

NEBRASKA RETIREMENT SYSTEMS COMMITTEE

LR 314 Interim Study Report

Actuarial Experience Analysis of the State-Administered Retirement Systems

2020

Committee Members

Senator Mark Kolterman, Chairman
Senator Brett Lindstrom, Vice-Chair
Senator Kate Bolz
Senator Mike Groene
Senator Rick Kolowski
Senator John Stinner

Kate Allen, Committee Legal Counsel
Katie Quintero, Committee Clerk

Background and Information Regarding the Actuarial Experience Study Report

Background

Neb. Rev. Stat. 84-1503 describes duties of the Public Employees Retirement Board (PERB) and Nebraska Public Employees Retirement System Director. One of the duties in this section is a requirement to obtain an experience study of the retirement systems administered by the PERB every four years or at the request of the Nebraska Retirement Systems Committee of the Legislature.

The relevant portion of the experience study language in subdivision (4)(a) of 84-1503 states:

(4)(a) Beginning in 2016, and at least every four years thereafter in even-numbered years or at the request of the Nebraska Retirement Systems Committee of the Legislature, the board shall obtain an experience study. Within thirty business days after presentation of the experience study to the board, the actuary shall present the study to the Nebraska Retirement Systems Committee at a public hearing. If the board does not adopt all of the recommendations in the experience study, the board shall provide a written explanation of its decision to the Nebraska Retirement Systems Committee and the Governor. The explanation shall be delivered within ten business days after formal action by the board to not adopt one or more of the recommendations.

Public Employees Retirement Board Process

Actuaries with Cavanaugh MacDonald made numerous presentations to the Public Employees Retirement Board regarding various components of the Actuarial Experience Study.

At the September PERB meeting, the actuaries presented a “Preliminary Discussion of Economic Assumptions”. Following extensive discussion with the PERB board members, the actuaries presented their “Initial Recommendations on Actuarial Assumptions at the October PERB meeting.

In response to these initial recommendations, the PERB members provided guidance to the actuaries regarding the recommendation to lower the assumed investment rate incrementally over a four-year period from 7.5% to 7.0%.

At the November PERB meeting, the actuaries made a “Follow-up on Experience Study Recommendations” presentation. The PERB formally adopted the “Final Experience Study Report” at the December PERB meeting. After quite a bit of discussion, the PERB members decided to wait until the PERB’s January 25, 2021 meeting to hear the actuaries’ presentation on “Board Decisions on Actuarial Factors”.

Nebraska Retirement Systems Committee Public Hearing

Due to COVID-19 meeting restrictions, Nebraska Retirement Systems Committee Chairman, Senator Mark Kolterman, delayed the presentation of the Experience Study to the Committee until hearings began during the 2021 session.

APPENDICES

Appendix A

2020 Actuarial Experience Study



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***NEBRASKA PUBLIC EMPLOYEES
RETIREMENT SYSTEMS***

Experience Study
**Study Period: Four Years Ending June 30, 2019 or
December 31, 2019**

Date: December 21, 2020





Table of Contents

Section

1.	Board Summary	Page 1
2.	Actuarial Methods	Page 11
3.	Economic Assumptions	Page 17
4.	Demographic Assumptions	Page 43
5.	Retiree Mortality	Page 45
6.	Active Mortality	Page 51
7.	Retirement	Page 53
8.	Disability	Page 69
9.	Termination of Employment (Withdrawal)	Page 71

APPENDICES

A – Current Assumptions and Methods

B – Proposed Assumptions and Methods

C – Graphs of Actual and Expected Results

D – Exhibits of Actual and Expected Results



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The experience and dedication you deserve

December 21, 2020

Public Employees Retirement Board
Nebraska Public Employees Retirement System
Post Office Box 94816
Lincoln, NE 68509

Dear Members of the Board:

It is a pleasure to submit this report of our investigation of the experience of the Nebraska Public Employees Retirement System (NPERS) for the four-year period ending in 2019. For the Schools, Patrol, and Judges Plans, this is the period July 1, 2015 to June 30, 2019, while for the County and State Cash Balance Plans the period is January 1, 2016 through December 31, 2019. The study was based on the data submitted by NPERS for the annual valuations of each of the plans. In preparing this report we relied, without audit, on the data provided.

The purpose of this report is to present the results of our review of the actuarial methods and assumptions used in the actuarial valuations of the NPERS plans. With the Board's approval of the recommendations in this report, these assumptions and methods would be used in the January 1, 2021 and July 1, 2021 actuarial valuations.

We hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board (ASB) and the Code of Professional Conduct and Qualification Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

We further certify that, in our opinion, the assumptions developed in this report satisfy Actuarial Standards of Practice, in particular, No. 27 (Selection of Economic Assumptions for Measuring Pension Obligations) and No. 35 (Selection of Demographic and Other Non-economic Assumptions for Measuring Pension Obligations). At the time this study was prepared, the world is in the midst of a pandemic. We have considered available information, but do not believe that there is yet sufficient data to influence the recommended assumptions which are intended to be long term estimates. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.

In order to prepare the results in this study we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

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SECTION 1 - BOARD SUMMARY

Introduction

The purpose of an actuarial valuation is to provide a timely best estimate of the ultimate costs of a retirement system. Actuarial valuations of the Nebraska Public Employees Retirement System (NPERs) five plans (School Retirement System, Judges Retirement System, State Patrol Retirement System, State Cash Balance Plan, and County Cash Balance Plan) are prepared annually to determine the actuarial contribution rate required to fund them on an actuarial reserve basis, i.e. the current assets plus future contributions, along with investment earnings will be sufficient to provide the benefits promised by the system. The valuations require the use of certain assumptions with respect to the occurrence of future events, such as rates of death, termination of employment, retirement age, and salary changes to estimate the obligations of the system.

The basic purpose of an experience study is to determine whether the actuarial assumptions currently in use align with the actual emerging experience of the plan and to review if there have been any changes in expectations of future plan experience. This information, along with the professional judgment of system personnel and advisors, is used to evaluate the appropriateness of continued use of the current actuarial assumptions. When analyzing experience and assumptions, it is important to recognize that actual experience is reported in the short term while assumptions are intended to be long-term estimates of experience. Therefore, actual experience is expected to vary from study period to study period, without necessarily indicating a change in assumptions is needed.

At the request of the Nebraska Public Employees Retirement Board (PERB), Cavanaugh Macdonald Consulting, LLC (CMC), performed a study of the experience of the NPERs plans, for the four-year periods ending in 2019. For the School, Patrol, and Judges plans, this is the period July 1, 2015 to June 30, 2019, while for the County and State plans the period is January 1, 2016 through December 31, 2019. This report presents the results, analysis, and resulting recommendations of our study. It is anticipated that the changes, if approved, will first be reflected in the January 1, 2021 and July 1, 2021 actuarial valuations.

These assumptions have been developed in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the applicable Actuarial Standards of Practice adopted by the Actuarial Standards Board (ASB). While the recommended assumptions represent our best estimate of future experience, there are other reasonable assumption sets that could be supported by the results of this experience study. Those other sets of reasonable assumptions could produce liabilities and costs that are either higher or lower.

Our Philosophy

Similar to an actuarial valuation, the calculation of actual and expected experience is a fairly mechanical process, and differences between actuaries in this area are generally minor. However, the setting of assumptions differs, as it is more art than science. In this report, we have recommended changes to certain assumptions. To explain our thought process, we offer a brief summary of our philosophy:

- **Don't Overreact:** When we see significant changes in experience, we generally do not adjust our rates to reflect the entire difference. We will typically recommend rates somewhere between the old rates and the new experience. If the experience during the next study period shows the same result, we will probably recognize the trend at that point in time or at least move further in the direction of the observed experience. On the other hand, if experience



SECTION 1 - BOARD SUMMARY

periods of time, as clearly seen in the economic downturn that occurred in 2008 followed by the rebound in many financial markets in the years following. Our goal is to try to find the emerging long-term trends in the midst of this volatility so that we can then apply reasonable assumptions.

Most of the economic assumptions used by actuaries are developed through a building-block approach. For example, the expected return on assets is based on the expectation for inflation plus the expected real return on assets. At the core of the economic assumptions is the inflation assumption. As we discuss later in the report, based on the historical trends of inflation, the market pricing of inflation, and other economic forecasts, we are recommending a decrease in the inflation assumption from 2.75% to 2.35%. This change moves the assumption closer to recent inflation levels and closer to the levels expected by most economic forecasts.

With the change in inflation assumption, most of the other economic assumptions which build upon it are also impacted. In addition, we are also recommending several other changes to the set of economic assumptions including:

- Lowering the productivity assumption from 0.75% to 0.50% which results in a general wage growth assumption of 2.85%.
- Lowering the payroll growth assumption from 3.50% to 2.85%, consistent with the change in the general wage inflation.
- Lowering the real rate of return from 4.75% to 4.65%.
- Explicitly including the administrative expenses as part of the actuarial contribution rate instead of netting the expenses out of investment earnings.

The following table summarizes the current and proposed economic assumptions:

	Current Assumptions	Proposed Assumptions
Price Inflation	2.75%	2.35%
Investment Return	7.50%	7.00%
General Wage Growth	3.50%	2.85%
Payroll Growth	3.50%	2.85%
Cost-of-Living Adjustment (Tier 1)	2.25%	2.00%
Cash Balance Interest Credit Rate	6.25%	6.00%

Note: Cost-of-living assumption for other benefit tiers is 1.0% (both current and proposed).

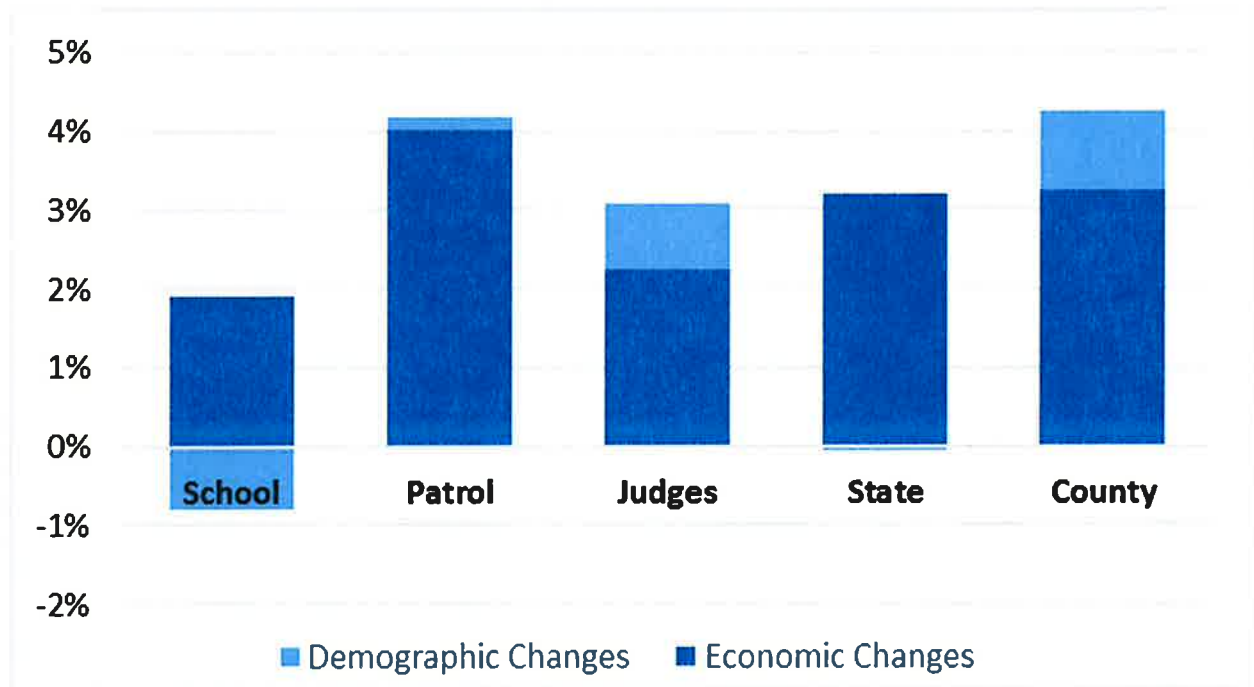
In order to provide a smoother cost pattern, the proposed change to the inflation assumption of 40 basis points will be phased-in over four years. We believe the set of economic assumptions in each year complies with actuarial standards of practice.



SECTION 1 - BOARD SUMMARY

and normal cost). However, the actual impact may vary due to underlying changes that occur between valuation dates. Of particular note, the comparability may be affected by the actual investment return experience during the prior year.

The relative and net impact of the full four-year phase-in of both the recommended economic and demographic assumptions on each Plan's actuarial accrued liability is shown in the following graph:



The following tables illustrate the expected impact over the next seven valuations under the current and proposed assumptions. The School, Patrol, and Judges tables also show the results if the future liability experience gains/losses and assumption changes are amortized over 25 rather than 30 years. Note that these results rely on the projection models prepared in conjunction with the most recent actuarial valuations and assume that all assumptions are met in future years. Actual results, especially the investment returns each year, will vary from those assumed and therefore the valuation results will also vary. These projections are shown for comparative purposes only.



SECTION 1 - BOARD SUMMARY

STATE PATROL RETIREMENT SYSTEM

The following table illustrates the expected impact over the next seven valuations as described above.

	Current Assumptions		Proposed Assumptions	
	30-Year Amortization	30-Year Amortization	25-Year Amortization	
UAAL				
2021	61,174,800	67,985,535	67,985,535	
2022	65,654,775	75,940,225	75,890,942	
2023	70,801,357	84,527,412	84,370,456	
2024	74,566,069	96,895,420	96,558,262	
2025	73,045,700	95,970,135	95,352,481	
2026	71,384,740	94,409,805	93,479,252	
2027	69,514,924	92,338,243	91,069,281	
Funded Ratio				
2021	88.46%	87.33%	87.33%	
2022	88.07%	86.42%	86.42%	
2023	87.60%	85.47%	85.50%	
2024	87.40%	84.10%	84.16%	
2025	88.07%	84.73%	84.82%	
2026	88.72%	85.42%	85.56%	
2027	89.36%	86.14%	86.33%	
Actuarial Rate				
2021	45.59%	47.45%	47.60%	
2022	46.44%	49.30%	49.61%	
2023	47.32%	51.19%	51.68%	
2024	48.02%	53.87%	54.60%	
2025	48.13%	54.21%	54.97%	
2026	48.23%	54.46%	55.22%	
2027	48.13%	54.41%	55.17%	
Additional Appropriation				
2021	13.19%	15.05%	15.20%	
2022	13.96%	16.82%	17.13%	
2023	14.76%	18.63%	19.12%	
2024	15.36%	21.21%	21.94%	
2025	15.35%	21.43%	22.19%	
2026	15.33%	21.56%	22.32%	
2027	15.05%	21.33%	22.09%	



SECTION 1 - BOARD SUMMARY

STATE CASH BALANCE PLAN

The following table illustrates the expected impact over the next seven valuations as described above.

	Current Assumptions	Proposed Assumptions
UAAL		
2021	(93,753,262)	(71,394,540)
2022	(145,251,327)	(105,286,949)
2023	(174,395,359)	(112,916,903)
2024	(244,077,169)	(157,345,145)
2025	(283,144,808)	(181,320,870)
2026	(326,081,173)	(207,768,048)
2027	(373,216,690)	(238,001,571)
Funded Ratio		
2021	105.39%	104.06%
2022	108.03%	105.71%
2023	109.25%	105.85%
2024	112.43%	107.80%
2025	113.85%	108.65%
2026	115.31%	109.54%
2027	116.82%	110.53%
Actuarial Rate		
2021	9.27%	10.02%
2022	8.70%	9.73%
2023	8.44%	9.77%
2024	7.77%	9.43%
2025	7.47%	9.24%
2026	7.17%	9.05%
2027	6.86%	8.84%
Contribution Shortfall/(Margin)		
2021	(3.02%)	(2.27%)
2022	(3.58%)	(2.56%)
2023	(3.84%)	(2.52%)
2024	(4.52%)	(2.86%)
2025	(4.81%)	(3.04%)
2026	(5.12%)	(3.24%)
2027	(5.43%)	(3.45%)



SECTION 2 – ACTUARIAL METHODS

ACTUARIAL COST METHOD

The systematic financing of a pension plan requires that contributions be made in an orderly fashion while a member is actively employed, so that the accumulation of these contributions, together with investment earnings should be sufficient to provide promised benefits and cover administration expenses. The actuarial valuation is the process used to determine when money should be contributed; i.e., as part of the budgeting process.

The actuarial valuation will not impact the amount of benefits paid or the actual cost of those benefits. In the long run, actuaries cannot change the costs of the pension plan, regardless of the funding method used or the assumptions selected. However, the choice of actuarial methods and assumptions **will** influence the incidence of costs.

