



Austin Firefighters' Relief and Retirement Fund

Actuarial Experience Study

Performed By:



April 21, 2020

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April 21, 2020

Board of Trustees
Austin Firefighters'
Relief and Retirement Fund
4101 Parkstone Heights Drive, Suite 270
Austin, TX 78746

Re: Actuarial Experience Study

Dear Board:

As requested, we have performed an experience study determined as of December 31, 2018. In the course of the analysis, we compiled plan experience from January 1, 2010 through December 31, 2019. While we cannot verify the accuracy of all of the information provided, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy of the information and believe it has produced appropriate results.

The purpose of this study is to review the current actuarial assumptions and methods to determine which changes, if any, are necessary in order to achieve the objective of developing costs that are stable, predictable, and represent our best estimate of anticipated experience.

It is important to remember that the ultimate cost of your retirement plan is independent of any actuarial assumptions or methods utilized throughout the valuation process. This cost will be the sum of the benefits paid from the fund and the expenses incurred, less any net investment gains received.

The specific assumptions and methods investigated throughout the remainder of this study are as follows:

- Price Inflation
- Investment Return
- Salary Increases
- Payroll Growth
- Mortality Rates
- Retirement Rates
- Retro-DROP Elections
- Withdrawal Rates
- Disability Rates

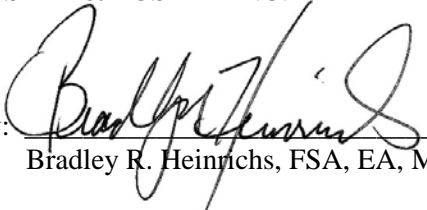
The balance of this Report presents details of the experience analysis. In addition, the report also contains the corresponding actuarial impact on the funding period required to amortize the Unfunded Actuarial Accrued Liability (UAAL) for any proposed changes.


To the best of our knowledge, this report is complete and accurate in all aspects.

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

Respectfully submitted,

FOSTER & FOSTER INC.

By: 
Bradley R. Heinrichs, FSA, EA, MAAA

By: 
Drew D. Ballard, EA, MAAA

ACTUARIAL STANDARDS OF PRACTICE

Background

The Actuarial Standards Board has provided coordinated guidance through of a series of Actuarial Standards of Practice (ASOPs) for measuring pension obligations and determining pension plan costs or contributions. The ASOPs that apply specifically to valuing pensions are as follows:

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

Please note that the contents displayed throughout the remainder of this report are in compliance and consistent with the above-mentioned Actuarial Standards of Practice. When applicable, further details of the ASOP associated with the reviewed actuarial assumption will be provided in the experience analysis, which is the basis for the remainder of the report.

Additional Required Communications

Please keep in mind that future actuarial measurements may differ significantly from current measurements due to such factors as the following:

- Plan experience differing from that anticipated by the economic or demographic assumptions
- Changes in demographic assumptions
- Increases or decreases expected as part of the natural operation of the methodology used
- Changes in plan provisions or applicable law

The data used for purposes of this report was compiled from previous actuarial valuations and from data provided by the plan administrator, unless otherwise indicated.

REVIEW OF ECONOMIC ASSUMPTIONS

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

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

- Price Inflation
- Investment Return
- Salary Increases
- Payroll Growth Rate

Please keep in mind that ASOP No. 27 states that “the best an actuary can do is to use professional judgment to estimate possible future economic outcomes based on past experience and future expectations, and to select assumptions based upon that application of professional judgment.”

Price Inflation

Generally, inflation is the rate at which prices change over the whole of the economy. The inflation assumption is considered to be the cornerstone in the development of most of the economic assumptions used in an actuarial valuation. It is employed in the building block approach used to develop the investment return assumption and the salary increase assumption. The current valuation assumption for price inflation is 2.75% per year.

ASOP No. 27 provides that in selecting an inflation assumption, specific data elements that can be used in the selection of the inflation assumption are consumer price indices, the implicit price deflator, forecasts of inflation, yields on government securities of various maturities, and yields on nominal and inflation-indexed debt.

There are several sources that can be gathered for reviewing the appropriateness of the current price inflation assumption used in the actuarial valuation. The Board's investment advisor provided a long-term inflation assumption of 2.70% per year, as of December 31, 2018.

