85.6%	98.2%
4	23	944	0.0244	0.0237	0.0200	22.4	18.9	102.7%	121.7%
5	14	956	0.0146	0.0238	0.0200	22.8	19.1	61.4%	73.3%
6	20	971	0.0206	0.0239	0.0200	23.2	19.4	86.2%	103.1%
7	31	988	0.0314	0.0261	0.0250	25.8	24.7	120.2%	125.5%
8	21	992	0.0212	0.0282	0.0250	28.0	24.8	75.0%	84.7%
9	21	971	0.0216	0.0302	0.0250	29.3	24.3	71.7%	86.4%
10	36	971	0.0371	0.0320	0.0300	31.1	29.1	115.8%	123.7%
11	32	969	0.0330	0.0422	0.0350	40.9	33.9	78.2%	94.4%
12	38	980	0.0388	0.0444	0.0375	43.5	36.8	87.4%	103.3%
13	38	964	0.0394	0.0465	0.0400	44.8	38.6	84.8%	98.4%
14	73	957	0.0763	0.0525	0.0700	50.2	67.0	145.4%	109.0%
15	55	823	0.0668	0.0575	0.0825	47.3	67.9	116.3%	81.0%
16	45	604	0.0745	0.0575	0.0825	34.7	49.8	129.7%	90.4%
17	52	575	0.0904	0.0575	0.0825	33.1	47.4	157.1%	109.7%
18	38	305	0.1246	0.0575	0.0825	17.5	25.2	217.1%	150.8%
Totals	578	15,660	0.0369	0.0342	0.0361	535.0	565.8	108.0%	102.2%

City of Austin Employees' Retirement System
Retirement Experience for Males

Years to Retirement	Actual Retirements	Exposures	Actual Rate	Assumed Rates		Expected Retirements		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 45	22	52	0.4231	0.2500	0.2200	11.0	11.0	200.0%	200.0%
45	6	29	0.2069	0.2200	0.2000	6.0	6.0	100.0%	100.0%
46	11	50	0.2200	0.2200	0.2000	11.0	10.0	100.0%	110.0%
47	5	64	0.0781	0.2200	0.2000	14.0	13.0	35.7%	38.5%
48	17	79	0.2152	0.2200	0.2000	17.0	16.0	100.0%	106.3%
49	6	88	0.0682	0.2200	0.2000	19.0	18.0	31.6%	33.3%
50	26	105	0.2476	0.2200	0.2200	23.0	23.0	113.0%	113.0%
51	17	124	0.1371	0.2200	0.2200	27.0	27.0	63.0%	63.0%
52	21	119	0.1765	0.2200	0.2200	26.0	26.0	80.8%	80.8%
53	31	125	0.2480	0.2200	0.2200	28.0	28.0	110.7%	110.7%
54	30	125	0.2400	0.2200	0.2200	28.0	28.0	107.1%	107.1%
55	43	201	0.2139	0.2200	0.2100	44.0	42.0	97.7%	102.4%
56	39	192	0.2031	0.2200	0.2100	42.0	40.0	92.9%	97.5%
57	33	181	0.1823	0.2200	0.2100	40.0	38.0	82.5%	86.8%
58	30	171	0.1754	0.2200	0.2100	38.0	36.0	78.9%	83.3%
59	28	165	0.1697	0.2200	0.2100	36.0	35.0	77.8%	80.0%
60	36	160	0.2250	0.2200	0.2200	35.0	35.0	102.9%	102.9%
61	38	140	0.2714	0.2200	0.2200	31.0	31.0	122.6%	122.6%
62	89	418	0.2129	0.2700	0.2700	113.0	113.0	78.8%	78.8%
63	58	326	0.1779	0.2200	0.1800	72.0	59.0	80.6%	98.3%
64	37	264	0.1402	0.2200	0.1800	58.0	48.0	63.8%	77.1%
65	42	232	0.1810	0.2200	0.1800	53.0	42.0	79.2%	100.0%
66	64	190	0.3368	0.3000	0.3000	59.0	57.0	108.5%	112.3%
67	39	121	0.3223	0.3000	0.3000	36.0	36.0	108.3%	108.3%
68	12	74	0.1622	0.2200	0.2200	17.0	16.0	70.6%	75.0%
69	7	60	0.1167	0.2200	0.2200	13.0	13.0	53.8%	53.8%
70	17	52	0.3269	0.2200	0.3000	12.0	16.0	141.7%	106.3%
71	3	31	0.0968	0.2200	0.2200	7.0	7.0	42.9%	42.9%
72	3	22	0.1364	0.2200	0.2200	5.0	5.0	60.0%	60.0%
73	3	16	0.1875	0.2200	0.2200	4.0	4.0	75.0%	75.0%
74	2	10	0.2000	1.0000	1.0000	10.0	10.0	20.0%	20.0%
Totals	815	3,986	0.2045			935.0	889.0	87.2%	91.7%
75 & Over	10	25	0.4000			25.0	25.0	40.0%	40.0%
Total	825	4,011	0.2057			960.0	914.0	85.9%	90.3%