The valuation or determination of the present value of all future benefits to be paid by the System reflects the assumptions that best seem to describe anticipated future experience. The choice of a funding method does not impact the determination of the present value of future benefits. The funding method determines only the incidence or allocation of cost. In other words, the purpose of the funding method is to allocate the present value of future benefits determination into annual costs. In order to do this allocation, it is necessary for the funding method to “break down” the present value of future benefits into two components: (1) that which is attributable to the past (2) and that which is attributable to the future. The excess of that portion attributable to the past over the plan assets is then amortized over a period of years. Actuarial terminology calls the part attributable to the past the “past service liability” or the “actuarial accrued liability”. The portion of the present value of future benefits allocated to the future is commonly known as the “present value of future normal costs”, with the specific piece of it allocated to the current year being called the “normal cost”. The difference between the plan assets and actuarial accrued liability is called the “unfunded actuarial accrued liability”.

Two key points should be noted. First, there is no single “correct” funding method. Second, the allocation of the present value of future benefits, and hence cost, to the past for amortization and to the future for annual normal cost payments is not necessarily in a one-to-one relationship with service credits earned in the past and future service credits to be earned.

There are various actuarial cost methods, each of which has different characteristics, advantages and disadvantages. However, Governmental Accounting Standard Board Statement Numbers 67 and 68 require that the Entry Age Normal cost method be used for financial reporting. Most systems do not want to use a different actuarial cost method for funding and financial reporting. In addition, the Entry Age Normal method has been the most common funding method for public systems for many years. This is the cost method currently used by NPERs.

The rationale of the Entry Age Normal (EAN) cost method is that the cost of each member’s benefit is determined to be a level percentage of his salary from date of hire to the end of his employment with the employer. This level percentage multiplied by the member’s annual salary is referred to as the normal cost and is that portion of the total cost of the employee’s benefit which is allocated to the current year. The portion of the present value of future benefits allocated to the future is determined by multiplying this percentage times the present value of the member’s assumed earnings for all future years including the current year. The Entry Age Normal actuarial accrued liability is then developed by subtracting from the present value of future benefits that portion of costs allocated to the future. To determine the unfunded actuarial accrued liability, the value of plan assets is subtracted from the Entry Age Normal actuarial



SECTION 2 – ACTUARIAL METHODS

AMORTIZATION OF UAAL

As described earlier, actuarial accrued liability is the portion of the actuarial present value of future benefits that are not included in future normal costs. Thus it represents the liability that, in theory, should have been funded through normal costs for past service. Unfunded actuarial accrued liability (UAAL) exists when the actuarial accrued liability exceeds the actuarial value of plan assets. These deficiencies can result from (i) plan improvements that have not been completely paid for, (ii) experience that is less favorable than expected, (iii) assumption changes that increase liabilities, or (iv) contributions that are less than the actuarial contribution rate.

There are a variety of different methods that can be used to amortize the UAAL. Each method results in a different payment stream and, therefore, has cost implications. For each methodology, there are three characteristics:

- The period over which the UAAL is amortized,
- The rate at which the amortization payment increases, and
- The number of components of UAAL (separate amortization bases).

Amortization Period: The amortization period can be either closed or open. If it is a closed amortization period, the number of years remaining in the amortization period declines by one in each future valuation. Alternatively, if the amortization period is an open or rolling period, the amortization period does not decline but is reset to the same number each year. This approach essentially “refinances” the System’s debt (UAAL) every year.

Amortization Payment: The level dollar amortization method is similar to the method in which a home owner pays off a mortgage. The liability, once calculated, is financed by a constant fixed dollar amount, based on the amortization period until the liability is extinguished. This results in the liability steadily decreasing while the payments, though remaining level in dollar terms, in all probability decrease as a percentage of payroll. (Even if a plan sponsor’s population is not growing, inflationary salary increases will usually be sufficient to increase the aggregate covered payroll).

The rationale behind the level percentage of payroll amortization method is that since normal costs are calculated to be a constant percentage of pay, the unfunded actuarial accrued liability should be paid off in the same manner. When this method of amortizing the unfunded actuarial accrued liability is adopted, the initial amortization payments are lower than they would be under a level dollar amortization payment method, but the payments increase at a fixed rate each year so that ultimately the annual payment far exceeds the level dollar payment. The expectation is that total payroll will increase at the same rate so that the amortization payments will remain constant, as a percentage of payroll. In the initial years, the level percentage of payroll amortization payment is often less than the interest accruing on the unfunded actuarial accrued liability meaning that even if there are no experience losses, the dollar amount of the unfunded actuarial accrued liability will grow (called negative amortization). This is particularly true if the plan sponsor is paying off the unfunded actuarial accrued liability over a long period, such as 20 or more years.

Amortization Bases: The UAAL can either be amortized as one single amount or as components or “layers”, each with a separate amortization base, payment and period. If the UAAL is amortized as one amount, the UAAL is recalculated each year in the valuation and experience gains/losses or other changes in the UAAL are folded into the single UAAL amortization base. The amortization payment is then the total UAAL divided by an amortization factor for the applicable amortization period.



SECTION 2 – ACTUARIAL METHODS

most of the considerations outlined in ASOP 4 would lead us to recommend a shorter amortization period than the current 30 years for School, Patrol and Judges. For these three plans, the UAAL is amortized as a level percentage of payroll which creates a pattern of contributions that is back-end loaded, i.e., payments are much higher in the latter part of the amortization period. This contribution pattern results in “negative amortization” wherein the dollar amount of the UAAL increases for several years because the dollar amount of the amortization payment is less than the interest on the UAAL. The period of time the plan experiences negative amortization is dependent on the investment return assumption and the payroll growth assumption. The reduction to both of these assumptions over the last two experience studies has helped reduce the number of years of negative amortization and the resulting growth in the dollar amount of UAAL, but with an amortization period of 30 years the dollar amount of the UAAL is not expected to be lower than the initial amount for 18 years. Because the State and County plans use level-dollar amortization, they do not experience negative amortization. Each amortization payment includes some portion that reduces the dollar amount of the UAAL.

Given trends in the industry, guidance from the Government Finance Officers Association (GFOA), recent guidance from the Actuarial Standards Board about amortization periods, and the State’s desire to fund these plans with fixed contribution rates, **we recommend NPERS work to change the statutes to reduce the current 30 year amortization period for new bases for the School, Patrol and Judges Plans to 25 years.** An amortization period of 20 years would conform better to best practices in the industry, but would also introduce more volatility in the actuarial contribution rate and, therefore, any additional state contributions. To implement the change in the amortization period with minimal financial impact on the short-term valuation results, we suggest the change be made prospectively to new amortization bases and existing amortization bases remain on their current payment schedules. Under the layered amortization method, there are other, considerations that can create volatility or discontinuity in contribution rates. These can be addressed by combining amortization bases or synchronizing the amortization periods to smooth out the UAAL contribution rate in future years. It is extremely difficult to write these discretionary decisions in statute. As a result, it would be ideal if the Legislature would delegate the authority to the PERB to make decisions on combining, offsetting, or synchronizing existing UAAL amortization bases. We recommend the Board consider the advantages and disadvantages of such a change and then make a decision about whether to seek legislative change.

The following table illustrates the expected impact on contributions over the next seven valuations if future amortization bases for assumption changes and experience gains/losses are amortized over 25 rather than 30 years. Note that these results rely on the projection models prepared in conjunction with the most recent actuarial valuations and assume that all assumptions are met in future years. Actual results, especially the investment returns each year, will vary from those assumed and therefore the valuation results will also vary. These projections are shown for comparative purposes only.



SECTION 3 – ECONOMIC ASSUMPTIONS

Economic assumptions include price inflation, general wage increase (the across-the-board portion of salary increases), payroll growth, the long-term investment return, interest crediting rate for the Cash Balance Plans, salary increase for individual members, and the cost-of-living adjustment assumptions. Unlike demographic assumptions, economic assumptions do not lend themselves to analysis based solely upon internal historical patterns, because both salary increases and investment return are influenced more by external forces which are difficult to accurately predict over the long term. The investment return and salary increase assumptions are generally selected on the basis of expectations in an inflation-free environment and then increased by the long-term expectation for price inflation.

Sources of data considered in the analysis and selection of the economic assumptions included:

- Historical observations of price and wage inflation statistics and investment returns.
- The 2020 Social Security Trustees Report.
- Future expectations of the Nebraska Investment Council (NIC) and their consultant (Aon Consulting), along with the expectations of other investment consultants (Horizon Actuarial Survey).
- U. S. Department of the Treasury bond rates.
- Forecasts from various sources including the Congressional Budget Office, Federal Reserve Bank and the Survey of Professional Forecasters.
- Assumptions used by other large public retirement systems, based on the Public Fund Survey, published by the National Association of State Retirement Administrators.

Note that some of these sources were published after the COVID-19 pandemic impacted the world economy and some were issued prior to the pandemic. In evaluating the forecasts, we considered the timing on the published information and the potential impact COVID-19 might have had on the forward-looking measurements.

ACTUARIAL STANDARD OF PRACTICE NUMBER 27

Actuarial Standards of Practice are issued by the Actuarial Standards Board to provide guidance to actuaries with respect to certain aspects of performing actuarial work. Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, provides actuaries with guidance regarding the selection of economic assumptions for measuring pension obligations. Because no one knows what the future holds, an actuary must use professional judgment to estimate possible future economic outcomes, based on a mixture of past experience, future expectations, and professional judgment. Our analysis of the expected rate of return, as well as all other economic assumptions, was performed following the guidance in ASOP 27.

Due to the application of ASOP 27, it may be informative for others to be aware of the basic content of ASOP 27. The standard applies to the selection of economic assumptions to measure obligations under any defined benefit pension plan that is not a social insurance program (e.g., Social Security).

With respect to relevant data, the standard recommends the actuary review appropriate recent and long-term historical economic data but advises the actuary not to give undue weight to recent experience. Furthermore, it advises the actuary to consider that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment. In addition, with respect to any particular valuation, each economic assumption should be consistent with all other economic assumptions over the measurement period.



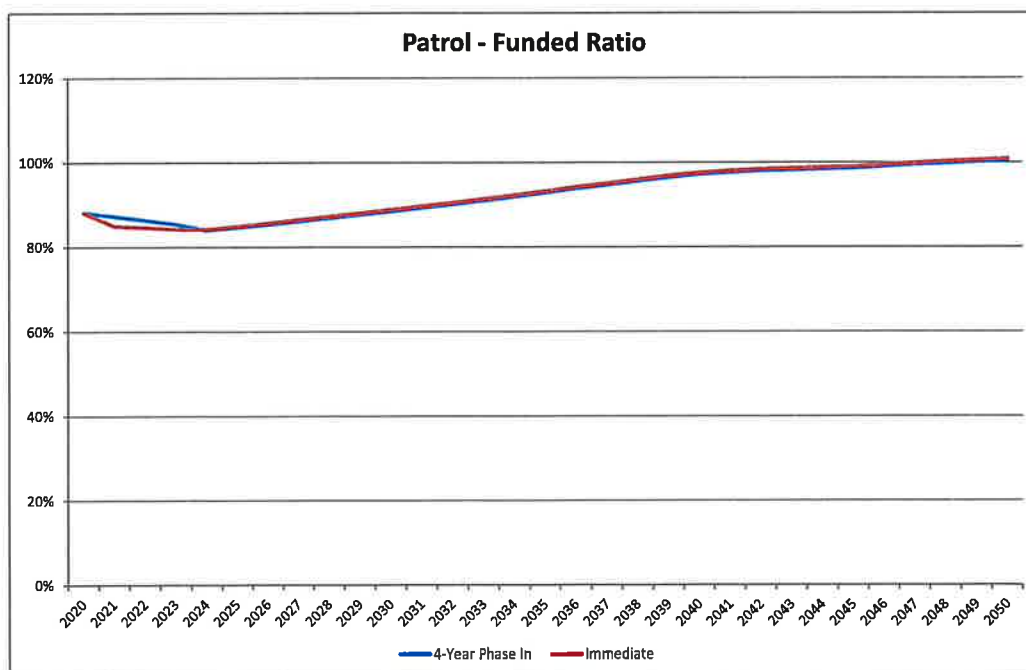
SECTION 3 – ECONOMIC ASSUMPTIONS

The following table summarizes the current and proposed economic assumptions:

	Current Assumptions	Proposed Assumptions
Price Inflation	2.75%	2.35%
Real Rate of Return	4.75%	4.65%
Investment Return	7.50%	7.00%
Productivity	0.75%	0.50%
General Wage Growth	3.50%	2.85%
Payroll Growth	3.50%	2.85%
Cost-of-Living Adjustment (Tier 1)	2.25%	2.00%
Cash Balance Interest Credit Rate	6.25%	6.00%

Note: Cost-of-living assumption for other benefit tiers is 1.0% (both current and proposed).

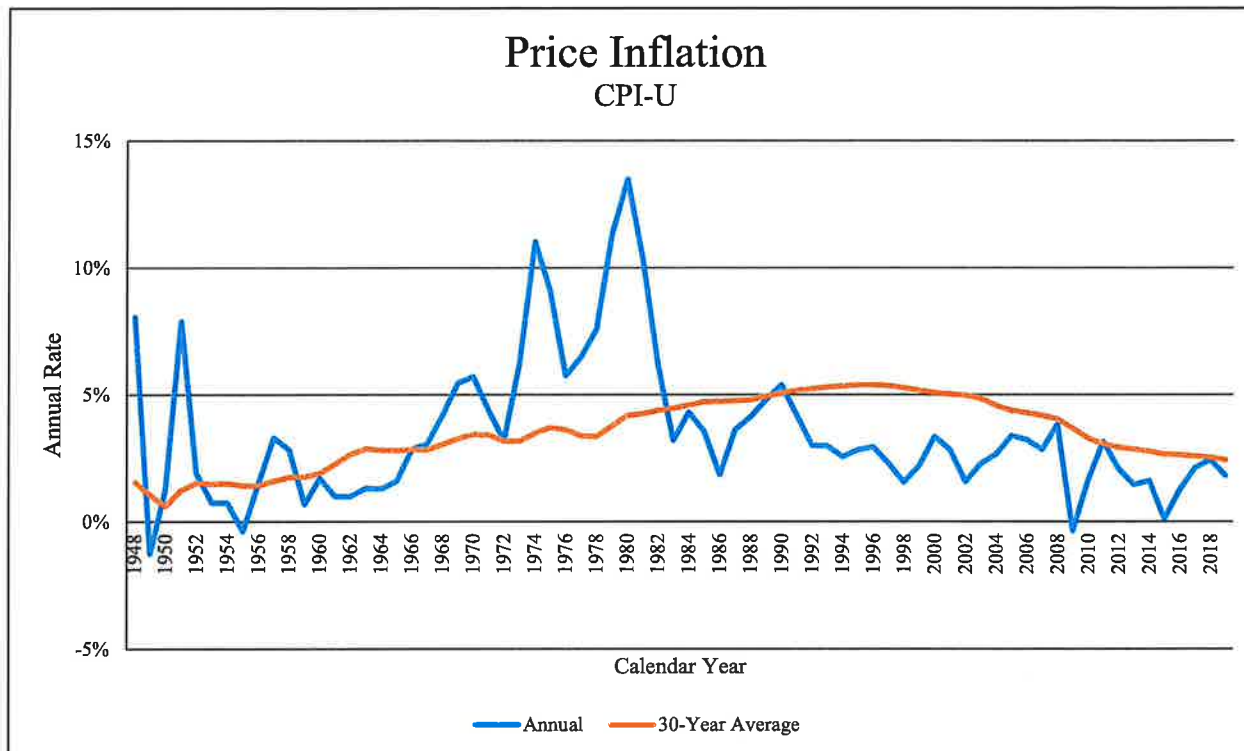
In order to provide a smoother cost pattern, the proposed change to the inflation assumption of 40 basis points will be phased-in over four years. Our analysis indicates that phasing in the change in the inflation assumption does not have any negative implications on the funding the plans, as illustrated in the following graph.





SECTION 3 – ECONOMIC ASSUMPTIONS

The following graph illustrates the historical annual change in price inflation, measured as of December 31, as well as the thirty-year rolling average.



Historical averages are heavily dependent on the period selected. For example, the period of high inflation from 1973 to 1981 has a significant impact on the averages over periods which include these years. Over more recent periods (last 25 years), measured from December 31, 2019, the average annual rate of increase in the CPI-U has been much lower than the current assumption of 2.75%. Inflation has been under 2.50% for the last thirty years and under 2.00% for the last ten years.

Forecasts of Inflation

For our purposes, the assumed inflation rate, and all economic assumptions, should be a forward-looking expectation of future experience. There are several sources to consider that offer expectations for future price inflation although many of these focus on a shorter timeframe than is used for pension funding. These sources are discussed below.