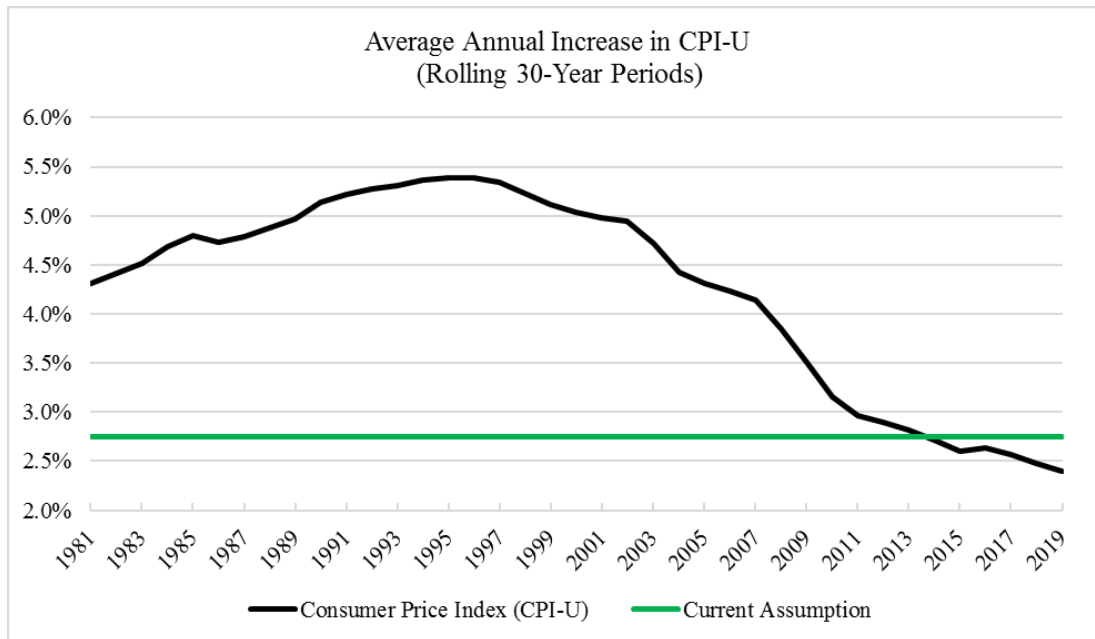
An additional source for gaining an insight into forecasts of expected inflation rates is the ‘Survey of Capital Market Assumptions’ produced by Horizon Actuarial Services each year. This report includes capital market and inflation assumptions provided by a number of investment consulting firms (including the Board's investment advisor).

In the 2019 edition of the survey, 34 investment advisors responded, of which 16 provided their assumptions based on a horizon of 20 or more years. Based on the information provided, the survey compiles an average expected long-term real rate of return for each asset class, as well as an average inflation assumption.

As illustrated in the survey, the average inflation assumption over a 10-year horizon produced by all 34 respondents was 2.21% per year and the average inflation assumption over a 20-year horizon produced by 16 respondents was 2.29% per year.

Another source for gaining an insight into future inflation rates is the OASDI Trustees Reports, which predict inflation for low, intermediate and high cost scenarios. The range between the low-cost and high-cost scenarios in the 2019 report was 2.00% to 3.20%, with the intermediate-cost scenario being 2.60%.

The graph below illustrates the historical average annual increases in the consumer price indices (CPI-U) for each 30-year period ending in 1981 to 2019.



As you can see, the average annual increase for the previous 30 years has been lower than the current assumption since 2014 and has historically been decreasing. The 30-year average increase in the CPI-U for the period ending in 2019 was 2.4% per year.

Below, we have included a summary of the inflation rate assumptions utilized across the State of Texas, as published in the PRB's 2019 "Guide to Public Retirement Systems in Texas" (PRB Guide), which focuses on the 99 actuarially-funded defined benefit systems around the state. As you can see, 51% of plans across the state use an inflation assumption that is equal to or less than the current 2.75% inflation assumption.

Inflation Assumption	Percent of Plans	Running Total
2.00%	2%	2%
2.25%	2%	4%
2.30%	3%	7%
2.50%	29%	36%
2.75%	15%	51%
3.00%	29%	80%
3.25%	4%	84%
3.40%	1%	85%
3.50%	4%	89%
3.75%	1%	90%
N/A	10%	100%

Based on the above, we believe that the current 2.75% inflation assumption is reasonable, but suggest the Board consider lowering the assumption from 2.75% to 2.50% per year for future valuations since inflation rates have generally decreased in recent years.

Investment Return

The assumed rate of investment return is currently 7.70% per year compounded annually, net of all expenses. We believe that the decision to modify the investment return assumption shall be made based upon input from your investment professionals, reflecting any significant changes to the asset allocation, and their judgment of capital market returns. Keep in mind, however, that this assumption should reflect the best estimate of investment returns expected to be realized until the last participant in the plan dies, which could be 50+ years from now.

The investment return assumption is critical in the actuarial valuation since it determines the portion of assets that will come from investment income rather than from City and member contributions. The investment return assumption should be determined based on the long-term rate of return (net of fees) the Plan expects to earn over the life of the plan. ASOP No. 27 provides that in developing a reasonable assumption, the actuary may consider a broad range of data and other inputs, including the judgment of the investment professionals. The data to be considered includes: current yields of fixed income securities, forecasts of inflation, GDP growth and total returns for each asset class, historical and current investment data (including real and nominal returns), inflation and inflation risk, dividend yields, earnings yields, real estate capitalization rates, and historical plan performance.