City of Austin Employees' Retirement System
Retirement Experience for Females

Years to Retirement	Actual Terminations	Exposures	Actual Rate	Assumed Rates		Expected Terminations		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 45	4	17	0.2353	0.2700	0.2500	4.0	4.0	100.0%	100.0%
45	2	22	0.0909	0.2300	0.2000	5.0	4.0	40.0%	50.0%
46	4	30	0.1333	0.2300	0.2000	7.0	6.0	57.1%	66.7%
47	11	35	0.3143	0.2300	0.2000	8.0	7.0	137.5%	157.1%
48	6	41	0.1463	0.2300	0.2000	9.0	8.0	66.7%	75.0%
49	10	52	0.1923	0.2300	0.2000	12.0	10.0	83.3%	100.0%
50	10	65	0.1538	0.2600	0.2400	17.0	16.0	58.8%	62.5%
51	14	60	0.2333	0.2600	0.2400	16.0	14.0	87.5%	100.0%
52	19	70	0.2714	0.2600	0.2400	18.0	17.0	105.6%	111.8%
53	12	74	0.1622	0.2600	0.2400	19.0	18.0	63.2%	66.7%
54	25	86	0.2907	0.2600	0.2400	22.0	21.0	113.6%	119.0%
55	31	128	0.2422	0.2600	0.2600	33.0	33.0	93.9%	93.9%
56	21	118	0.1780	0.2600	0.2600	31.0	31.0	67.7%	67.7%
57	29	120	0.2417	0.2600	0.2600	31.0	31.0	93.5%	93.5%
58	28	106	0.2642	0.2600	0.2600	28.0	28.0	100.0%	100.0%
59	28	88	0.3182	0.2600	0.2600	23.0	23.0	121.7%	121.7%
60	18	85	0.2118	0.2100	0.2100	18.0	18.0	100.0%	100.0%
61	21	86	0.2442	0.2100	0.2100	18.0	18.0	116.7%	116.7%
62	45	239	0.1883	0.2400	0.2400	57.0	57.0	78.9%	78.9%
63	19	171	0.1111	0.2100	0.1600	36.0	27.0	52.8%	70.4%
64	29	155	0.1871	0.2100	0.1600	33.0	25.0	87.9%	116.0%
65	29	126	0.2302	0.2400	0.2400	32.0	30.0	90.6%	96.7%
66	20	97	0.2062	0.2400	0.2400	24.0	23.0	83.3%	87.0%
67	24	76	0.3158	0.2400	0.2600	19.0	20.0	126.3%	120.0%
68	12	48	0.2500	0.2100	0.2600	10.0	12.0	120.0%	100.0%
69	11	38	0.2895	0.2100	0.2600	8.0	10.0	137.5%	110.0%
70	9	29	0.3103	0.2000	0.2600	6.0	8.0	150.0%	112.5%
71	2	20	0.1000	0.2000	0.2400	4.0	5.0	50.0%	40.0%
72	4	16	0.2500	0.2000	0.2400	3.0	4.0	133.3%	100.0%
73	2	11	0.1818	0.2000	0.2400	2.0	3.0	100.0%	66.7%
74	1	9	0.1111	1.0000	1.0000	9.0	9.0	11.1%	11.1%
Totals	500	2,318	0.2157			562.0	540.0	89.0%	92.6%
75 & Over	1	17	0.0588			17.0	17.0	5.9%	5.9%
Total	501	2,335	0.2146			579.0	557.0	86.5%	89.9%

City of Austin Employees' Retirement System
Healthy Post-Retirement Mortality for Males