Investment Consultants

Based on Aon's second quarter 2020 capital market assumptions, the ten-year price inflation assumption is 2.0% and the thirty-year assumption is 2.1%. Aon is expecting future inflation to remain around 2%, as targeted by the Federal Reserve.

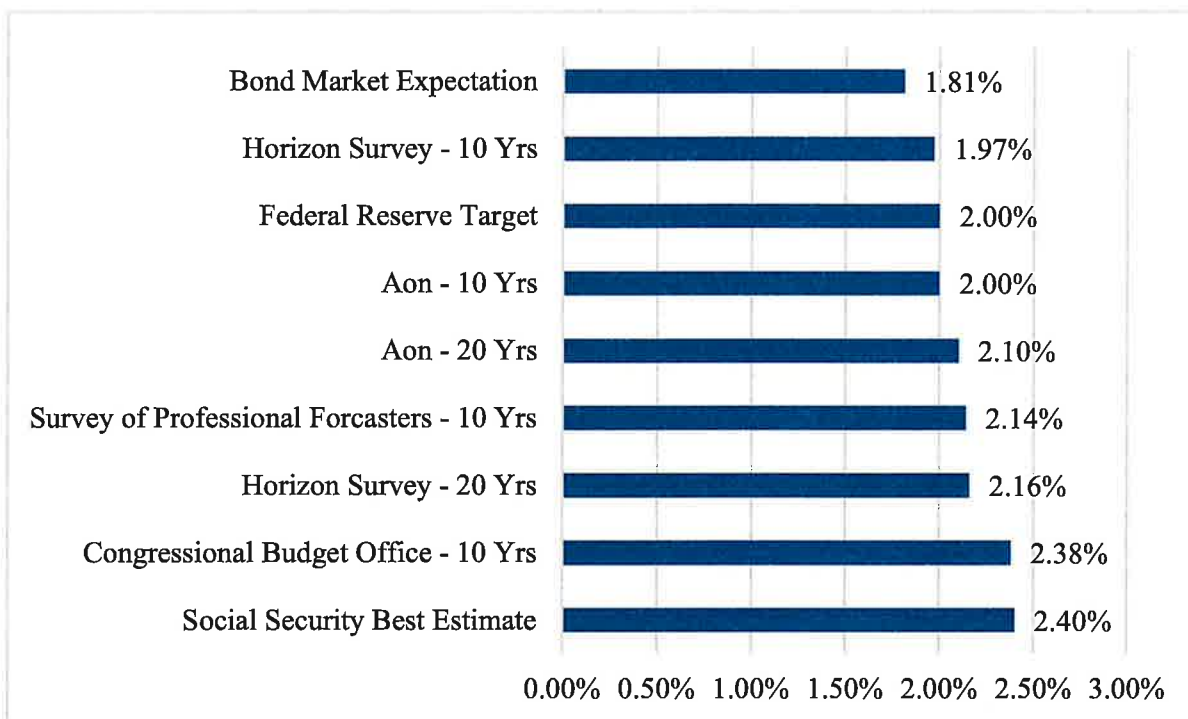
Using the 2020 Horizon Survey, the range of inflation assumptions for the short term (10 years) based on data for 39 consultants included in the survey was 0.9% to 3.0% with a median of 2.0%. For the 18 consultants providing an inflation assumption for a longer period (20-30 years), the median assumption was 2.1% with a range of 1.7% to 3.0%. Note that the 25th to 75th percentile range for long term inflation was 2.0% to 2.2%. These inflation expectations are consistent with Aon's inflation assumptions.



SECTION 3 – ECONOMIC ASSUMPTIONS

Comparison of Inflation Expectations

The following graph provides a comparison of the current levels of expected inflation.



The lower inflation over the last 10, 20 and even 30 years, coupled with the low future inflation anticipated by the bond markets, investment consultants, and professional economic forecasters suggests the current inflation assumption of 2.75% is on the high end of the reasonable range. We are recommending the **inflation assumption be lowered to a rate of 2.35%. This change moves the assumption closer to recent inflation levels as well as closer to the levels expected by most economic forecasts.**

Consumer Price Inflation	
Current Assumption	2.75%
Recommended Assumption	2.35%

INVESTMENT RETURN

Use in the Valuation: The investment return assumption reflects the anticipated returns on the current and future assets. It is one of the primary determinants in the allocation of the expected cost of the System’s benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. Generally, the investment return assumption should be set with consideration of the asset allocation policy, expected long-term real rates of return on the specific asset classes, the underlying price inflation rate, and investment expenses.

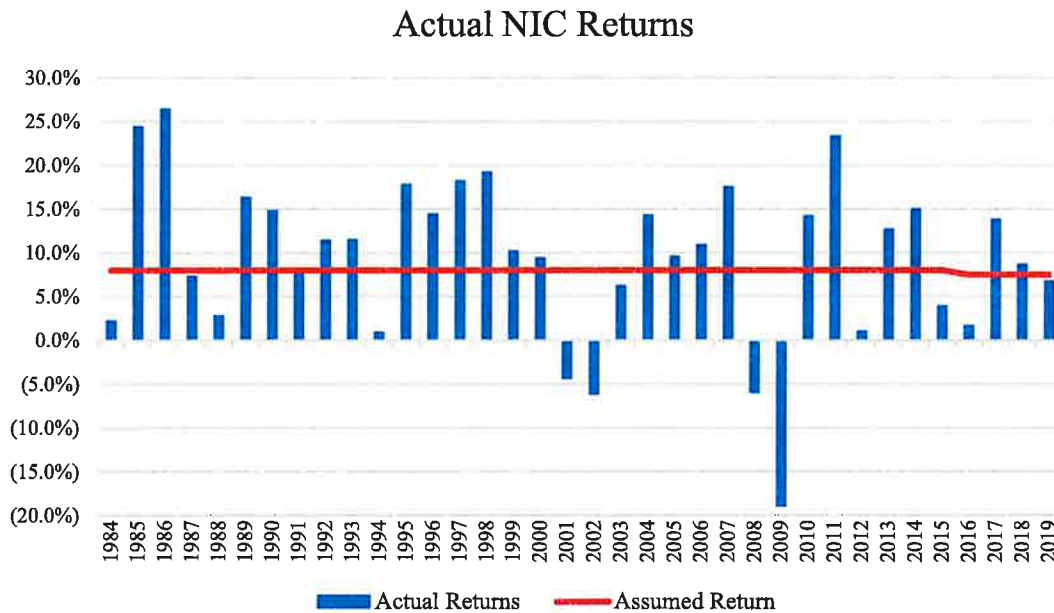


SECTION 3 – ECONOMIC ASSUMPTIONS

NPERS Historical Returns

One of the inherent problems with analyzing historical data is that the results can look significantly different depending on the timeframe used, especially if the year-to-year results vary widely. In addition, the asset allocation can also impact the investment returns so comparing results over long periods when different asset allocations were in place may not be meaningful.

The following graph shows the actual fiscal year (June 30) returns for the NPERS portfolio (School Retirement System) for the last 36 years ending June 30, 2019. Despite significant volatility in the results from year to year, the actual geometric (compound) return was 9.9% for the last 10 years, 6.2% for the last 20 years, and 7.4% for the last 30 years.



ANNUALIZED RETURNS through 6/30/19			
5-Year Return:	6.8%	20-Year Return:	6.2%
10-Year Return:	9.9%	30-Year Return:	8.3%

Another way to analyze historical data is to consider the compound return on the NIC’s portfolio over longer periods like 20 years. As the graph below illustrates, there is a definite downward trend.

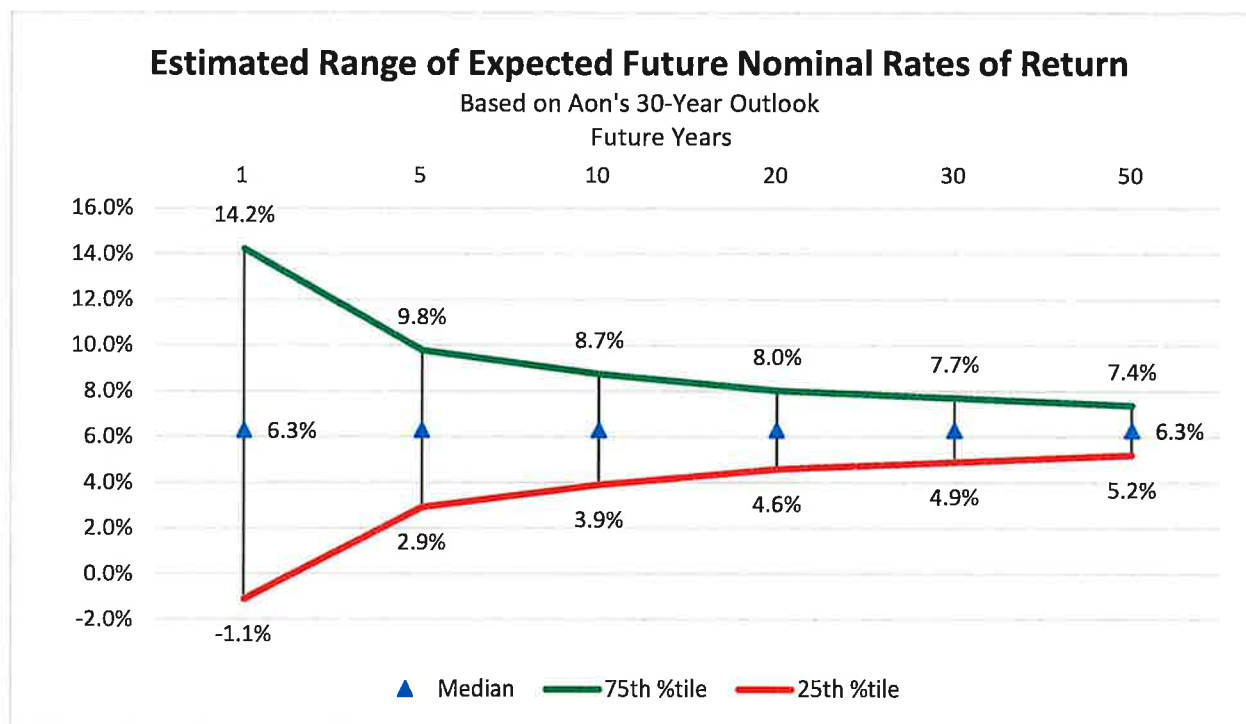


SECTION 3 – ECONOMIC ASSUMPTIONS

Our forward-looking analysis is based on the current target asset allocation for the system, as shown in the following table:

Asset Class	Long Term Policy Allocation
US Equities	27.0%
Non-US Equities	11.5%
Global Equities	19.0%
Fixed Income	30.0%
Private Equity	5.0%
Real Estate	7.5%
Total Fund	100.0%

The results in the following graph show the expected range of the compound average nominal returns over time, using Aon’s 30-year forecast of capital market assumptions. **It is important to note that Aon’s assumptions are as of June 30, 2020 and, therefore, reflect the impact of the pandemic.** As the graph indicates, the median nominal return is 6.3%. While the range of potential results is very high over shorter periods, the range narrows considerably over time. Over a 30-year time span, the results indicate there is a 25% chance that returns will be below 5.2% and a 25% chance they will be above 7.4%. In other words, there is a 50% chance the compound return will be between 5.2% and 7.4%. This also means there is less than a 25% chance of meeting the current assumed rate of return of 7.5%, based on Aon’s assumptions.



Although it is interesting to consider the probability of reaching the nominal expected return, the investment return assumption is developed using the “building block” approach which considers both the price inflation

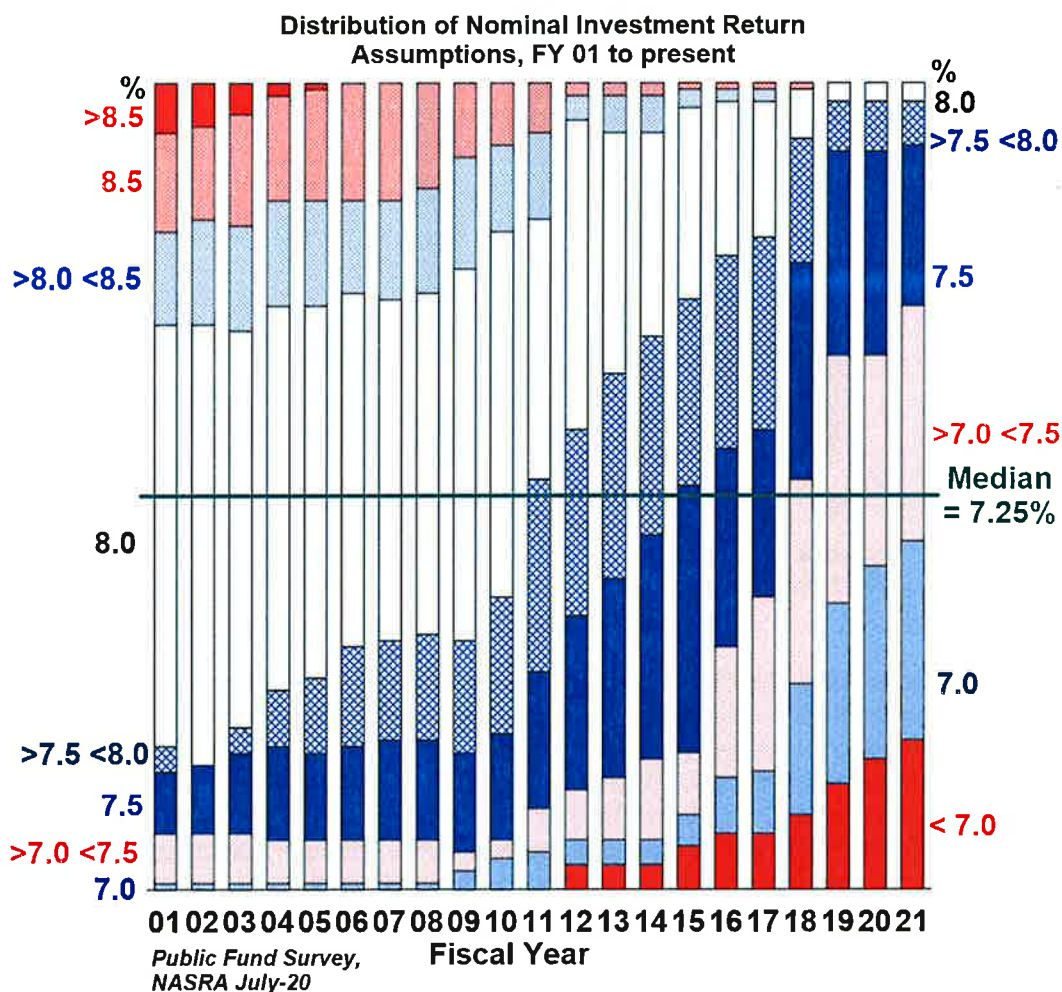


SECTION 3 – ECONOMIC ASSUMPTIONS

graph shows the change in the distribution of the investment return assumption from fiscal year 2001 through 2021 for the 125+ large public retirement systems included in the National Association of State Retirement Administrators (NASRA) Public Fund Survey. The assumed rate of return is heavily influenced by the asset allocation of the system, so comparisons must be made cautiously.

The trends observed in the data are far more valuable than the absolute return data. As the graph below indicates, the investment return assumptions used by public plans have decreased materially over the last decade.

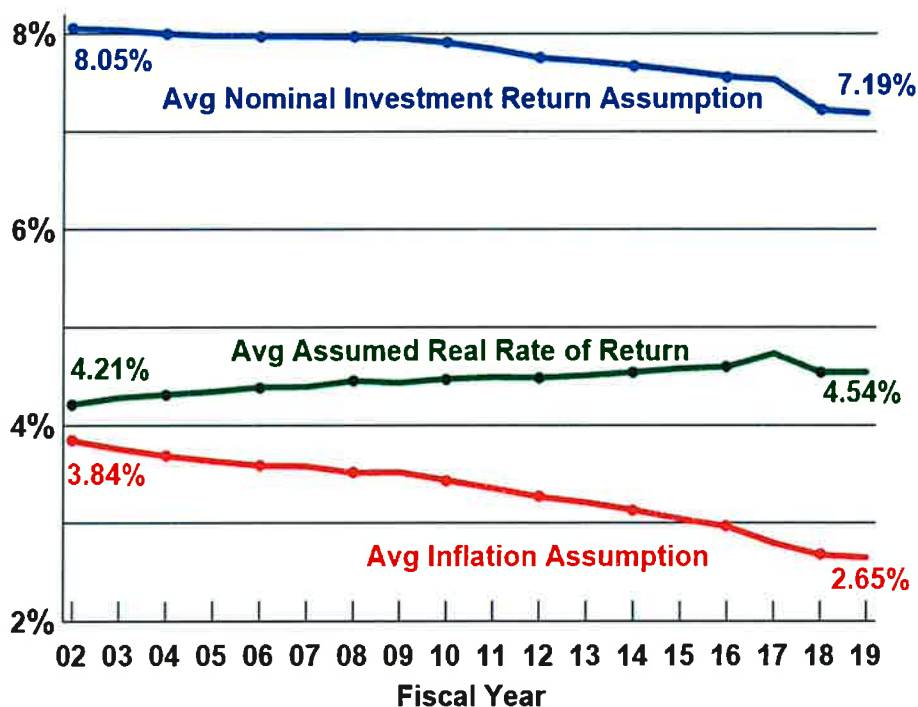
Change in distribution of investment return assumptions, FY 01 to present



It is worth noting that the median investment return assumption when the last experience study was performed in 2016 was solidly 7.50% but dropped to 7.25% in 2018. The current distribution in July 2020 shows that while the median assumption remains 7.25%, it is moving closer to 7.00%. While 8.00% used to be the most common and the median assumption in the first half of this period (it was also NPERS' assumption), there are only 3 systems out of 130 currently using an 8.0% assumption.