For this purpose, a building block approach is often used, whereby the actuary determines the weighted average expected real rate of return for the Plan's target investment portfolio and then makes adjustments for inflation and expenses not reflected in the real rates of return. Foster & Foster is an actuarial firm, and we do not have the required expertise to produce our own capital market assumptions.

As previously mentioned, the Horizon 'Survey of Capital Market Assumptions' compiles an average expected long-term real rate of return for each asset class based on a number of respondents across the industry. In order to review the current 7.70% investment return assumption, we applied the current target asset allocation of the Plan (as provided for the GASB disclosures) and mapped the asset classes to those illustrated in the Horizon survey in order to produce a long-term (20+ years) expected return for the entire portfolio. The current target allocation by asset class is illustrated below.

Asset Class	Target
Public Domestic Equity	20%
Public Foreign Equity	22%
Private Equity Fund of Funds	15%
Investment Grade Bonds	13%
TIPS	5%
High Yield / Bank Loans	5%
Emerging Market Debt	7%
Core Real Estate	5%
Non-Core Real Estate	5%
Natural Resources	3%
Total	100%

Based on the average expected geometric return and the expected risk produced in the survey by asset class, we determined that the current target asset allocation produces an expected long-term real rate of return of approximately 5.5%. Applying the recommended 2.5% inflation rate, this produces a long-term return expectation of 8.0%.

Please note this method produced an expected return that is net of investment-related expenses and does not account for expected administrative expenses (which are typically less than 0.1% of assets). This indicates that the current 7.70% investment return assumption is a reasonable long-term expectation.

The table below summarizes the investment return assumptions used around the state, as disclosed in the PRB Guide. Based on this information, 65% of plans across the state use an investment return assumption that is below the 7.70% assumption. Therefore, the 7.70% assumption is larger compared to the average assumption used by other plans across the state.

Investment Return Assumption	Percent of Plans	Running Total
5.00%	1%	1%
6.17%	1%	2%
6.25%	1%	3%
6.50%	1%	4%
6.75%	8%	12%
7.00%	14%	26%
7.25%	18%	44%
7.40%	1%	45%
7.50%	20%	65%
7.70%	2%	67%
7.75%	22%	89%
7.90%	2%	91%
8.00%	9%	100%

Based on the above, we believe that the investment return assumption is reasonable and complies with ASOP No. 27. However, the assumed rate is higher than the average assumption across the state and country. We recommend the Board consider lowering the investment return assumption from 7.70% per year to 7.50% per year, net of expenses, in conjunction with the reduction in the price inflation assumption. The actuarial impact of lowering the investment return assumption to 7.50% is shown below.

Assumed Return	Amortization Period	UAAL
7.70% (Current)	17.9 years	\$130.0 million
7.50%	25.9 years	\$149.7 million

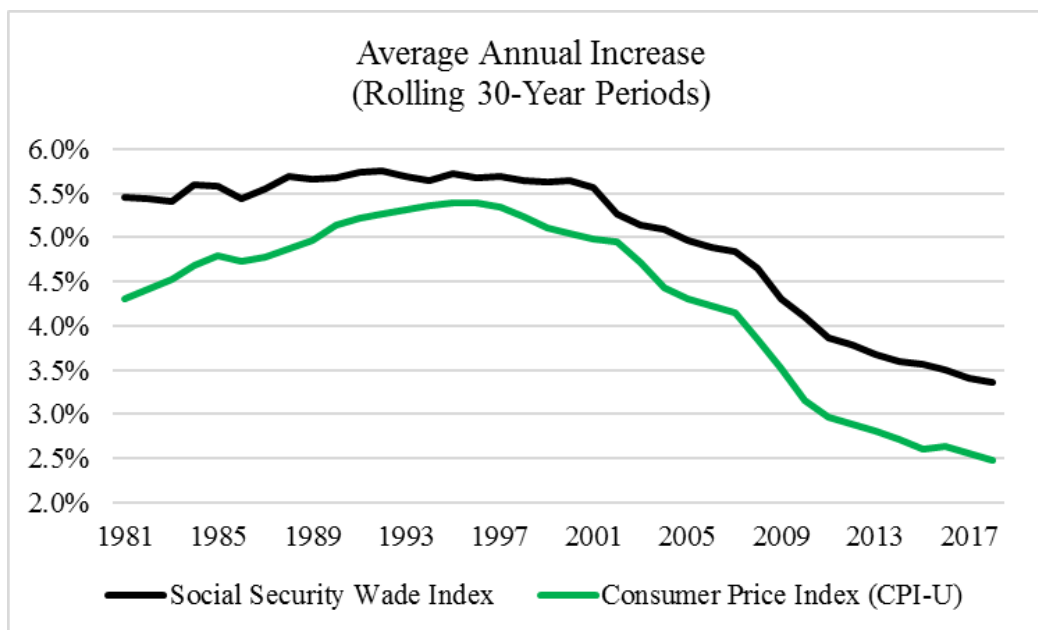
As you can see, the amortization period and unfunded actuarial accrued liability increase due to lowering the expected level of future investment earnings, absent of an increase in the scheduled annual contribution rates.