Age	Benefit Weighted Deaths	Benefit Weighted Exposures	Actual Rate	Assumed Rates		Benefit Weighted Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40-44	0	1,398,368	0	0.002174	0.000725	3,367	1,122	0.0%	0.0%
45-49	0	10,915,459	0	0.003207	0.001544	36,891	19,691	0.0%	0.0%
50-54	191,273	48,295,372	0.003960	0.004705	0.003258	237,862	163,395	80.4%	117.1%
55-59	297,067	89,723,243	0.003311	0.006832	0.004679	617,411	423,640	48.1%	70.1%
60-64	820,213	107,561,582	0.007626	0.009653	0.006713	1,057,317	734,600	77.6%	111.7%
65-69	1,162,886	117,821,577	0.009870	0.014617	0.010432	1,730,548	1,241,117	67.2%	93.7%
70-74	1,522,070	63,049,267	0.024141	0.022969	0.017926	1,408,770	1,094,951	108.0%	139.0%
75-79	1,235,932	31,403,864	0.039356	0.037204	0.031643	1,164,643	991,616	106.1%	124.6%
80-84	1,439,106	21,559,356	0.066751	0.061749	0.056978	1,307,330	1,203,862	110.1%	119.5%
85-89	1,200,005	10,305,754	0.116440	0.103991	0.101233	1,059,789	1,028,048	113.2%	116.7%
90-94	666,587	4,189,562	0.159107	0.174498	0.168081	705,562	681,313	94.5%	97.8%
95-99	369,165	1,086,364	0.339817	0.258407	0.254270	264,137	258,567	139.8%	142.8%
100-104	5,358	16,074	0.333333	0.353182	0.354474	5349.1	5370.5	100.2%	99.8%
105-109	0	0	N\A	0.448227	0.448599	0	0	0.0%	0.0%
Totals	8,909,662	507,325,843	0.017562	0.018921	0.015468	9598975.7	7847293.3	92.8%	113.5%

City of Austin Employees' Retirement System
Healthy Post-Retirement Mortality for Females

Age	Benefit Weighted Deaths	Benefit Weighted Exposures	Actual Rate	Assumed Rates		Benefit Weighted Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40-44	0	406,716	0	0.001431	0.000405	647	182	0.0%	0.0%
45-49	0	5,536,744	0	0.002210	0.000998	13,002	6,847	0.0%	0.0%
50-54	27,623	21,228,563	0.001301	0.003255	0.002316	71,743	50,516	38.5%	54.7%
55-59	137,953	51,469,185	0.002680	0.004543	0.002994	237,915	156,363	58.0%	88.2%
60-64	352,315	63,295,362	0.005566	0.006576	0.004274	422,188	276,041	83.4%	127.6%
65-69	573,098	59,491,600	0.009633	0.010226	0.007155	604,865	423,525	94.7%	135.3%
70-74	398,399	27,616,511	0.014426	0.016614	0.012569	450,371	340,299	88.5%	117.1%
75-79	359,312	14,835,428	0.024220	0.027411	0.022294	403,468	328,289	89.1%	109.4%
80-84	598,403	8,694,412	0.068826	0.045969	0.040258	392,444	343,493	152.5%	174.2%
85-89	452,831	4,396,703	0.102993	0.078838	0.075333	343,418	327,793	131.9%	138.1%
90-94	403,218	2,755,246	0.146345	0.135131	0.134872	370,530	369,266	108.8%	109.2%
95-99	212,744	1,345,327	0.158136	0.212335	0.212684	272,008	272,039	78.2%	78.2%
100-104	40,437	86,029	0.470044	0.310199	0.313280	23,783	23,943	170.0%	168.9%
105-109	0	0	N\A	0.410849	0.416590	0	0	0.0%	0.0%
Totals	3,556,332	261,157,825	0.013618	0.013809	0.011176	3,606,381	2,918,596	98.6%	121.9%

City of Austin Employees' Retirement System
Disabled Post-Retirement Mortality for Males