SECTION 3 – ECONOMIC ASSUMPTIONS



INVESTMENT AND ADMINISTRATIVE EXPENSES

The NPERS trust fund pays the administrative expenses of the system in addition to member benefits so an assumption must be made about such expenses. Investment consulting firms, including Aon, typically issue reports that describe their capital market assumptions, which are net of investment-related expenses. Therefore, no direct adjustment to the expected return is necessary to account for investment-related expenses. Active management strategies are used by NPERS and many other retirement systems with the expectation that they will result in investment returns sufficiently above passive index funds to at least cover the increased investment fees. We have assumed that active management strategies would result in the same returns, net of investment expenses, as passive management strategies.

There is some variance of practice on how administrative expenses are handled in the valuation process. The two most common are:

- A separate component of the actuarial contribution rate.
- An offset or reduction to the assumed rate of return.

For NPERS, the past practice has been to set the investment return assumption as the net return after both investment and administrative expenses. Using this methodology, the investment return assumption is theoretically lowered to reflect the impact of paying administrative expenses from investment income. However, in practice the adjustment is typically quite small (about 4 to 5 basis points for NPERS). The investment return assumption tends to be rounded, so there has not necessarily been an explicit reduction to the investment return assumption for the payment of administrative expenses.

The current GASB accounting standards require administrative expenses to be separately accounted for in disclosure and, more importantly, in the projection of plan assets in future years to determine the discount rate used to calculate the Net Pension Liability. Therefore, technically, the expected long-term rate of return



SECTION 3 – ECONOMIC ASSUMPTIONS

Recommendation for Investment Return Assumption:

By actuarial standards we are required to maintain a long-term perspective in setting all assumptions, including the investment return assumption. Therefore, we believe we must consider both the short-term and long-term expectations in setting this assumption. After reviewing the available information, we **recommend the investment return assumption be lowered from 7.50% to 7.00%, based on the 2.35% inflation assumption and a real rate of return of 4.65%.** Furthermore, we recommend the administrative expense for each Plan be included as a separate component of the actuarial contribution rate.

Investment Return	
Current Assumption	7.50%
Recommended Assumption	7.00%

COST OF LIVING ADJUSTMENTS

The final pay plans provide for an annual COLA based on actual inflation up to a maximum of 2.5% (Tier 1) or 1.0% (Tier 2, 3 and 4). For Tier 1, the current assumption is 2.25% (note the Purchasing Power Floor is not expected to apply until 59 years after retirement so no assumption is used to address the potentially higher COLA at that time). The assumption for Tiers 2, 3 and 4 is 1% for all years.

It is important to remember that the inflation assumption represents the expected average rate of inflation, recognizing that variability exists. This variation means that there will likely be some years when the COLA granted will be less than 2.5%, and even some years when it may be less than 1%. It also means that most retirees will never reach the Purchasing Power Floor when a higher COLA might apply.

Using the actual COLA plan provisions, we examined the distribution of expected COLA's using the inflation assumption of 2.35% and a 1.00% standard deviation. This choice of standard deviation is intentionally on the low end of typical assumptions for the variability of inflation, but it was selected to provide some conservatism since it results in a higher COLA assumption. The resulting median COLA for Tier 1 members was 2.03%. Based on our analysis, **we recommend that the COLA assumption be set at 2.00% for Tier 1 and 1.0% for Tiers 2 and later. The Purchasing Power Floor is not expected to apply for most members, so there is no assumption regarding its application.**

GENERAL WAGE INCREASE (GENERAL WAGE INFLATION)

Background: The general wage increase assumption represents the real wage growth over time in the general economy. Another way to think about this assumption is it anticipates how much the pay scales themselves will change from year to year. It does not necessarily indicate how much the pay increases received by individual members will be (the individual salary increase assumption) or how the total covered payroll may change (the payroll growth assumption).

General wage inflation can be thought of as the “across the board” rate of salary increases and is composed of the price inflation assumption combined with an assumption for the real rate of wage increase. In



SECTION 3 – ECONOMIC ASSUMPTIONS

becoming a larger portion of total compensation. This trend supports the use of a lower general wage increase assumption for those in public employment compared to private employment.

Based on data available and our professional judgment, **we recommend that the long-term assumed real wage increase assumption be reduced from 0.75% to 0.50% per year. When coupled with the price inflation assumption of 2.35%, the resulting recommendation for the general wage increase assumption is 2.85%.**

PAYROLL GROWTH

The payment on the unfunded actuarial accrued liability is determined as a level percent of payroll for the School, Patrol and Judges. Therefore, those valuations require an assumption regarding future annual increases in covered payroll. The wage inflation assumption is most commonly used for this purpose. The current assumption of 3.50% is the same as the general wage increase/wage inflation assumption.

The current payroll growth assumption also reflects the assumption that there will be no future growth or decline in number of active members. With no assumed change in the size of the active membership, future salary growth due only to general wage increases is anticipated. If increases should occur not only because of wage increases but also because of additional active members, there will be a larger pool of covered payroll over which to spread the payment on the unfunded actuarial accrued liability, which would result in lower UAAL payments as a percent of payroll. The uncertainties in light of current conditions in public employment and the national economy in general, along with actual experience, argue against anticipating any increase or decrease in active membership for funding purposes.

We recommend the payroll growth assumption, used to amortize the UAAL, be lowered from 3.50% to 2.85%, reflecting the decrease in the general wage increase assumption.

Implementation of Recommended Economic Assumption Changes

The proposed changes to the economic assumptions have a significant impact on the funded status and actuarial contribution rate of each plan. In order to provide a smoother cost pattern and to provide sufficient time for the state to budget any increased contribution amounts, the proposed change to the inflation assumption could be phased in over four years. Particularly given the unknown impact of the Covid-19 pandemic on government revenues in the next few years, a phase-in approach seems to be prudent.

We believe the following sets of economic assumptions for the next four valuations would comply with actuarial standards of practice and systematically implement the set of recommended assumptions.



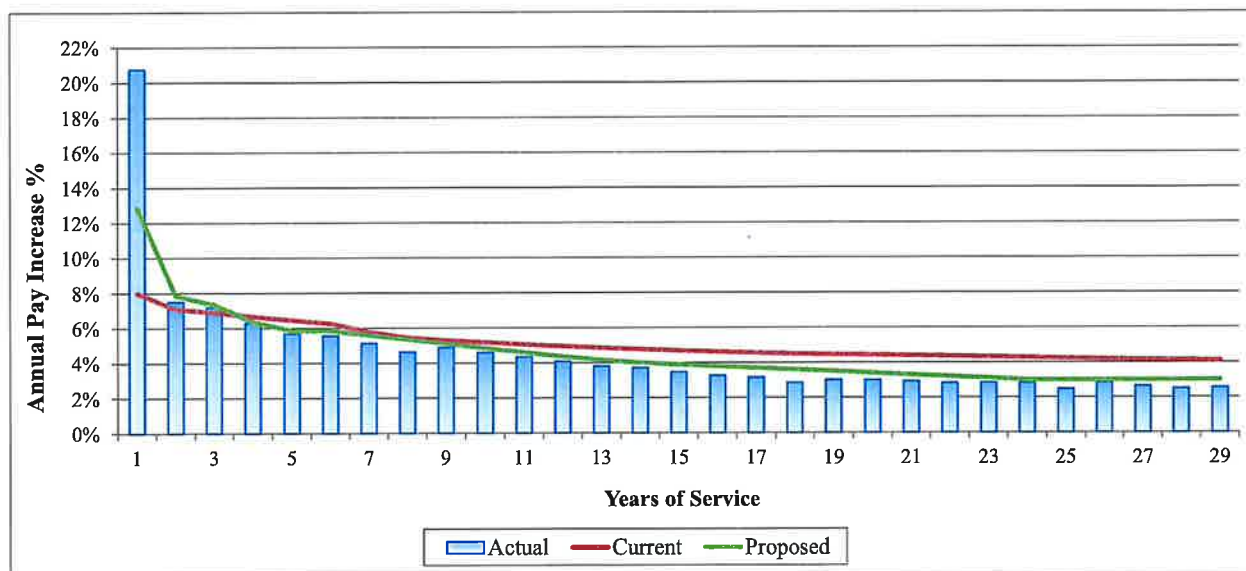
SECTION 3 – ECONOMIC ASSUMPTIONS

Schools

The following table contains a summary of the actual versus expected salary increases during the current study period:

Average Increase in Salaries			
Year	Actual	Expected	Difference
2015-16	4.36%	5.14%	(0.78%)
2016-17	4.61%	5.15%	(0.54%)
2017-18	4.01%	5.16%	(1.15%)
2018-19	4.12%	5.17%	(1.05%)
All years	4.28%	5.16%	(0.88%)

Since inflation is a component of the salary increase assumption, we would expect actual salary increases to be lower than the current assumption when actual price and wage inflation are lower than the assumption. During the study period, price inflation was around 2.0%, compared to the current assumption of 2.75%, and the increase in the national average wage index was 2.8% compared to the current assumption of 3.50%. The actual salary increases for members with more than 25 years of service (a proxy for actual general wage increases) was 2.7%, close to the increase in national wage data. This information suggests that we could expect actual wage increases reflected in our data to be around 0.70% to 0.80% lower than expected, simply as a function of the overall economy during this period. As noted in the table above, the actual increases were about 0.90% lower, relatively consistent with the difference in actual and assumed general wage increases so the current merit scale is a relatively good fit.



As a result of adjusting the general wage increase assumption from 3.50% to 2.85%, the individual salary increase assumption is lower and better matches the actual experience over this time period. In order to refine the assumption to reflect the actual experience, we are recommending some minor changes to the



SECTION 3 – ECONOMIC ASSUMPTIONS

Average Increase in Salaries			
Year	Actual	Expected	Difference
2015-16	3.58%	3.50%	0.08%
2016-17	4.16%	3.50%	0.66%
2017-18	0.76%	3.50%	(2.74%)
2018-19	0.96%	3.50%	(2.54%)
All years	2.32%	3.50%	(1.18%)

The current salary increase assumption for the Judges plan is the general wage increase assumption of 3.50%, i.e., no merit component. This reflects the fact that there is little promotional opportunity within the judicial system. The total salary increases over the period of 2.32% were about 1.18% lower than the assumed increase of 3.50%.

The salary of the Chief Justice and judges of the Supreme Court are set in statute and all other judges receive a percentage of that amount. Based on data supplied by NPERS staff, the actual increase in judicial salaries over the last eleven years (July 1, 2009 through July 1, 2020) was 2.7%. This is close to the increase in the national average wage index indicating actual judicial salary increases are substantially keeping pace with the general economy. Given the decrease in the general wage increase assumption, we prefer to have some small degree of conservatism in this assumption. Therefore, we are recommending the addition of a small merit component to the individual salary increase assumption for Judges equal to 0.25%. The result is a level individual salary increase assumption of 3.10% for Judges.

State Cash Balance

The following table contains a summary of the actual versus expected salary increases for each calendar year during the study period:

Average Increase in Salaries			
Year	Actual	Expected	Difference
2016	4.60%	4.20%	0.40%
2017	4.38%	4.14%	0.24%
2018	3.37%	4.16%	(0.79%)
2019	5.74%	4.15%	1.59%
All years	4.54%	4.16%	0.38%

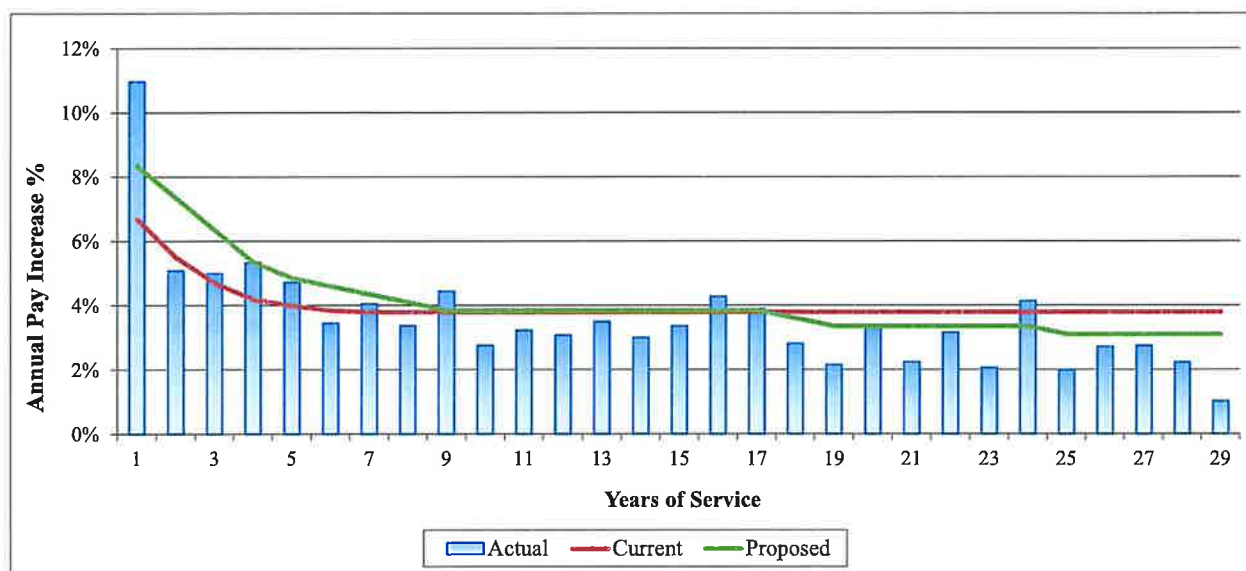
In the last study period, we observed actual salary increases of 4.88% compared to expected increases of 4.43%. We were hesitant to change the salary scale at that time because we only had four years of data (we had not performed the prior experience study). A similar trend has occurred in the current experience study. Therefore, we believe it is appropriate to make changes to the individual salary increase assumption for State members. As already discussed earlier in this report, we recommended the price inflation assumption be lowered to 2.35% and the general wage increase assumption be lowered to 2.85% (meaning a productivity assumption of 0.50%). Note that these changes will lower the current individual salary increase assumption by 0.65% if the merit salary scale is not adjusted, resulting in an even larger difference



SECTION 3 – ECONOMIC ASSUMPTIONS

In the last experience study, the actual salary increase over the study period was 4.79% and the expected increase was 4.79%. However, actual wage inflation was lower than the assumption (3.50%) so our expectation was that actual salary increases would be lower than assumed. Because we only had four years of data and had not performed the prior experience study, we were not comfortable making a material change to the assumption. In the current experience study, actual salary increases were slightly lower than expected, but actual wage inflation during the study period was far lower than assumed (3.50%). As we already discussed, we recommended the general wage increase assumption be lowered to 2.85% (2.35% price inflation and a productivity assumption of 0.50%). Given the observed salary experience over the study period, we are recommending a change to the merit scale so the total of the general wage inflation and merit scale more closely model actual experience.

We studied the actual salary increases for calendar years 2016 through 2019 for members with at least 25 years of service and observed increases of 2.4% which we used as an estimate for the general wage increase. The difference between the actual salary increase and 2.4% was then considered to be the actual merit increase for county members. We adjusted the merit salary scale to reasonably fit the actual experience, using the 2.4% general wage increase actually observed during the study period and then replaced the 2.4% general wage increase with our recommended general wage increase assumption of 2.85%. These changes increased the overall expected salary increase from 4.62% to 4.83%. The result is the recommended total individual salary increase assumption for County members (shown in the following graph).



INTEREST CREDITS ON ACCOUNT BALANCES

Both the final pay plans and the cash balance plans apply interest credits to member account balances. These rates are tied to government bonds or indices, so they are a function of economic conditions.

Cash Balance Interest Credits

The Cash Balance plans credit interest to the member accounts (for both the member and employer credits) and provides for the payment of dividends when certain conditions are met including a fully funded status.