Salary Increases

The salary increase assumption is used to project a participant's salary from the valuation date until the assumed retirement age. This allows the actuary to estimate the pension benefit the member will be entitled to at retirement. This assumption should be set based upon the experience and expectation of the Plan over a member's career. It should incorporate inflation adjustments, longevity increases, and step increases due to promotions.

Currently, the valuation utilizes a service-based salary scale assumption for longevity/step increases in conjunction with a 3.00% general wage inflation assumption.

The graph below illustrates a comparison of the historical average annual increases in the national average wage index (as reported by the Social Security Administration) and the CPI-U for each 30-year period ending in 1981 to 2019. As you can see, the average increase in the wage index is greater than the CPI-U for each 30-year period. On average, the wage inflation has exceeded the price inflation by approximately 0.7% for each 30-year period ending in 1981 to 2019.



Based on this relationship, we recommend maintaining the current 3.00% general wage inflation assumption for purposes of determining expected future salary increases. On the following page, we have included a table which illustrates the actual salary increase experience for the past ten (10) years. As you can see, the actual increase was less than the expected increase at each service point. Based on this experience, the bottom table on the following page includes our recommendations in lowering the expected increases due to longevity/step increases.

The impact of only the proposed changes to the salary increase assumption is shown below. Lowering the expected increases in salary has the effect of projecting smaller expected benefits at retirement and therefore decreases plan liabilities and ultimately the plan's amortization period.

Salary Increases	Amortization Period	UAAL
Current	17.9 years	\$130.0 million
Proposed	14.2 years	\$127.4 million

Service	Count	Salary (Prior Year)	Actual Salary	Expected Salary	Actual Increase	Expected Increase	Proposed Increase
< 1	493	25,375,920	27,500,903	27,705,429	8.4%	9.2%	8.7%
1	392	21,723,706	23,646,339	24,277,327	8.9%	11.8%	10.2%
2	387	22,316,624	24,348,971	24,710,082	9.1%	10.7%	10.2%
3	383	24,076,494	25,074,563	25,790,740	4.1%	7.1%	5.6%
4	317	20,630,653	21,039,148	21,462,068	2.0%	4.0%	3.5%
5	382	24,828,464	26,211,483	26,851,983	5.6%	8.1%	7.1%
6	343	22,803,462	23,542,908	23,957,317	3.2%	5.1%	4.5%
7	304	20,143,926	21,032,113	21,266,950	4.4%	5.6%	5.1%
8	318	21,897,090	23,318,469	23,681,703	6.5%	8.2%	7.6%
9	357	25,869,043	26,604,906	26,911,565	2.8%	4.0%	3.5%
10	386	28,033,156	28,956,820	29,307,263	3.3%	4.5%	4.0%
11	414	30,903,578	32,860,012	33,740,526	6.3%	9.2%	7.6%
12	319	24,829,842	25,791,934	26,086,232	3.9%	5.1%	4.5%
13	339	27,256,717	28,137,195	28,355,163	3.2%	4.0%	3.5%
14	381	31,183,409	32,873,283	33,724,856	5.4%	8.1%	7.1%
15	393	32,945,831	34,060,697	34,443,219	3.4%	4.5%	4.0%
16	363	31,051,071	32,403,875	32,462,342	4.4%	4.5%	4.5%
17	333	29,405,169	31,045,287	31,801,690	5.6%	8.1%	7.1%
18	331	30,600,265	31,509,205	31,991,047	3.0%	4.5%	4.0%
19	314	29,257,439	29,951,852	30,436,514	2.4%	4.0%	3.5%
20	248	23,015,335	24,458,413	25,009,613	6.3%	8.7%	7.6%
21	251	24,113,606	24,970,551	25,085,384	3.6%	4.0%	3.5%
22+	2,088	209,522,188	213,746,269	217,965,932	2.0%	4.0%	3.3%
<Total>	9,836	781,782,988	813,085,196	827,024,945	4.0%	5.8%	5.1%

Service	Current	Proposed
< 1	6.00%	5.50%
1	8.50%	7.00%
2	7.50%	7.00%
3	4.00%	2.50%
4	1.00%	0.50%
5	5.00%	4.00%
6	2.00%	1.50%
7	2.50%	2.00%
8	5.00%	4.50%
9	1.00%	0.50%
10	1.50%	1.00%
11	6.00%	4.50%
12	2.00%	1.50%
13	1.00%	0.50%
14	5.00%	4.00%
15	1.50%	1.00%
16	1.50%	1.50%
17	5.00%	4.00%
18	1.50%	1.00%
19	1.00%	0.50%
20	5.50%	4.50%
21	1.00%	0.50%
22+	1.00%	0.25%

Payroll Growth

While the salary increase assumption determines the rate at which the salary of an individual member grows, the payroll growth assumption is used to determine the rate at which the covered payroll for the entire department/membership grows and plays a vital role when calculating the funding period required to amortize any existing unfunded actuarial accrued liability. Typically, the payroll growth assumption is less than the salary increase assumption since many of the higher paid members retire each year and are replaced with new, lower paid members. The current payroll growth assumption is 3.50% per year, which is 0.5% larger than the general wage inflation assumption.