Age	Benefit Weighted Deaths	Benefit Weighted Exposures	Actual Rate	Assumed Rates		Benefit Weighted Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40-44	0	45,036	0.000000	0.030000	0.030000	1,351	1,351	0.0%	0.0%
45-49	31,457	342,431	0.091863	0.030000	0.030000	10,273	10,273	306.2%	306.2%
50-54	33,384	501,631	0.066550	0.030000	0.030000	15,049	15,049	221.8%	221.8%
55-59	13,474	1,300,953	0.010357	0.030000	0.030000	39,029	39,029	34.5%	34.5%
60-64	56,173	1,524,959	0.036836	0.030000	0.030000	45,749	45,749	122.8%	122.8%
65-69	25,705	636,416	0.040390	0.030000	0.030000	19,093	19,093	134.6%	134.6%
70-74	22,292	171,229	0.130186	0.030000	0.030000	5,138	5,150	433.9%	432.8%
75-79	0	0	N\A	0.040720	0.044946	0	0	0.0%	0.0%
80-84	0	0	N\A	0.068180	0.080883	0	0	0.0%	0.0%
85-89	0	0	N\A	0.122662	0.138721	0	0	0.0%	0.0%
90-94	0	0	N\A	0.205896	0.217452	0	0	0.0%	0.0%
95-99	0	0	N\A	0.299251	0.313767	0	0	0.0%	0.0%
100-104	0	0	N\A	0.412831	0.412710	0	0	0.0%	0.0%
105-109	0	0	N\A	0.494376	0.493733	0	0	0.0%	0.0%
Other	0	17,059	0.00000	0.030000	0.030000	8,530	8,530	0.0%	0.0%
Totals	182,483	4,539,715	0.040197	0.031766	0.031769	144,210	144,223	126.5%	126.5%

City of Austin Employees' Retirement System
Disabled Post-Retirement Mortality for Females

Age	Benefit Weighted Deaths	Benefit Weighted Exposures	Actual Rate	Assumed Rates		Benefit Weighted Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40-44	0	0	N\A	0.030000	0.030000	0	0	0.0%	0.0%
45-49	25,710	406,467	0.063251	0.030000	0.030000	12,194	12,194	210.8%	210.8%
50-54	22,059	414,533	0.053213	0.030000	0.030000	12,436	12,436	177.4%	177.4%
55-59	35,881	931,897	0.038503	0.030000	0.030000	27,957	27,957	128.3%	128.3%
60-64	127,439	1,465,413	0.086964	0.030000	0.030000	43,962	43,962	289.9%	289.9%
65-69	25,208	614,312	0.041035	0.030000	0.030000	18,429	18,429	136.8%	136.8%
70-74	0	64,366	0.000000	0.030000	0.030000	1,931	1,931	0.0%	0.0%
75-79	0	0	N\A	0.037254	0.031634	0	0	0.0%	0.0%
80-84	0	0	N\A	0.063460	0.058419	0	0	0.0%	0.0%
85-89	0	0	N\A	0.109418	0.108607	0	0	0.0%	0.0%
90-94	0	0	N\A	0.179412	0.178851	0	0	0.0%	0.0%
95-99	0	0	N\A	0.269235	0.270958	0	0	0.0%	0.0%
100-104	0	0	N\A	0.372273	0.376391	0	0	0.0%	0.0%
105-109	0	0	N\A	0.463061	0.470923	0	0	0.0%	0.0%
Other	0	0	N\A	0.030000	0.030000	0	0	0.0%	0.0%
Totals	3,556,332	261,157,825	0.013618	0.013809	0.011176	116,910	116,910	98.6%	121.9%

City of Austin Employees' Retirement System
Pre-Retirement Mortality for Males

				Assumed Rates		Expected Deaths		Actual/Expected	
Age	Deaths	Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 20	0	4	0.000000	0.000290	0.000308	0.0	0.0	0.0%	0.0%
20-24	0	430	0.000000	0.000628	0.000328	0.3	0.1	0.0%	0.0%
25-29	1	1,769	0.000565	0.000578	0.000308	1.0	0.5	98.0%	188.7%
30-34	2	3,087	0.000648	0.000613	0.000397	1.9	1.2	105.8%	170.9%
35-39	5	3,727	0.001342	0.000709	0.000525	2.6	1.9	190.1%	266.0%
40-44	1	4,100	0.000244	0.000932	0.000761	3.9	3.0	25.8%	33.3%
45-49	2	4,311	0.000464	0.001563	0.001143	6.7	4.8	29.8%	42.1%
50-54	6	4,137	0.001450	0.002665	0.001717	11.0	6.8	54.7%	87.8%
55-59	5	3,618	0.001382	0.004374	0.002490	15.6	8.7	32.1%	57.8%
60-64	10	2,293	0.004361	0.007456	0.003614	16.1	7.9	62.0%	127.1%
65-69	5	754	0.006631	0.012608	0.005339	8.5	3.7	58.5%	134.4%
70-74	0	128	0.000000	0.020302	0.008154	2.2	0.9	0.0%	0.0%
75 and over	0	0	N\A	0.032758	0.012810	0.0	0.0	0.0%	0.0%
Totals	37	28,358	0.001305	0.002462	0.001391	69.8	39.5	53.0%	93.8%