SECTION 4 – DEMOGRAPHIC ASSUMPTIONS

Actuarial Standard of Practice No. 35 (ASOP 35) provides guidance to actuaries regarding the selection of demographic and other non-economic assumptions for measuring pension obligations. ASOP 35 states that 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. The actuary should select reasonable demographic assumptions in light of the particular characteristics of the defined benefit plan that is the subject of the measurement. A reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

The actuary should follow the following steps in selecting the demographic assumptions:

1. Identify the types of assumptions. Types of demographic assumptions include but are not limited to retirement, mortality, termination of employment, disability, election of optional forms of payment, administrative expenses, family composition, and treatment of missing or incomplete data. The actuary should consider the purpose and nature of the measurement, the materiality of each assumption, and the characteristics of the covered group in determining which types of assumptions should be incorporated into the actuarial model.
2. Consider the relevant assumption universe. The relevant assumption universe includes experience studies or published tables based on the experience of other representative populations, the experience of the plan sponsor, the effects of plan design, and general trends.
3. Consider the assumption format. The assumption format includes whether assumptions are based on parameters such as gender, age or service. The actuary should consider the impact the format may have on the results, the availability of relevant information, the potential to model anticipated plan experience, and the size of the covered population.
4. Select the specific assumptions. In selecting an assumption the actuary should consider the potential impact of future plan design as well as the factors listed above.
5. Evaluate the reasonableness of the selected assumption. The assumption should be expected to appropriately model the contingency being measured. The assumption should not be anticipated to produce significant actuarial gains or losses.

ASOP 35 General Considerations and Application

Each individual demographic assumption should satisfy the criteria of ASOP 35. In selecting demographic assumptions, the actuary should also consider: the internal consistency between the assumptions, materiality, cost effectiveness, and the combined effect of all assumptions. At each measurement date the actuary should consider whether the selected assumptions continue to be reasonable, but the actuary is not required to do a complete assumption study at each measurement date. In addition, ASOP 35 requires the actuary to include a specific assumption with respect to expected mortality improvements after the measurement date. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP 35.



SECTION 5 – RETIREE MORTALITY

Retiree Mortality

One of the most important demographic assumptions in the valuation is mortality because it projects the length of time benefits are expected to be paid to current and future retirees and beneficiaries. If members live longer than expected, the true cost of future benefit obligations will be greater than stated.

Over the last few generations, rates of mortality have been declining, meaning people are generally living longer. Furthermore, the experience of large, public retirement systems that include school employees indicate that school groups, and teachers in particular, continue to exhibit better mortality than the average working population.

There are distinct differences in the mortality rates of males and females, healthy retired members, disabled retired members and non-retired members. Because of those differences in mortality, these groups are studied separately.

The Society of Actuaries periodically publishes mortality tables derived from large, national studies. In recent years, they have tended to publish families of tables, allowing actuaries to select a table that is based on a subset of data most similar to that of the data the actuary is trying to value. In early 2019, the Society released a set of tables based solely on public plan data. This family of tables, called the Pub-2010 tables, includes tables based not only on the gender and status factors already noted, but also on the type of membership (teachers, public safety, and general government), as well as further breakdowns based on those members who were above or below the median benefit amounts. Because most other recent families of tables had excluded public sector data, the Pub-2010 tables are expected to be quite useful for valuing the benefits for public retirement systems like NPERS.

Actuaries sometimes use various adjustments to these standard mortality tables in order to match the observed mortality rates of a specific retirement system. One of the most common adjustments is an age adjustment that can be either a “set back” or a “set forward”. A one-year age set back treats all members as if they were one year younger than they truly are when applying the rates in the mortality table. For example, a one year set back would treat a 61-year old retiree as if he will exhibit the mortality of a 60-year old in the standard mortality table. Another adjustment that can be used is to “scale” a mortality table by multiplying the probabilities of death by factors less than one (to reflect better mortality) or factors greater than one (to reflect poorer mortality). Scaling factors can be applied to an entire table or a portion of the table. Of course, if necessary, actuaries may use both methods to develop an appropriate table to model the mortality of the specific plan population.

An important note in the examination of mortality is that there is a tendency for better mortality to be observed in the portion of the population with higher benefits than in the portion with lower benefits. Because the goal of an actuarial valuation is to model the expected benefit payments to be provided by a system, actuaries will often analyze mortality experience on a benefit-weighted basis rather than simply considering headcounts (number of members dying). This benefit-weighted approach is typically used in the development of standard mortality tables, and so it makes sense to use a consistent basis to evaluate how a mortality table fits the actual experience of a group.

ASOP 35 requires the actuary to make a specific recommendation with respect to future improvements in mortality although it does not require that an actuary assume there will be future improvements. There have been significant improvements in longevity in the past, although there are different opinions about future expectations. We believe it is prudent to anticipate that the trend will continue to some degree in the



SECTION 5 – RETIREE MORTALITY

Healthy Retiree Mortality - Males

The following chart shows the exposures, actual deaths, and expected deaths for the key retirement ages of 60 to 85, along with the actual to expected ratio under the current assumption for each year in the experience study.

	Exposure	Actual	Expected	A/E Ratio	
				Count	Weighted
Year 1	6,765	139	110	126%	120%
Year 2	7,042	144	114	126%	119%
Year 3	7,265	156	119	131%	111%
Year 4	7,488	158	124	127%	119%
Total	28,560	597	467	128%	117%
Total (last 8 years)	52,546	1,041	858	121%	108%

The actual experience indicates that the current assumption for male retirees is predicting too few deaths, i.e., the A/E ratio is more than 100%. Because the current table is a generational table (with mortality rates reflecting improvement each year), we prefer the A/E ratio be around 100%. Further, the A/E ratio, when experience is weighted based on benefit amounts, is well over 100%. This indicates that the amount of liability being released as a result of retiree deaths is not being accurately anticipated by the current assumption.

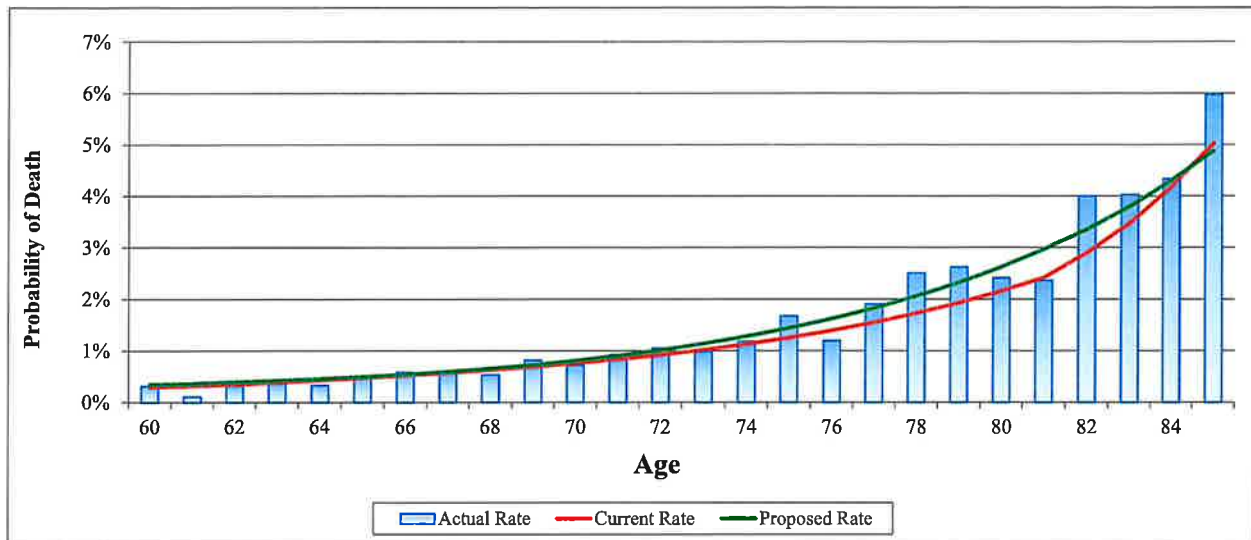
Our observation of the most recent four years compared to the last eight years is that this is consistent with the national trend that has been observed by actuaries in which the actual mortality improvement did not increase as expected. When we selected the recommended projection scale in 2015, we were concerned that the standard Society of Actuaries projection scale (named MP-2015) was too optimistic and so we developed a variant of that scale that reflected lower ultimate improvement. As it turns out, the short-term improvement of MP-2015 (which was blended into our recommended improvement scale) was also stronger than what actually occurred, i.e. actual improvements between 2015 and 2019 were less than anticipated by Scale MP-2015.

In selecting a new mortality table to consider, we looked to the Pub-2010 family of tables as published by the Society of Actuaries (SOA) in January of 2019. **We found that the General Members Table (Above Median) projected to the study years with Scale MP-2019, and then set back one year (treating a 65-year old as having the mortality of a 64-year old) provided a good fit to the observed data so we are recommending this assumption for male retiree mortality.** The comparison for ages 60 to 85 is shown below.



SECTION 5 – RETIREE MORTALITY

The comparison for ages 60 to 85 is shown below.



Healthy Retiree Mortality- Projected Improvement

For both males and females, we propose that improvements from 2019 forward be modeled by a mortality improvement scale that is constructed in the same manner as the MP-2019 scale produced by the SOA, but with 75% of the ultimate improvement rates. For comparison, the current scale uses 50% of the ultimate improvement rates from the MP-2015 scale. Because of the changes in the near-term improvement rates in MP-2019 vs. MP-2015, we believe that the higher ultimate rates are more appropriate.

It should be noted that as we prepare this analysis, the world is in the midst of a pandemic. At this time, we do not believe there is sufficient data to warrant reflecting any change in mortality. It is very probable that the next valuation or two may have more deaths than expected, but this could be followed by a period of fewer than expected if the current deaths from COVID-19 are significantly from groups who would have had higher than expected death rates in the short term. Because there are significant unknowns at this time, we believe it appropriate to utilize the data from the study period to help guide our long-term expectations. We will, of course, review the observed death rates each year as part of the valuation and make any needed recommendations to NPERS.

Beneficiaries

The mortality of beneficiaries applies to the survivors of members who receive a joint and survivor option. There are fewer members receiving benefits under the joint and survivor options which can produce more volatility in the observed mortality rates. Based on the limited data, we recommend using the Pub-2010 General Members Table (Above Median) Contingent Survivor mortality rates, with the same adjustments as proposed for retirees, be used for beneficiaries.



SECTION 6 – ACTIVE MORTALITY

The active member mortality assumption models eligibility for death benefits prior to retirement. Currently, the assumption is based on the same set of mortality tables used for in-pay members, the RP-2014 Tables. The specific assumption is the RP-2014 Employee White Collar Male Mortality Table multiplied by 100% and the RP-2014 Employee White Collar Female Mortality Table multiplied by 55% for males and females, respectively.

Because the probability of death prior to retirement is very low, this assumption has a much smaller impact on the valuation results than the post-retirement mortality assumption. Additionally, because it is a comparatively rare event, it is difficult to get meaningful analysis from a study of this size. Further complicating the analysis is the fact that the way the Cash Balance provisions are administered results in active member deaths that cannot be distinguished from terminations of employment. As a result, our analysis was restricted to School, Patrol and Judges only which reduced the number of exposure and, therefore, the credibility of the results.

It is common practice to use the same set of tables for active mortality as is used for retiree mortality. The Pub-2010 family of tables has both annuitant tables (recommended earlier as the underlying table for retirees) and employee tables. Since the retiree mortality is based on the Pub-2010 Above Median General Members Healthy Annuitant Tables with adjustments, we propose starting with those tables for the active mortality assumption and then adjusting as needed. **Based on this approach, we recommend using the Pub-2010 Above Median General Members Employee Male Mortality Table set back one year and the Pub-2010 Above Median General Members Employee Female Mortality Table set back one year and further adjusted by multiplying by 95% for females (100% for males).**

The following table shows that the proposed assumption provides a reasonable estimate of the observed experience. While the proposed A/E ratios are not as close to 100% as we usually are in setting an assumption, the limited number of observed deaths means that we assign more weight to using the retiree assumption. In any case, this assumption has only a very minor impact upon the overall cost of the plan.

Gender	Exposure	Actual	Current Assumption		Proposed Assumption	
			Expected	A/E Ratio	A/E Ratio	
Males	40,364	43	52	83%	90%	
Females	121,255	62	55	113%	76%	



SECTION 7 – RETIREMENT

The valuation uses several different assumptions to anticipate when retirement benefits will commence for members. One of the most significant factors affecting retirement patterns is, not surprisingly, the provisions governing when a member is eligible to retire. Additionally, provisions regarding eligibility for special benefits, subsidies, options, or any other special features may also influence retirement patterns. For NPERS, this results in separate retirement assumptions for each of the five plans.

Schools

The Nebraska Schools Plan currently contains four separate “tiers” of benefits. Tier membership is determined by the member’s date of participation:

Benefit Tier	Participation Date
One	Prior to 7/1/2013
Two	On/after 7/1/2013 and prior to 7/1/2017
Three	On/after 7/1/2017 and prior to 7/1/2018
Four	On/after 7/1/2018

While there are differences in other aspects of the plan benefits, the retirement eligibility for Tiers One, Two and Three are the same. Members of these Tiers may retire with an unreduced benefit after reaching age 65 (and being vested) or after reaching age 55 and meeting the “Rule of 85” when the member’s age plus creditable service is at least 85. Early (reduced) retirement is available to members who are at least age 60 with five years of creditable service. Although the retirement criteria for Tier Four School members is different than the other tiers, Tier Four was just recently implemented so all the experience during the study period is for Tier One through Three members. It will be many years before any credible retirement experience for Tier Four is available, so those retirement rates are set based on our professional judgment.

For this discussion, the focus is on the type of retirement a member is eligible to receive. Early retirement is the term used when the amount of the accrued benefit is reduced by an early retirement factor to reflect the longer expected payment period. Unreduced retirement occurs when such a factor is not applied. Currently, there are separate retirement rates based on early or unreduced retirement (including Rule of 85).

A summary of the actual and expected experience from age 55 to 80 during the study period for retirement is shown in the following table:

	Retirement Experience			A/E Ratio	
	Exposures	Actual	Expected	Count	Weighted
Early retirement	8,065	401	958	42%	45%
Unreduced retirement	21,346	3,865	5,255	74%	92%

A more detailed discussion of our findings is included below.



SECTION 7 – RETIREMENT

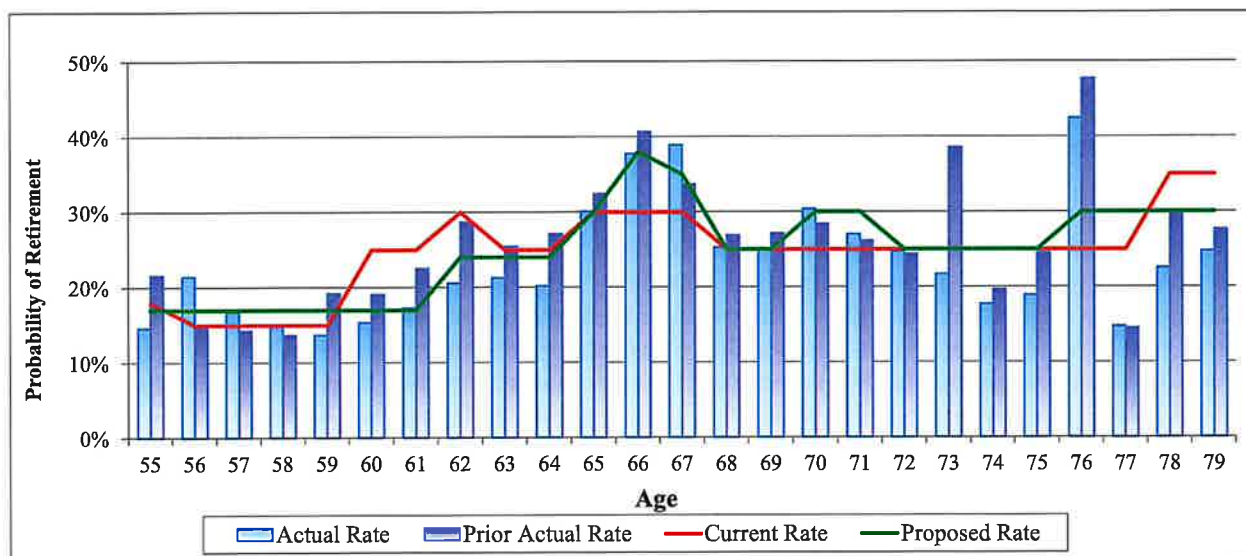
Unreduced Retirement

The actual experience for unreduced retirement experience in this study period, on a count basis, was also lower than expected, as observed for early retirement. The following table summarizes the retirement experience for unreduced retirement for ages 55 to 80.