Below we have summarized the payroll growth assumptions used across the state, as published by the PRB Guide. As you can see, the 52% of plans use a payroll growth assumption that is lower than the current 3.50% payroll growth assumption and 3.00% is the most commonly used assumption across the state.

Payroll Growth Assumption	Percent of Plans	Running Total
2.00%	1%	1%
2.75%	9%	10%
2.80%	1%	11%
3.00%	29%	40%
3.25%	11%	51%
3.40%	1%	52%
3.50%	21%	73%
3.75%	3%	76%
4.00%	20%	96%
4.50%	3%	99%
5.00%	1%	100%

On the following page, we have included historical information on the plan's covered payroll and active workforce since the completion of the December 31, 2009 actuarial valuation. As you can see, the actual average annual increase in covered payroll over the past 10 years has been approximately 1.9% per year, while the active workforce has increased by around 1.0% per year. The average increases over the past five (5) years have been 3.0% per year for covered payroll and 2.0% per year for the active workforce.

Based on this trend, we recommend the Board consider lowering the payroll growth assumption to a rate that is no greater than 3.00% per year. For illustrative purposes, we have determined the actuarial impact of lowering the payroll growth assumption to 3.00%, 2.50%, or 2.00% per year.

Payroll Growth	Amortization Period	UAAL
3.50% (Current)	17.9 years	\$130.0 million
3.00%	18.9 years	\$130.0 million
2.50%	20.1 years	\$130.0 million
2.00%	21.6 years	\$130.0 million

Valuation Year	Covered Payroll	Active Count
2019	\$95.6 million	1,130
2018	\$92.1 million	1,102
2017	\$88.2 million	1,045
2016	\$84.5 million	990
2015	\$85.7 million	1,050
2014	\$82.5 million	1,025
2013	\$84.0 million	1,074
2011	\$76.7 million	955
2009	\$79.0 million	1,025
2009 to 2019	1.9% per year	1.0% per year
2014 to 2019	3.0% per year	2.0% per year

REVIEW OF DEMOGRAPHIC ASSUMPTIONS

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

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

- Mortality Rates
- Retirement Rates
- Retro-DROP Elections
- Withdrawal Rates
- Disability Rates

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

Demographic trends generally remain consistent over time, absent significant changes in plan provisions. Therefore, the best true indicator of future experience is past experience. For each assumption, this analysis compares actual experience for the studied time period to the current assumptions used for purposes of the annual valuations.

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

Mortality Rates

The rate of mortality is the probability of death at a given age. As mortality rates have continued to decline over time, concern has increased about the impact of potential future mortality improvement on the magnitude of pension obligations. ASOP No. 35 discusses the importance of actuaries considering mortality improvements when measuring pension obligations. Specifically, an actuary should adjust mortality rates to reflect mortality improvement prior to the measurement date and include an assumption regarding the expected mortality improvement after the measurement date, if reasonable.

The Society of Actuaries underwent a comprehensive study with the primary objective to develop mortality tables comprised solely of public-sector lives. Additionally, contributors to the study were asked to identify plan members as teachers, public safety personnel, or general employees. This helped provide new insights into the composition of gender-specific pension mortality by factors such as job category, specifically in the public sector.

As your actuary, we feel it is necessary to adopt the most recent mortality tables applicable to public sector plans. Therefore, in conjunction with the December 31, 2018 valuation report, we amended the assumed rates of mortality to reflect the public safety mortality tables (above-median, amount-weighted) as released by the Society of Actuaries with mortality improvements projected five (5) years beyond the valuation date using Scale MP-2018. Previously, the RP-2000 (fully generational using Scale AA) with a set-back of two years for males and females was used for healthy lives and the RP-2000 disability mortality table was used for disabled lives.

The mortality rates used for the 2018 valuation are in compliance with ASOP No. 35. Since completion of that valuation, the Society of Actuaries has released an updated mortality improvement table, labeled the MP-2019 table. As the Society of Actuaries continues to release updated mortality improvement tables, we anticipate that future valuations will reflect the most recently released table. For purposes of this analysis, we have determined the impact of applying the MP-2019 mortality improvement scale, compared to the MP-2018 scale that was used in the previous valuation.

Mortality Improvement Scale	Amortization Period	UAAL
MP-2018 (Current)	17.9 years	\$130.0 million
MP-2019	17.7 years	\$128.8 million

Generally, the updated mortality improvement scale (MP-2019) reflected a decrease in the rates of mortality improvement, resulting in a slight decrease in life expectancies and therefore a slight decrease in actuarial liabilities and the amortization period.

Retirement Rates / Retro-DROP Elections

Retirement Rates

A retirement rate is the associated probability at a specific point in time that a participant will retire, given that they have attained the eligibility requirements for retirement. The associated cost due to retirement experience is determined by the age at which participants actually retire.