City of Austin Employees' Retirement System
Pre-Retirement Mortality for Females

				Assumed Rates		Expected Deaths		Actual/Expected	
Age	Deaths	Exposures	Actual Rate	Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 20	0	1	0.000000	0.000150	0.000120	0.0	0.0	0.0%	0.0%
20-24	0	149	0.000000	0.000181	0.000110	0.0	0.0	0.0%	0.0%
25-29	0	1,174	0.000000	0.000209	0.000110	0.3	0.1	0.0%	0.0%
30-34	1	2,049	0.000488	0.000272	0.000179	0.6	0.4	181.8%	285.7%
35-39	3	2,395	0.001253	0.000355	0.000278	0.9	0.6	352.9%	476.2%
40-44	3	2,460	0.001220	0.000532	0.000426	1.3	1.0	227.3%	297.0%
45-49	2	2,590	0.000772	0.000910	0.000651	2.3	1.6	85.8%	125.0%
50-54	1	2,389	0.000419	0.001466	0.000953	3.5	2.2	28.8%	45.5%
55-59	4	2,191	0.001826	0.002152	0.001407	4.6	3.0	87.3%	134.7%
60-64	2	1,347	0.001485	0.003135	0.002152	4.0	2.8	50.5%	72.5%
65-69	1	415	0.002410	0.004983	0.003474	1.9	1.3	53.5%	74.6%
70-74	1	80	0.012500	0.008385	0.005710	0.6	0.4	169.5%	238.1%
75 and over	0	0	N\A	0.014110	0.009415	0.0	0.0	0.0%	0.0%
Totals	18	17,240	0.001044	0.001148	0.000778	19.8	13.4	90.9%	134.1%

CITY OF AUSTIN EMPLOYEES' RETIREMENT SYSTEM
SALARY EXPERIENCE
Service-Based Salary Rates

	Current Salary Scale		Actual Experience (10 Yrs)			Proposed Salary Scale	
Years of Service	Total	Step Rate/ Promotional	Total	Above Inflation	Step Rate/ Promotional	Total	Step Rate/ Promotional
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	6.25%	2.25%	5.24%	3.47%	1.63%	6.00%	2.25%
2	6.25%	2.25%	5.83%	4.07%	2.22%	6.00%	2.25%
3	6.25%	2.25%	5.96%	4.20%	2.35%	6.00%	2.25%
4	6.25%	2.25%	5.65%	3.88%	2.03%	5.75%	2.00%
5	6.25%	2.25%	5.46%	3.69%	1.85%	5.75%	2.00%
6	6.25%	2.25%	5.44%	3.67%	1.83%	5.50%	1.75%
7	6.25%	2.25%	5.14%	3.37%	1.53%	5.25%	1.50%
8	6.00%	2.00%	4.79%	3.02%	1.18%	5.00%	1.25%
9	5.50%	1.50%	4.62%	2.85%	1.00%	4.75%	1.00%
10	5.25%	1.25%	4.63%	2.87%	1.02%	4.75%	1.00%
11	5.00%	1.00%	4.17%	2.41%	0.56%	4.50%	0.75%
12	5.00%	1.00%	4.39%	2.63%	0.78%	4.50%	0.75%
13	5.00%	1.00%	4.10%	2.34%	0.49%	4.25%	0.50%
14	5.00%	1.00%	3.98%	2.22%	0.37%	4.25%	0.50%
15	5.00%	1.00%	3.87%	2.10%	0.25%	4.00%	0.25%
16	4.75%	0.75%	3.82%	2.05%	0.20%	4.00%	0.25%
17-19	4.75%	0.75%	3.56%	1.80%	-0.05%	3.75%	0.00%
20+	4.00%	0.00%	3.61%	1.85%	0.00%	3.75%	0.00%

Current Inflation Assumption	2.75%	Proposed Inflation Assumption	2.50%
Current Productivity Component	1.25%	Proposed Productivity Component	1.25%
Actual CPI-U Inflation for Period	1.76%		
Apparent Productivity Component	1.85%