Unreduced Retirement Experience					
	Exposures	Actual	Expected	A/E Ratio	
				Count	Weighted
July 1, 2015 to June 30, 2016	5,423	1,074	1,333	81%	100%
July 1, 2016 to June 30, 2017	5,318	878	1,304	67%	81%
July 1, 2017 to June 30, 2018	5,311	989	1,306	76%	94%
July 1, 2018 to June 30, 2019	5,294	924	1,312	70%	92%
Total	21,346	3,865	5,255	74%	92%

As the A/E ratios in the table illustrate, the number of actual retirements was consistently lower than expected in each of the four years in the study period. However, on a liability-weighted basis, the A/E ratio was much closer to 100% indicating that retirement by members with higher liability was closer to the assumption than those with lower liability.

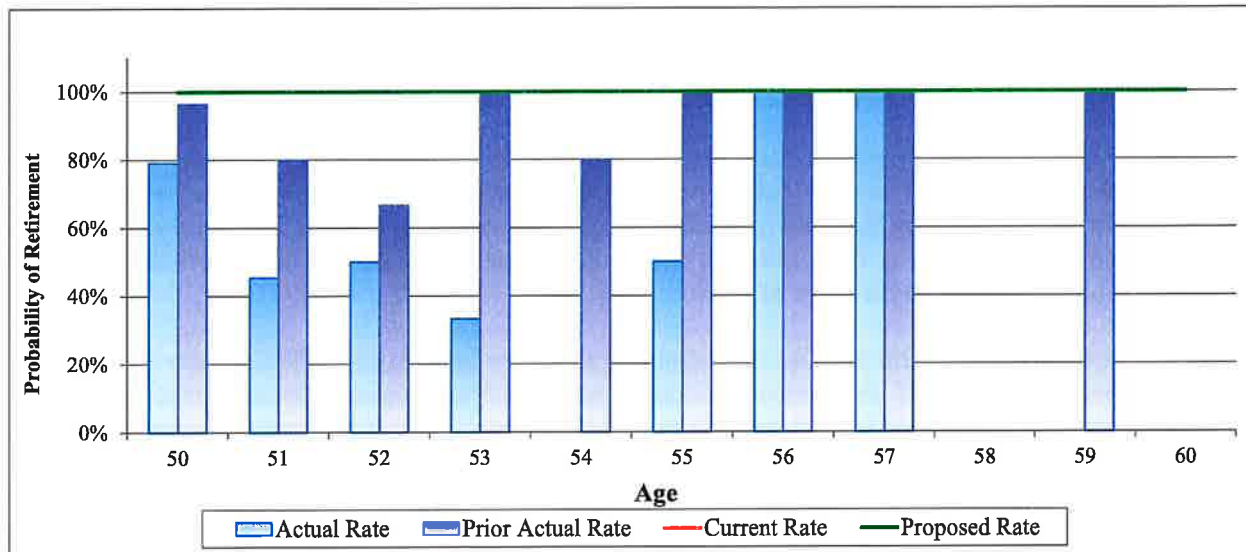
The current assumption, which was adopted in the last experience study and reflected an A/E ratio of 102%, indicated a close match with the actual experience in the last study. We wish to be cautious in revising the current assumption, so the recommended assumption was developed using the experience over the last two studies. **Using the recommended assumption for unreduced retirement, shown in the following graph for ages 55 through 79 (green line), the A/E ratio is 95% on a liability-weighted basis for the current study period and 100% for the last two study periods.** While this assumption change does not materially change the A/E ratio, it does improve the fit of the assumption to actual experience.





SECTION 7 – RETIREMENT

the funding of the retirement plan essentially the same way. The current assumption reflects a 100% probability of retirement/DROP at age 50 with at least 25 years of service. The results for the current study are shown below:



In the prior experience study, 51 of 55 eligible members retired/elected DROP once they had 25 years of service and 3 of the remaining 4 retired the following year. At first glance, the experience in the current study period appears to be quite different with 34 actual retirements versus 54 expected for an A/E ratio of 63%. However, after additional review the results in the current study period are not significantly different. It is important to note that this is a relatively small group as evidenced by the fact there were only 54 exposure over a four-year period, an average of about 13 per year. Each year, the number of exposure and retirements are determined and then summed for the total results for the entire study period. Therefore, if a member is eligible to retire during the entire four-year period but does not actually retire, he is included as an exposure each year (and would represent four exposures over the study period). During the current study period, the total exposure was 54. Of that number, there were three members who delayed retirement (one member for the entire four-year study period and two members who delayed for three years each). Consequently, these three members were counted as an exposure a total of 10 times. **Based on our professional judgment and the data available, we recommend the current assumption be retained.**

Judges

Under the Judges Plan, unreduced retirement is available at age 65, regardless of service. Early retirement is available from ages 55 to 64, again without any minimum service requirement. It should be noted that the early retirement reduction for ages 62 to 64 is subsidized by using factors that produce less reduction than would be required for full actuarial equivalence. However, as the table below shows the early retirement provisions are not heavily utilized by the membership.

The following table summarizes the key results during the study period. Note that this is a very small group, so the actual experience has limited credibility.



SECTION 7 – RETIREMENT

The current assumption for ages 65 and older is a reasonable fit to the actual experience in the current study period given the size of the group (A/E ratio of 100% for ages 65 through 71 on a liability-weighted basis). The results appear less reasonable (A/E ratio of 77%) if the ultimate age is extended to age 72, the assumed certain retirement age. Because all members age 72 (10 over the period) are assumed to retire, but only four actually retired, inclusion of age 72 tends to skew the results. Therefore, we prefer to base our recommendation on the results for ages 65 through 71. **Based on our professional judgment and the available data for the last two experience studies, we are recommending no change to the retirement rates for ages 65 and beyond.**

State Cash Balance

The State Cash Balance Plan does not have any specific eligibility requirements for retirement, other than being vested. Because of the prevalence of age 55 as the earliest retirement age in the Schools and Judges plans as well as society in general, it is customary to consider age 55 as the first eligible retirement age. Members ending employment prior to age 55 are considered to have terminated employment, while those ending employment after age 55 are considered to have retired.

Under the State Cash Balance Plan, members may actually retire any time and either take their vested account balance as a lump sum or receive an actuarially equivalent annuity. There is no distinction between early and unreduced retirement since the benefit amount is based on the account balance at the benefit commencement date and the member's age. In other words, the benefit amount automatically adjusts for earlier commencement, i.e., the younger the member's age at retirement, the lower the benefit amount.

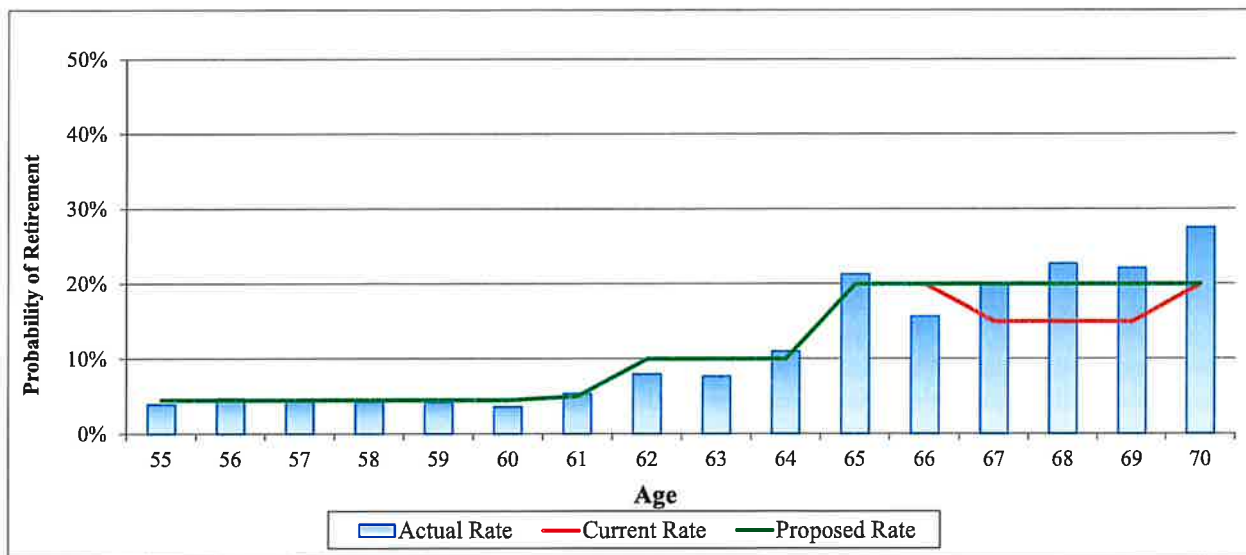
The following table summarizes the retirement experience of the State Cash Balance plan during the four-year study period (calendar years 2016 through 2019). The number of active members eligible to retire drops significantly after age 70 even though retirement rates continue to apply to age 80. Therefore, the focus of our analysis for the retirement assumption was ages 55 through 70. The detailed information for that age range is supplied in the following table:

Retirement Experience					
Calendar Year	Exposures	Actual	Expected	A/E Ratio	
				Count	Weighted
2016	4,130	471	480	98%	85%
2017	4,127	600	488	123%	110%
2018	3,958	564	472	119%	107%
2019	3,844	504	461	109%	88%
Total	16,059	2,139	1,901	113%	98%

As can be noted in the graph below, the current assumption was a relatively good fit at most ages. We are recommending minor adjustments at to improve the fit of the assumption to actual experience. The experience is also consistent with the change to age 66 for full Social Security Retirement Age. The proposed assumption moves the weighted A/E ratio from 98% to 101% on a liability-weighted basis.



SECTION 7 – RETIREMENT



Cash Balance Lump Sum/Annuity Election Rate

The State and County Cash Balance plans use an additional assumption in the valuation to better project future cash flows and estimate plan liabilities. Under the provisions of the plans, members may elect to receive a lump sum, an annuity based on the value of the account balance, or a combination of the two. The current assumption for the State Plan is that 50% of the account balances will be paid as a lump sum and 50% will be paid as monthly benefits (annuitized). For the County Plan, 60% of the account balances are assumed to be paid as a lump sum and 40% of the account balances will be paid as monthly benefits.

As the result of the current interest rate environment, the cost of annuities sold by insurance companies are currently much more expensive than the statutory conversion basis (i.e. lower monthly benefit for the same account balance). In addition, given the recent market volatility during the COVID-19 pandemic, new retirees may also value the fact that an annuity provides steady income as well as providing protection against longevity risk, i.e., outliving one’s money. Thus, the election of annuities is partially a function of economic conditions (recent and expected) along with plan design. In addition, as account balances in the two plans increase over time there may be more members electing to receive some portion of the benefit as an annuity.

For purposes of our analysis on a count basis, a member who took any portion of their benefit as an annuity was counted as electing an annuity. The relevant question for actuarial purposes is what percentage of account balances are annuitized versus paid out as lump sums. Therefore, we analyzed the portion of the account values at retirement that were paid as a lump sum versus paid as an annuity in order to evaluate the current assumption. The results are as follows:

Annuitization Rate Experience		
Proportion Electing Annuity Benefit		
	Count Basis	Account Balance Weighted
County	30%	50%
State	44%	53%



SECTION 7 – RETIREMENT

changes the annuity factor and, therefore, the corresponding monthly benefit amount for all forms of monthly income.

Legislative Bill 415 from the 2017 Session changed the actuarial equivalent basis for current and future members of the retirement plans as follows:

	Before LB 415	After LB 415
School and Judges	Set in statute	Set by PERB
State and County	Mortality in statute, interest rate assumption set by PERB	Both interest and mortality assumption set by PERB

* Note: For School and Judges the Change Date was July 1, 2017 and for State and County the Change Date was January 1, 2018.

The actuarial equivalent basis that was previously in statute for members of the School and Judges Plans who were hired before July 1, 2017 remains in place. (Patrol members do not have any optional benefit forms and so are not discussed.) However, the PERB now determines the assumptions for actuarial equivalence for optional forms of payment for members hired after June 30, 2017 in the School and Judges Plans. Similarly, the PERB has the authority to determine the actuarial equivalent basis (both mortality and interest rate assumptions) for members of the Cash Balance Plans hired after December 31, 2017. For members of the State and County Cash Balance Plans, the mortality assumption used for actuarial equivalence for members hired prior to January 1, 2018 is protected in statute, but the PERB sets the interest rate assumption for that group.

There are three primary assumptions that create the actuarial equivalent basis for the actuarial factors:

- (1) Mortality assumption,
- (2) interest rate (investment return assumption),
- (3) cost of living adjustment (if the adjustment is variable).

Recommended Mortality Assumption for Actuarial Equivalent Basis

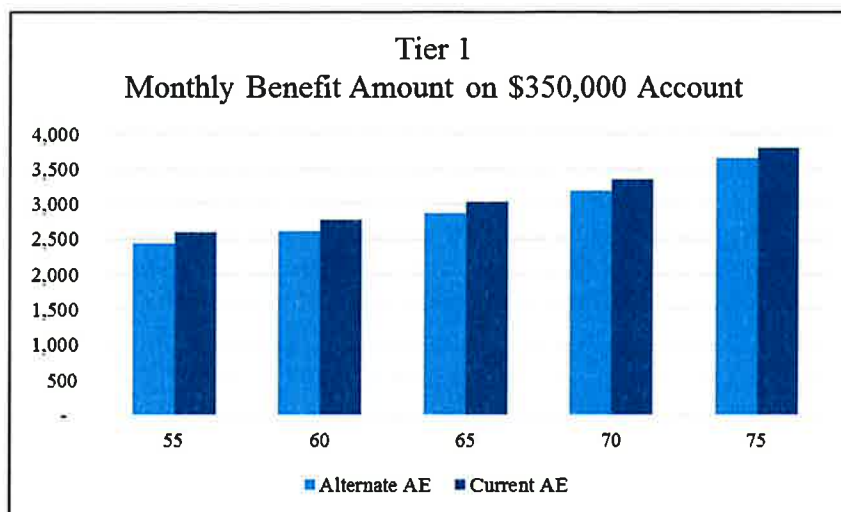
A gender-neutral mortality assumption is needed to comply with legal requirements. In addition, the mortality tables used in the valuation are “generational” meaning that the probabilities of death decrease slightly in each future year, which would result in different life expectancies each year and a change to the actuarial equivalent factors, if used. Rather than update actuarial factors each year, it is common practice to project the mortality rates to a specific year in the future and then use that single set of mortality rates for actuarial equivalent purposes.

Our approach in this study is consistent with the last experience study. To determine the unisex blend of male and female mortality rates for the School and Judges plans, the male/female split of liability for those members nearing retirement was studied. We further examined the actual election patterns for optional forms of payment by gender to determine if any adjustment was needed to reflect different utilization of joint and survivor benefits. For the Cash Balance Plans, we reviewed the male/female split of recently annuitized account balances, focusing on only those who were in the cash balance plan (excluding those in the defined contribution plan). The opposite gender blend is used for the mortality assumption of the joint annuitant.



SECTION 7 – RETIREMENT

blended 50% Male/50% Female) and an alternate definition based on the recommended valuation assumptions (7% interest and 1994 Group Annuity Mortality Table blended 50% Male/50% Female).



Age	55	60	65	70	75
Alternate AE	2,436	2,619	2,866	3,194	3,649
Current AE	2,605	2,784	3,027	3,350	3,800
Alternate/Current	93.5%	94.1%	94.7%	95.3%	96.0%

As the table illustrates, lowering the interest rate from 7.75% to 7.00% has a significant impact on the amount of monthly benefit the members will receive. The reduction at age 55 is about 6.5% while the reduction at age 75 is about 4.0%. This situation is similar to that occurring after the last experience study when the investment return assumption was lowered to 7.50%. At that time the Board voted to maintain the 7.75% interest rate to provide consistent benefits for members in subsequent years. Given the benefit policy implications of these decisions, we do not believe it is appropriate for us to make a specific recommendation but rather to make the Board aware of the implications of their choices.

If the PERB decides to maintain the use of the current 7.75% interest rate for actuarial equivalence for this group, benefits will not be reduced. As a result, the liability for this group will be higher than if the definition of actuarial equivalence was based on 7.00%. As we stated in the last experience study, this approach is reasonable and defensible at the current time given the Plans’ strong funded status. However, the Board should be aware that an adjustment to the interest rate assumption for this group could be necessary in the future if the Plan’s funding warrants such action. As the investment return assumption continues to decline, this is more likely to become a potential consideration.

Cash Balance Members Hired After December 31, 2017

The PERB sets both the interest rate and mortality assumption used to define actuarial equivalence for this group. The current actuarial equivalence basis for this group is based on the valuation assumptions, with the necessary adjustment to reflect unisex mortality:

- 7.50% interest and the valuation mortality table, projected to 2035 using NPERS mortality projection scale, with a 55% male/45% female blend.