As you are probably aware, the current provisions for Early and Normal Retirement are as follows:

- Early Retirement: Earlier of (1) Attainment of age 45 and the completion of 10 years of service, or (2) the completion of 20 years of service, regardless of age.
- Normal Retirement: Earlier of (1) Attainment of age 50 and the completion of 10 years of service, or (2) the completion of 25 years of service, regardless of age.

The benefit structure under early retirement is very similar to normal retirement, with the exception that members who retire under early retirement are not eligible to receive any cost-of-living adjustments until the date they would have met normal retirement eligibility requirements.

The valuation currently applies retirement probabilities based on the number of years past first retirement eligibility. During the course of our analysis, it became clear that the actual incidence of retirement was happening later than assumed. As shown on the following page, there were 357 retirements since December 31, 2009, while 446 were expected based on the current retirement assumptions. Based on this experience, we have proposed many changes to the retirement rates based on the number of years past first retirement eligibility. Please note a 100% probability of retirement applies at age 65.

Years Beyond First Eligibility (45/10,0/20)	Count	Actual Retirements	Expected Retirements	Actual Rate	Expected Rate	Proposed Rate
0	267	4	5.3	1.5%	2.0%	1.5%
1	388	7	7.8	1.8%	2.0%	1.5%
2	389	5	7.8	1.3%	2.0%	1.5%
3	383	6	7.7	1.6%	2.0%	1.5%
4	396	9	7.9	2.3%	2.0%	2.0%
5	394	15	19.7	3.8%	5.0%	4.0%
6	363	16	27.2	4.4%	7.5%	5.0%
7	326	17	24.5	5.2%	7.5%	5.0%
8	306	23	30.6	7.5%	10.0%	7.5%
9	286	26	47.7	9.1%	16.7%	10.0%
10	260	46	43.3	17.7%	16.7%	16.7%
11	206	36	34.3	17.5%	16.7%	16.7%
12	159	29	31.8	18.2%	20.0%	20.0%
13	131	31	26.2	23.7%	20.0%	20.0%
14	93	26	27.9	28.0%	30.0%	30.0%
15	64	20	25.6	31.3%	40.0%	30.0%
16	45	15	22.5	33.3%	50.0%	30.0%
17	27	15	20.3	55.6%	75.0%	50.0%
18+	28	11	28.0	39.3%	100.0%	100.0%
<Total>	4,511	357	446.1			

As you can see, the proposed retirement rates reflect reductions in many of the assumed probabilities of retirement, reflecting the expectation that members will generally retire at later ages than the currently assumed rates (the weighted average retirement age for the current membership increases from approximately age 55.6 to age 56.3). This has the effect of lengthening the funding span to pay for expected benefits which decreases the plan's normal cost, actuarial accrued liability and amortization period.

Retirement Rates	Amortization Period	UAAL
Current	17.9 years	\$130.0 million
Proposed	15.6 years	\$123.9 million

Retro-DROP Elections

As you are aware, the plan offers a unique benefit feature which is commonly referred to as the Retroactive DROP, or Retro-DROP. In lieu of electing early or normal retirement, members who have reached retirement eligibility are allowed to elect Retro-DROP and have their retirement benefits calculated based upon pay and service as if they would have elected to enter DROP on a specified date in the past of their choosing. The Retro-DROP period may not exceed 84 months. The Retro-DROP accumulated balance is the sum of:

- 1) Monthly benefits that would have been deposited into a DROP account,
- 2) Employee contributions deposited into the fund between the DROP date and the actual date of retirement, and
- 3) Fixed interest at 5.0%, compounded annually

Based on our analysis of the 357 retirements that occurred in the past 10 years, it is clear that Retro-DROP remains a popular choice across the membership. The table below illustrates the experience of Retro-DROP elections. As you can see, 88% of members chose to retire with a Retro-DROP benefit.

Years Beyond First Eligibility (45/10,0/20)	Retirements	Retro-DROP Elections	Average Retro-DROP Period Elected	Actual Retro-DROP Rate	Expected Retro-DROP Rate	Proposed Retro-DROP Rate
0	4	1	0.4	25%	10%	25%
1	7	3	0.8	43%	50%	50%
2	5	3	1.2	60%	50%	50%
3	6	3	1.9	50%	50%	50%
4	9	5	1.4	56%	80%	50%
5	15	10	2	67%	80%	80%
6	16	12	3.5	75%	80%	80%
7	17	13	3.7	76%	80%	80%
8	23	20	4.2	87%	80%	80%
9	26	21	4	81%	90%	80%
10	46	44	4.7	96%	90%	100%
11	36	33	5	92%	90%	100%
12	29	29	5.1	100%	90%	100%
13	31	29	4.8	94%	90%	100%
14	26	26	5.7	100%	90%	100%
15	20	20	5.6	100%	90%	100%
16	15	15	5.9	100%	90%	100%
17	15	15	6.4	100%	90%	100%
18+	11	11	6.2	100%	90%	100%
<Total>	357	313		88%		

Based on this experience, we propose amending the assumed Retro-DROP elections which includes the percentage of retirees that will elect Retro-DROP as well as the length of Retro-DROP they will elect at the time of retirement. The table below represents the current and proposed assumptions. As you can see, the proposed assumptions incorporate the expectation that many retirees will elect the maximum allowed participation period of 7 years.