SECTION 7 – RETIREMENT

Because the change in the underlying actuarial assumptions impacts both annuity factors, the cost impact is somewhat mitigated.

Given we are recommending changes to the investment return assumption, the mortality assumption, and the COLA assumption for members with a maximum COLA of 2.50% in this experience study, we believe it is appropriate to update the definition of actuarial equivalence for members of the School and Judges Systems hired after June 30, 2017. For the key retirement ages of 60 to 70, the new interest and mortality assumptions produce optional form factors that range from 99% to 101% of the current factors. Reflecting the changes now will result in smaller adjustments to the resulting benefit amounts compared to waiting until a later date when the assumption changes are more significant.

State Service Annuity

Based on state statutes, NPERS transfers the actuarial accrued liability to OSERS for members who retire from OSERS and are entitled to a service annuity from the state of Nebraska. Therefore, the valuation assumptions are appropriate for use in this calculation. For this calculation, a mortality assumption and investment return assumption are needed since the member has already retired. We recommend the investment return assumption used in the valuation be used for this purpose. The valuation assumptions use generational mortality which would require a different table each year. To simplify the calculation process and eliminate the need to update factors every year, we recommend the valuation mortality assumptions (gender-specific) be projected to 2040 with the mortality projection scale used in the valuation. This assumption would be used until re-evaluated in the next experience study.

Assumed Commencement Date for Deferred Annuity

Some vested members who terminate active employment elect to receive a distribution of their member account balance, forfeiting their right to receive monthly benefits in the future, while others wait and take an annuity at retirement eligibility. For inactive vested School members, the current assumption is that those who choose the deferred annuity will elect to start benefits at age 62. This assumption was just recently introduced in the valuation process once NPERS was able to provide the benefit amounts for terminated vested members. A review of the actual retirements by terminated vested School members during the study period indicated the average retirement age was 64. Given there is an early retirement reduction applied to benefits commencing before age 65 (unless meeting the Rule of 85), the behavior observed is consistent with reasonable expectations. **We recommend the benefit commencement age assumption for terminated vested School members be changed from age 62 to age 64.**

For Patrol members, it is assumed terminated vested members will commence benefit payments at age 55. For Judges, the assumed benefit commencement age for vested inactive members is age 63. There is insufficient data for both the Patrol and Judges Plans to provide any credible results. However, we believe the current assumption is reasonable, based on our professional judgment, and **we recommend it be maintained.**

The State Cash Balance Plan and the County Cash Balance Plan both assume that all members who terminate employment (not eligible for retirement) take the lump sum value of their account. Therefore, no specific assumption for benefit commencement is necessary in the valuation.



SECTION 8 – DISABILITY

One of the types of benefits the System provides to members is a disability benefit. Typically, the frequency of the occurrence of disability is dependent upon the membership type and the nature of the benefits provided. In the case of NPERS, only the School and Patrol plans utilize a disability assumption. The occurrence of disability in the Judges Plan is quite rare, and because many judges would be eligible for retirement at the time of disability, the cost to the Plan of a disability would be minor. Therefore, a specific assumption is not used.

The State and County Cash Balance Plans provide a disability benefit that is equal to the termination or retirement benefit (although the taxable nature of the annuity is different). Because the benefit amount does not differ whether the benefit is paid for termination or disability, there is no tracking of disabilities in the data provided to the actuary. Because the disability benefits and the termination or retirement benefits are identical, the occurrence of a disability is included in the termination and retirement decrements and no separate assumption is required.

In our analysis of rates for Schools and Patrol, we considered only the count basis for developing A/E ratios. In our experience, the use of liability-weighted results is frequently distorted by lower salaries in the year leading up to a disability as the member typically first uses leave from work to manage medical issues.

Schools

The disability assumption was changed from a unisex assumption to a gender-specific assumption in the last experience study based on the meaningful differences observed in the data. The table below indicates the actual and expected disability experience during the current study period and the resulting A/E Ratios.

	Exposure	Actual	Expected	A/E Ratio
Males	36,976	11	15	73%
Females	115,697	21	38	55%
Total	152,673	32	53	60%

The A/E ratio for males in the current study was 73%, but it was 113% in the prior study and the A/E ratio for females in the current study is 55%, but it was 87% in the prior study. It is not unusual to observe considerable volatility in the A/E ratios for disability due to the relatively small number of occurrences. Based on our professional judgment and the observed experience in the last two studies, **we recommend the current assumptions be retained.**

Patrol

During the study period, there were three Patrol disabilities compared with five expected. In the prior study, there were two disabilities with five expected. Given the small numbers involved and the actual experience, we do not see any compelling reason to propose any change. **We recommend the current assumption be retained.**



SECTION 9 – TERMINATION OF EMPLOYMENT (WITHDRAWAL)

Not all active members on the valuation date are expected to continue working until retirement. Therefore, a termination of employment assumption is used to anticipate the probability that a member will leave covered employment at any given service level. In analyzing the actual results, the number of terminations includes all members reported to have terminated employment. Some of these members subsequently receive refunds of their contributions, some return to active membership, and some leave their contributions with the System until retirement and receive a monthly benefit. Explicit assumptions are made regarding the elections made by such terminated vested members. Non-vested members are assumed to elect a refund of their employee contribution account balance.

This section of the report summarizes the results of our study of termination of employment for reasons other than death, retirement, or disability. Because the types of jobs and employee characteristics vary significantly among the five plans, it is not surprising that each plan has a distinct termination assumption. In the case of the Schools Plan, there are also noteworthy differences in termination patterns between males and females, and so gender-specific rates are developed and used in the valuation process.

Schools

As mention above, gender-distinct termination rates are used for the School Retirement System. The rates are service-based, with employees with lower years of service exhibiting higher incidences of termination than the rates for employees with more years of service. A summary of the experience in the current study period for durations 1 through 25 is displayed in the following tables:

Termination Experience - Males					
	Exposures	Actual	Expected	A/E Ratio	
				Count	Weighted
July 1, 2015 to June 30, 2016	7,397	478	443	108%	90%
July 1, 2016 to June 30, 2017	7,552	502	454	111%	86%
July 1, 2017 to June 30, 2018	7,641	515	453	114%	88%
July 1, 2018 to June 30, 2019	7,766	550	459	120%	107%
Total	30,355	2,045	1,809	113%	93%

Termination Experience - Females					
	Exposures	Actual	Expected	A/E Ratio	
				Count	Weighted
July 1, 2015 to June 30, 2016	24,130	2,129	1,825	117%	97%
July 1, 2016 to June 30, 2017	24,571	2,116	1,886	112%	87%
July 1, 2017 to June 30, 2018	24,910	2,156	1,901	113%	89%
July 1, 2018 to June 30, 2019	25,173	2,271	1,917	118%	96%
Total	98,784	8,672	7,530	115%	92%

As is evident from the charts, the current assumptions are estimating the liability associated with terminations more closely than the number of terminations. Given that the current assumptions were developed using the liability-weighted experience in the prior study, this result is to be expected. Essentially, the terminations are occurring more often among members with lower salaries relative to higher salaried members. There are undoubtedly multiple factors that might lead to this correlation, but we do note from our experience with school systems that termination rates for teachers tend to be lower than



SECTION 9 – TERMINATION OF EMPLOYMENT (WITHDRAWAL)

Patrol

Termination of employment in the Patrol plan is very low and termination rates apply only in the first twenty years of employment (the assumption is service based). There were just 26 terminations during the current four-year study period compared to 23 expected (resulting in an A/E ratio of 113% on a count basis and 161% on a liability-weighted basis). The number of terminations is consistent with the results of the prior study period in which there were 27 terminations compared to 23 expected (A/E ratio of 120% on count basis but 95% on a liability-weighted basis).

Due to the small number of terminations (six to seven per year), it is not surprising the data does not indicate a strong pattern. We also analyzed the results by age to determine if that provided any greater insight, but it was also inconclusive. The A/E Ratio on a count basis was 113%, but the difference between actual and expected experience was only three terminations over a four-year period. The high A/E Ratio of 161% on a weighted basis is due to terminations by 4 members with more than 15 years of service (unusual experience for this group). Given the small size of the group, some volatility in the results from one study period to another is not unexpected. Based on our professional judgment as well as the experience in the last two studies, **we recommend the current assumption be retained.**

Judges

Termination of employment for judges is a rare event, so no assumption is used in the valuation. During the study period, no terminations were observed. We believe it is reasonable to continue using an assumption that there is no termination of employment.

State Cash Balance

The current assumption used in the valuation of the State Cash Balance Plan is a service-based assumption with the probability of termination varying with the member’s years of service. The actual and expected experience in the study period is summarized in the table below:

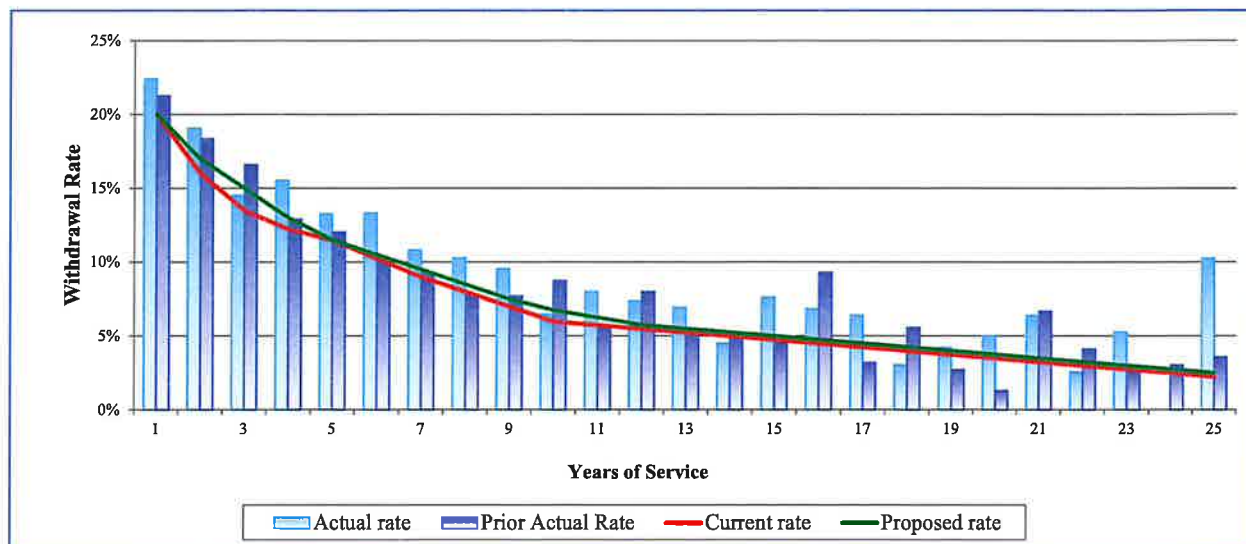
	Termination Experience					
	Exposures	Actual	Expected	A/E Ratio		
				Count	Weighted	
July 1, 2015 to June 30, 2016	7,860	1,050	1,108	95%	98%	
July 1, 2016 to June 30, 2017	8,218	1,424	1,165	122%	120%	
July 1, 2017 to June 30, 2018	7,909	1,219	1,086	112%	118%	
July 1, 2018 to June 30, 2019	8,148	1,190	1,125	106%	103%	
Total	32,135	4,883	4,484	109%	110%	

We considered separate rates for males and females but did not find the difference to be significant enough to justify distinct assumptions. However, future experience studies should continue to study this assumption by gender to ensure differences do not unfold over time.

The results shown in the graph below show the current and proposed rates, based on the results of the last two experience studies. The recommended changes are intended to partially reflect the higher termination experience in the current study, so the resulting A/E ratio is 107% on a count basis, down from 109% (down from 110% to 106% on a liability-weighted basis).



SECTION 9 – TERMINATION OF EMPLOYMENT (WITHDRAWAL)



ELECTION OF A DEFERRED ANNUITY/REFUND

Some vested members who terminate active employment elect to receive a distribution of their member account balance, forfeiting their right to receive monthly benefits in the future, while others wait and take an annuity at retirement eligibility. For Schools and Patrol members, the current assumption is that the member will elect the most valuable option, i.e., the option with the higher present value (using the valuation assumptions for investment return and mortality). While actual experience may vary, this approach is reasonable and protects NPERS against experience losses from the actual elections. **We recommend the current approach be maintained.**

Because the Judges System assumes no termination of employment, there is no need for an assumption regarding the election of a deferred annuity. This is noted here for completeness.

The State Cash Balance plan and the County Cash Balance plan both assume that all members who terminate employment (not eligible for retirement) take the lump sum value of their account. Because of the difference in interest crediting rates and discount rates, this is the most valuable alternative to the member, and so it is effectively the same approach as is used by the School and Patrol Plans. **We also believe this is a reasonable approach and should be maintained.**



APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS – ALL PLANS

A. ACTUARIAL METHODS

1. **Calculation of Normal Cost and Actuarial Accrued Liability:** The method used to determine the normal cost and actuarial accrued liability was the Entry Age Actuarial Cost Method described below.

Entry Age Actuarial Cost Method

Projected pension and preretirement spouse's death benefits were determined for all active members under age 80. Cost factors designed to produce annual costs as a constant percentage of each member's expected compensation in each year from the assumed entry age to the assumed retirement age were applied to the projected benefits to determine the normal cost (the portion of the total cost of the plan allocated to the current year under the method). The normal cost is determined by summing intermediate results for active members under age 80 and determining an average normal cost rate which is then related to the total payroll of active members. The actuarial assumptions shown on the following page were used in determining the projected benefits and cost factors. The actuarial accrued liability for active members (the portion of the total cost of the plan allocated to prior years under the method) was determined as the excess of the actuarial present value of projected benefits over the actuarial present value of future normal costs.

The actuarial accrued liability for retired members and their beneficiaries currently receiving benefits, active members age 80 and over, terminated vested members and disabled members not yet receiving benefits was determined as the actuarial present value of the benefits expected to be paid. No future normal costs are payable for these members.

The actuarial accrued liability under this method at any point in time is the theoretical amount of the fund that would have been accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over the actuarial value of plan assets measured on the valuation date. Under this Entry Age method, experience gains or losses, i.e., decreases or increases in accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

The unfunded actuarial accrued liability is amortized using the "layered" approach. The unfunded actuarial accrued liability as of July 1, 2006 was the initial or legacy amortization base, amortized over a closed 30-year period. Changes in the unfunded actuarial accrued liability due to assumption changes or actuarial experience gains/losses are amortized over separate 30-year amortization bases, each with their own individual payment schedules. If the UAAL is less than or equal to zero, then all prior bases shall be considered fully funded and the UAAL shall be amortized over a 30-year period as of the actuarial valuation date. The UAAL amortization payment schedules are determined using the level percent of payroll methodology, where payments escalate annually with the assumed increase in payroll growth.



APPENDIX A – CURRENT ACTUARIAL ASSUMPTIONS – ALL PLANS

ECONOMIC ASSUMPTIONS

- | | |
|---|--|
| 1. Investment Return | 7.50% per annum, compounded annually, net of expenses |
| 2. Inflation | 2.75% per annum, compounded annually |
| 3. Payroll Growth | 3.50% per annum |
| 4. Interest on Employee Contributions | 3.00% per annum, compounded annually |
| 5. Increases on Compensation And Benefit Limits | 2.75% per annum on the 401(a)(17) compensation limit and the 415 benefit limit |

DEMOGRAPHIC ASSUMPTIONS

1. Mortality

- | | |
|---|--|
| a. Healthy lives - Active members | RP-2014 White Collar Table for Employees (100% of male rates for males, 55% of female rates for females), projected generationally with MP-2015 |
| b. Healthy lives – Retired members and beneficiaries | RP-2014 White Collar Table for Employees, set back two years, scaled (males: under 80, 1.008; over 80, 1.449; females: under 85, .924; over 85, 1.5855; geometrically blended), projected generationally from 2013 with a Society of Actuaries (SOA) projection scale tool using 0.5% ultimate 2035 rate in 2035 |
| c. Disabled lives | RP-2014 Disabled Lives Table (static table) |
| d. Healthy mortality rates and projection scale are shown below at sample ages: | |

Sample Age	Pre-retirement Mortality	
	Males	Females
20	0.03%	0.01%
30	0.03	0.01
40	0.04	0.02
50	0.12	0.05
60	0.33	0.11



APPENDIX A-1 – CURRENT ACTUARIAL ASSUMPTIONS - SCHOOLS

ECONOMIC ASSUMPTIONS

1. Salary Increases

Rates vary by service. Sample rates are as follows:

Rates by Service	
Years	Rate
<1	8.50%
1	8.00
5	6.46
10	5.18
15	4.71
20	4.45
25	4.24
30	4.07
35	3.82
40+	3.50

DEMOGRAPHIC ASSUMPTIONS

1. Retirement

Rates vary by age and eligibility for benefits.
Rates are as follows:

Retirement Rates When Eligible for Unreduced Benefits	
Age	Rate
55	18%
56-59	15
60-61	25
62	30
63-64	25
65-67	30
68-77	25
78-79	35
80	100

Retirement Rates When Eligible for Reduced Benefits	
Age	Rate
60	10%
61	12
62	12
63	12
64	15



APPENDIX A-1 – CURRENT ACTUARIAL ASSUMPTIONS - SCHOOLS

5. Cost of Living Adjustment

Service annuity – None

Formula annuity – 2.25% per annum, compounded annually, for members hired before January 1, 2013. 1.00% per annum, compounded annually, for members hired on or after January 1, 2013.