Years Beyond First Eligibility (45/10,0/20)	No DROP Elected (Current)	No DROP Elected (Proposed)	Duration 1 Election (Current)	Duration 1 Election (Proposed)	Duration 2 Election (Current)	Duration 2 Election (Proposed)
0	90%	75%	0.5 years (10%)	0.5 years (25%)	n/a	n/a
1	50%	50%	1 year (50%)	1 year (50%)	n/a	n/a
2	50%	50%	1 year (25%)	1 year (25%)	2 years (25%)	2 years (25%)
3	50%	50%	1 year (25%)	1 year (40%)	2 years (25%)	3 years (10%)
4	20%	50%	1 year (60%)	1 year (40%)	3 years (20%)	3 years (10%)
5	20%	20%	2 years (40%)	1 year (40%)	4 years (40%)	3 years (40%)
6	20%	20%	2 years (60%)	2 years (50%)	5 years (20%)	6 years (30%)
7	20%	20%	2 years (50%)	2 years (50%)	5 years (30%)	6 years (30%)
8	20%	20%	3 years (60%)	3 years (50%)	6 years (20%)	6 years (30%)
9	10%	20%	3 years (50%)	3 years (50%)	6 years (40%)	6 years (30%)
10	10%	0%	3 years (50%)	3 years (50%)	6 years (40%)	7 years (50%)
11	10%	0%	3 years (60%)	3 years (50%)	6 years (30%)	7 years (50%)
12	10%	0%	3 years (75%)	3 years (50%)	6 years (15%)	7 years (50%)
13	10%	0%	3 years (40%)	3 years (50%)	6 years (50%)	7 years (50%)
14	10%	0%	3 years (40%)	3 years (25%)	6 years (50%)	7 years (75%)
15	10%	0%	3 years (20%)	3 years (25%)	6 years (70%)	7 years (75%)
16	10%	0%	3 years (20%)	3 years (25%)	6 years (70%)	7 years (75%)
17	10%	0%	3 years (20%)	3 years (25%)	6 years (70%)	7 years (75%)
18+	10%	0%	3 years (20%)	3 years (25%)	6 years (70%)	7 years (75%)

In general, the proposed assumptions include increasing the probability that a member will elect to utilize Retro-DROP and include an increase in the assumed Retro-DROP participation period. Since the existence of Retro-DROP adds cost to the plan, the proposed assumptions result in an increase in actuarial liabilities and the plan's amortization period.

Retro-DROP Elections	Amortization Period	UAAL
Current	17.9 years	\$130.0 million
Proposed	18.7 years	\$133.2 million

We have determined the aggregate impact of the proposed changes to the assumed retirement rates in conjunction with the Retro-DROP elections. The combination effect would be a reduction in the amortization period from 17.9 years to 16.3 years.

Extending the discussion surrounding Retro-DROP, it was previously noted that participants receive fixed interest earnings at 5.0%, compounded annually, during their DROP participation period. It should also be noted that retirees electing Retro-DROP are allowed to keep their accumulated DROP balances in the plan following separation of employment. Each retiree's DROP balance is guaranteed to be credited with a return of 5.00% per year, compounded annually, until he or she withdraws the accumulated DROP balance from the plan.

The accumulated DROP balances are invested in the same manner as the other assets in the plan. This means that depending upon the actual plan investment performance for a given year, there will be a gain or loss associated with this benefit provision. The table on the following page shows an illustration of how the gain/loss is calculated. Please note the earnings shown are an approximation based on the accumulated DROP balances at the end of the prior year and do not account for additions or withdrawals during the year.

Year Ending	Accumulated DROP Balances	Credited Return	Credited Earnings (Est.)	Plan Return	Plan Earnings (Est.)	(Gain)/Loss
2019	TBD	5.00%	4,970,000	15.70%	15,600,000	(10,630,000)
2018	99,360,841	5.00%	4,320,000	-2.73%	(2,360,000)	6,680,000
2017	86,322,683	5.00%	3,470,000	17.11%	11,870,000	(8,400,000)
2016	69,354,195	5.00%	2,560,000	7.04%	3,610,000	(1,050,000)
2015	51,207,560	5.00%	1,950,000	0.73%	280,000	1,670,000
2014	38,945,510	5.00%	1,390,000	5.50%	1,530,000	(140,000)
2013	27,785,420					

As you can see, the plan's actual 2018 investment return was -2.73% (compared to the 5% credited to DROP accounts) which resulted in an estimated loss of around \$6.7 million on the accumulated DROP balances. In 2017, the actual plan return of 17.11% was significantly greater than the 5% credited to DROP accounts, yielding an estimated gain on DROP accounts of \$8.4 million.

It is important to point out that the accumulated DROP balances on December 31, 2018 of \$99.4 million represented approximately 11% of the total assets in the plan. As the DROP assets continue to represent a larger percentage of the total assets, the pressure of achieving an investment return larger than the 5% credited to DROP accounts becomes a more significant factor for the overall health and actuarial soundness of the plan.

Ideally, the existence of this provision will produce long-term savings as the actual investment earnings are expected to exceed the 5% annual return credited to DROP accounts. The actuarial valuation currently does not utilize any assumptions to account for this expectation. If assumptions were put into place for future valuations, we would expect to see a decrease in the amortization period of between 1-2 years.

Withdrawal Rates

The withdrawal rate, or termination rate, is the probability that a participant will separate employment from a cause other than disability, death, or retirement. Currently, the valuation utilizes the following service-based table:

Service	Rate
<5	1.0%
5-13	0.5%
14+	0.0%

Overall, the actual incidence of termination was more than expected. Since 2010, there have been 42 non-retirement terminations, while about 34 were expected. Given this experience, we are proposing slight changes to the assumed termination rates. The experience, along with the current and proposed assumptions, are displayed in the table below.

Service	Count	Actual	Expected	Actual Termination Rate	Expected Termination Rate	Proposed Termination Rate
<8	3,032	30	25.1	1.0%	0.8%	1.0%
8-13	1,794	11	9.0	0.6%	0.5%	0.5%
14+	907	1	0.0	0.1%	0.0%	0.0%
<Total>	5,733	42	34.1	0.7%	0.6%	0.7%

The changes to the assumed rates include increasing the probability of termination from 0.5% to 1.0% upon completion of five to seven years of service. The assumed rates at all other services points remain unchanged. The proposed changes have a minor actuarial impact on the valuation results.

Withdrawal Rates	Amortization Period	UAAL
Current	17.9 years	\$130.0 million
Proposed	17.8 years	\$130.2 million

Disability Rates

The disability rate assumption is the probability that a member will become disabled while an active member in the plan. Currently, the valuation utilizes an age-based assumption for predicting the occurrence of future disabilities.

Over the studied time period (2010-2019), there were five (5) disability retirements in the plan, while nearly 20 were expected. Given this experience, we are proposing changes to the assumed disability rates. The experience, along with the current and proposed assumptions, are displayed in the table below.

Age	Count	Actual	Expected	Actual Disability Rate	Expected Disability Rate	Proposed Disability Rate
<30	518	0	0.1	0.000%	0.019%	0.020%
30-39	3,451	2	1.8	0.058%	0.052%	0.060%
40-49	4,075	3	8.6	0.074%	0.211%	0.100%
50+	2,200	0	9.2	0.000%	0.418%	0.050%
<Total>	10,244	5	19.7	0.049%	0.192%	0.072%

As you can see, the most significant difference between the actual and expected number of disability retirements occurred at ages 50 and above. The proposed assumption changes have the result of reducing the plan's amortization period, as shown below.

Disability Rates	Amortization Period	UAAL
Current	17.9 years	\$130.0 million
Proposed	17.3 years	\$129.0 million

SUMMARY

As stated throughout the content of this report, we have recommended a number of changes to the actuarial assumptions utilized for purposes of completing the annual valuations. It is our belief that these changes reflect sound actuarial principles, are our best estimate of anticipated future experience, and will assist in achieving the objective of describing the true funded nature of the plan.

Below we have provided a summary of the impact on the plan's amortization period for the discussed changes. We look forward to discussing the results with the Board at an upcoming meeting.

Change	Assumption	Investment Return	Payroll Growth	Amortization Period (Years)
	Current	7.70%	3.50%	17.9
(1)	Investment Return	7.50%	3.50%	25.9
(2)	Salary Increases	7.70%	3.50%	14.2
(3a)	Payroll Growth	7.70%	3.00%	18.9
(3b)	Payroll Growth	7.70%	2.50%	20.1
(3c)	Payroll Growth	7.70%	2.00%	21.6
(4)	Mortality Rates	7.70%	3.50%	17.7
(5a)	Retirement Rates	7.70%	3.50%	15.6
(5b)	Retro-DROP Elections	7.70%	3.50%	18.7
(6)	Withdrawal Rates	7.70%	3.50%	17.8
(7)	Disability Rates	7.70%	3.50%	17.3
(8a)	Combination	7.70%	3.50%	12.8
(8b)	Combination	7.70%	3.00%	13.3
(8c)	Combination	7.70%	2.50%	13.8
(8d)	Combination	7.70%	2.00%	14.4
(9a)	Combination	7.50%	3.50%	17.2
(9b)	Combination	7.50%	3.00%	18.2
(9c)	Combination	7.50%	2.50%	19.2
(9d)	Combination	7.50%	2.00%	20.5