6. State Contribution

State contributions for the current plan year are assumed to be contributed in a lump sum on the July 1 following the plan year end. These amounts from the prior plan year are treated as a contribution receivable on the plan's financial statements.



APPENDIX A-2 – CURRENT ACTUARIAL ASSUMPTIONS - PATROL

3. Disability

Rates vary by age. Sample rates are as follows:

Rates by Age	
Age	Rate
25	0.08%
30	0.10
35	0.13
40	0.20
45	0.31
50	0.52
55	0.91
60	1.36

OTHER ASSUMPTIONS

1. Form of Payment

75% Joint & Survivor Annuity. Deferred vesteds are assumed to take the greater of the present value of an annuity at earliest unreduced eligibility or a refund of contributions.

2. Marital Status

- a. Percent married
- b. Spouse's age

100% married
Females assumed to be three years younger than males.

3. Children

All members are assumed to have one dependent child at death or retirement. The child is assumed to be 28 years younger than the member and is assumed to always survive until age 19.

4. Administrative Expense

Investment return is assumed to be net of investment and administrative expenses.

5. Cost of living adjustments

2.25% per annum, compounded annually for Tier 1 members.
1.00% per annum, compounded annually for Tier 2 members.

6. DROP participation

All members elect the DROP at the earliest possible date and remain in the DROP for 4 years or to age 60, if earlier.

7. State Contribution

Additional State contributions for the current plan year are assumed to be contributed in a lump sum on the July 1 following the plan year end. These amounts from the prior plan year are treated as a contribution receivable on the plan's financial statements.



APPENDIX A-3 – CURRENT ACTUARIAL ASSUMPTIONS - JUDGES

2. Actuarial Equivalence Basis for Members Hired after July 1, 2017

- a. Interest 7.50%
- b. Mortality RP-2014 White Collar Table for Employees, set back two years, scaled (males: under 80, 1.008; over 80, 1.449; females: under 85, 0.924; over 85, 1.5855; geometrically blended), projected to 2035 with a Society of Actuaries (SOA) projection scale tool using a 75% male, 25% female blend

3. Marital Status

- a. Percent married 100% married
- b. Spouse's age Females assumed to be three years younger than males.

4. Administrative Expense Investment return is assumed to be net of investment and administrative expenses.

5. Cost of Living Adjustment 2.25% per annum, compounded annually for members hired before July 1, 2015. 1.00% per annum for members hired on or after July 1, 2015.

6. State Contribution State contributions for the current plan year are assumed to be contributed in a lump sum on the July 1 following the plan year end. These amounts from the prior plan year are treated as a contribution receivable on the plan's financial statements.



APPENDIX A-4 – CURRENT ACTUARIAL ASSUMPTIONS – STATE CASH BALANCE

DEMOGRAPHIC ASSUMPTIONS

1. Mortality

a. Mortality for Annuitization of Employee and Employer Cash Balance Accounts

1994 Group Annuity Mortality Table, with 50 % Male, 50% Female blending for members hired before January 1, 2018 (set statutorily)

Sample Age	Mortality Rate	Life Expectancy (Years)
55	0.34%	28.0
60	0.62	23.5
65	1.16	19.4
70	1.87	15.7
75	2.99	12.2
80	5.07	9.3

2. Retirement

Rates vary by retirement age after 5 years of service. Rates are as follows:

Age	Annual Rates
55-60	5.0%
61	8.0
62	12.0
63	12.0
64	15.0
65	30.0
66	30.0
67-79	25.0
80	100.0

3. Termination

Rates vary by service. Rates are as follows:

Service	Rate
<1	30.0%
1	22.0
5	14.0
10	7.0
15	3.5
20	3.0
25+	2.0

4. Disability

None



APPENDIX A-5 CURRENT ACTUARIAL ASSUMPTIONS – COUNTY CASH BALANCE

ECONOMIC ASSUMPTIONS

1. Interest Crediting Rate on Cash Balance Accounts 6.25% per annum, compounded annually

2. Annuitization Rate of Member & Employer Accumulated Balances 7.75% per annum, compounded annually, for members hired before January 1, 2018 (set statutorily)

3. Salary Scale Rates vary by service. Rates are as follows:

Service	Annual Increase
0	8.00%
1	6.70
2	5.50
3	4.70
4	4.20
5	4.00
6	3.85
7	3.80
8	3.80
9	3.80
10+	3.80

DEMOGRAPHIC ASSUMPTIONS

1. Mortality

- a. Mortality for Annuitization of Employee and Employer Cash Balance Accounts

1994 Group Annuity Mortality Table, with 50% Male, 50% Female blending, for members hired before January 1, 2018 (set statutorily)

Sample Age	Mortality Rate	Life Expectancy (Years)
55	0.34%	28.0
60	0.62%	23.5
65	1.16%	19.4
70	1.87%	15.7
75	2.99%	12.2
80	5.07%	9.3



APPENDIX B PROPOSED ACTUARIAL ASSUMPTIONS – ALL PLANS

A. ACTUARIAL METHODS

- 1. Calculation of Normal Cost and Actuarial Accrued Liability:** The method used to determine the normal cost and actuarial accrued liability was the Entry Age Actuarial Cost Method described below.

Entry Age Actuarial Cost Method

Projected pension and preretirement spouse's death benefits were determined for all active members under age 80. Cost factors designed to produce annual costs as a constant percentage of each member's expected compensation in each year from the assumed entry age to the assumed retirement age were applied to the projected benefits to determine the normal cost (the portion of the total cost of the plan allocated to the current year under the method). The normal cost is determined by summing intermediate results for active members under age 80 and determining an average normal cost rate which is then related to the total payroll of active members. The actuarial assumptions shown on the following page were used in determining the projected benefits and cost factors. The actuarial accrued liability for active members (the portion of the total cost of the plan allocated to prior years under the method) was determined as the excess of the actuarial present value of projected benefits over the actuarial present value of future normal costs.

The actuarial accrued liability for retired members and their beneficiaries currently receiving benefits, active members age 80 and over, terminated vested members and disabled members not yet receiving benefits was determined as the actuarial present value of the benefits expected to be paid. No future normal costs are payable for these members.

The actuarial accrued liability under this method at any point in time is the theoretical amount of the fund that would have been accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over the actuarial value of plan assets measured on the valuation date. Under this Entry Age method, experience gains or losses, i.e., decreases or increases in accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

The unfunded actuarial accrued liability is amortized using the "layered" approach. The unfunded actuarial accrued liability as of July 1, 2006 was the initial or legacy amortization base, amortized over a closed 30-year period. Changes in the unfunded actuarial accrued liability due to assumption changes or actuarial experience gains/losses are amortized over separate 25-year amortization bases, each with their own individual payment schedules, beginning June 30, 2021 and after for School, Patrol and Judges. If the UAAL is less than or equal to zero, then all prior bases shall be considered fully funded and the UAAL shall be amortized over a 30-year period as of the actuarial valuation date. The UAAL amortization payment schedules are determined using the level percent of payroll methodology, where payments escalate annually with the assumed increase in payroll growth.



APPENDIX B PROPOSED ACTUARIAL ASSUMPTIONS – ALL PLANS

The PERB has decided to phase in the inflation assumption over the next four valuation cycles. Due to using the building block approach for developing economic assumption, the change in inflation affects a number of other economic assumptions. The table below shows the change in economic assumptions during the next few valuations.

	Current (2020 Valuations)	2021 Valuations	2022 Valuations	2023 Valuations	2024 Valuations
Inflation	2.75%	2.65%	2.55%	2.45%	2.35%
Real Return	4.75%	4.65%	4.65%	4.65%	4.65%
Investment Return	7.50%	7.30%	7.20%	7.10%	7.00%
COLA (Tier 1)	2.25%	2.15%	2.10%	2.05%	2.00%
Cash Balance Interest Credit	6.25%	6.15%	6.10%	6.05%	6.00%
General Wage	3.50%	3.15%	3.05%	2.95%	2.85%
Payroll Growth	3.50%	3.15%	3.05%	2.95%	2.85%

Note that the assumptions listed below are the ultimate assumptions that will be used in the 2024 valuation.

ECONOMIC ASSUMPTIONS

1. Investment Return 7.00% per annum, compounded annually, net of investment expenses
2. Inflation 2.35% per annum, compounded annually
3. Payroll Growth 2.85% per annum
4. Investment on Employee Contributions 2.50% per annum compounded annually
5. Increase in Compensation And Benefit Limits 2.35% per annum on the 401(a)(17) compensation limit and 415 benefit limit

DEMOGRAPHIC ASSUMPTIONS

1. Mortality
 - a. Healthy lives - Active members Pub-2010 General Members (Above Median) Employee Mortality Table (100% of male rates for males, 95% of female rates for females), both male and female rates set back one year, projected generationally using MP-2019 modified to 75% of the ultimate rates.
 - b. Healthy lives – Retired members Pub-2010 General Members (Above Median) Retiree Mortality Table (100% of male rates for males, 95% of female rates for females), both male and female rates set back one year, projected generationally using MP-2019 modified to 75% of the ultimate rates.



APPENDIX B-1 – PROPOSED ACTUARIAL ASSUMPTIONS - SCHOOLS

ECONOMIC ASSUMPTIONS

1. Salary Increases

Rates vary by service. Sample rates are as follows:

Rates by Service				
Years	Inflation	Productivity	Merit	Total
1	2.35%	0.50%	10.00%	12.85%
2	2.35	0.50	5.00	7.85
3	2.35	0.50	4.50	7.35
4	2.35	0.50	3.50	6.35
5	2.35	0.50	3.00	5.85
6	2.35	0.50	3.00	5.85
7	2.35	0.50	2.75	5.60
8	2.35	0.50	2.50	5.35
9	2.35	0.50	2.25	5.10
10	2.35	0.50	2.00	4.85
11	2.35	0.50	1.75	4.60
12	2.35	0.50	1.50	4.35
13	2.35	0.50	1.30	4.15
14	2.35	0.50	1.15	4.00
15	2.35	0.50	1.05	3.90
16	2.35	0.50	0.95	3.80
17	2.35	0.50	0.85	3.70
18	2.35	0.50	0.75	3.60
19	2.35	0.50	0.65	3.50
20	2.35	0.50	0.55	3.40
21	2.35	0.50	0.45	3.30
22	2.35	0.50	0.35	3.20
23	2.35	0.50	0.25	3.10
24-39	2.35	0.50	0.15	3.00
40+	2.35	0.50	0.00	2.85



APPENDIX B-1 – PROPOSED ACTUARIAL ASSUMPTIONS - SCHOOLS

2. Termination

Rates vary by service. Sample rates are as follows:

Rates by Service		
Years	Male	Female
<1	27.5%	31.7%
1	17.0	19.0
5	6.0	8.0
10	3.5	4.7
15	2.3	3.1
20	1.0	2.0
25+	1.0	1.0

3. Disability

Rates vary by age. Sample rates are as follows:

Age	Male	Female
Under 35	0.00%	0.00%
35	0.02	0.01
40	0.02	0.01
45	0.03	0.03
50	0.05	0.04
55	0.07	0.06
60	0.10	0.08

OTHER ASSUMPTIONS

1. Form of Payment

Service annuity – Life annuity

Formula annuity – Five year certain and life annuity

Members who terminated vested are assumed to take a refund of contributions if it is more valuable than their deferred benefit.

For members who die with between 5 and 20 years of service before reaching age 65, their surviving spouse is assumed to take the lump sum benefit if it is more valuable than the annuity.

2. Marital Status

a. Percent married

85% married

b. Spouse's age

Females assumed to be two years younger than males.

3. Administrative Expense

0.18% of payroll

4. Commencement age for deferred vested benefit

Age 64



APPENDIX B-2 – PROPOSED ACTUARIAL ASSUMPTIONS - PATROL

ECONOMIC ASSUMPTIONS

1. Salary Increase

Rates vary by service. Sample rates are as follows:

Rates by Service				
Years	Inflation	Productivity	Merit	Total
1	2.35%	0.50%	5.50%	8.35%
2	2.35	0.50	4.50	7.35
3	2.35	0.50	3.60	6.45
4	2.35	0.50	3.00	5.85
5	2.35	0.50	2.60	5.45
6	2.35	0.50	2.30	5.15
7	2.35	0.50	2.05	4.90
8	2.35	0.50	1.85	4.70
9	2.35	0.50	1.65	4.50
10	2.35	0.50	1.60	4.45
11	2.35	0.50	1.56	4.41
12	2.35	0.50	1.53	4.38
13-25	2.35	0.50	1.50	4.35
26	2.35	0.50	1.20	4.05
27	2.35	0.50	0.90	3.75
28	2.35	0.50	0.60	3.45
29	2.35	0.50	0.30	3.15
30	2.35	0.50	0.00	2.85

DEMOGRAPHIC ASSUMPTIONS

1. Retirement

Retirement is assumed to occur upon attaining certain age and service requirements. The retirement assumption varies depending on benefit eligibility and age at retirement.

Early/Normal Retirement Eligibility	Age and Service Requirements	Retirement Assumption
Reduced	Age 50 Service: 10 years	1% at each age
Unreduced	Age 55 Service: 10 years	10% at each age
Unreduced (Eligible for DROP)	Age 50 Service: 25 years	100% at each age
Unreduced (Mandatory)	Age 60	100% at each age



APPENDIX B-2 – PROPOSED ACTUARIAL ASSUMPTIONS - PATROL

7. DROP participation for COLA valuation

All members elect the DROP at the earliest possible date and remain in the DROP for 4 years or to age 60, if earlier. No COLA is received during DROP.

8. State Contribution

Additional State contributions for the current plan year are assumed to be contributed in a lump sum on the July 1 following the plan year end. These amounts from the prior plan year are treated as a contribution receivable on the plan's financial statements.



APPENDIX B-3 – PROPOSED ACTUARIAL ASSUMPTIONS - JUDGES

2. Marital Status

a. Percent married 100% married

b. Spouse's age Females assumed to be three years younger than males.

3. Administrative Expense 0.18% of payroll

4. Cost of Living Adjustment 2.00% per annum, compounded annually for members hired before July 1, 2015.

1.00% per annum for members hired on or after July 1, 2015.

5. State Contribution State contributions for the current plan year are assumed to be contributed in a lump sum on the July 1 following the plan year end. These amounts from the prior plan year are treated as a contribution receivable on the plan's financial statements.



APPENDIX B-4 – PROPOSED ACTUARIAL ASSUMPTIONS – STATE CASH BALANCE

DEMOGRAPHIC ASSUMPTIONS

1. Mortality

a. Mortality for Annuitization of Employee and Employer Cash Balance Accounts

1994 Group Annuity Mortality Table, with 50 % Male, 50% Female blending for members hired before January 1, 2018 (set statutorily)

Sample Age	Mortality Rate	Life Expectancy (Years)
55	0.34%	28.0
60	0.62	23.5
65	1.16	19.4
70	1.87	15.7
75	2.99	12.2
80	5.07	9.3

2. Retirement

Rates vary by retirement age after 5 years of service. Rates are as follows:

Age	Annual Rates
55-58	5.0%
59-61	6.0
62	10.0
63	12.0
64	12.0
65-79	28.0
80	100.0

3. Termination

Rates vary by service. Rates are as follows:

Service	Rate
<1	30.0%
1	22.0
5	14.0
10	8.0
15	3.5
20	3.0
25+	2.0

4. Disability

None



APPENDIX B-5 – PROPOSED ACTUARIAL ASSUMPTIONS– COUNTY CASH BALANCE

ECONOMIC ASSUMPTIONS

1. Interest Crediting Rate on Cash Balance Accounts

6.00% per annum, compounded annually

2. Annuitization Rate of Member & Employer Accumulated Balances

The Board has statutory some authority to adopt the mortality tables and the interest rate used in the actuarial basis used for annuitization of member balances. A different basis will apply to those hired before January 1, 2018 and after December 31, 2017. For valuation purposes, the most recent basis adopted by the Board will be used.

5. Salary Scale

Rates vary by service. Rates are as follows:

Rates by Service				
Years	Inflation	Productivity	Merit	Total
1	2.35%	0.50%	5.50%	8.35%
2	2.35	0.50	4.50	7.35
3	2.35	0.50	3.50	6.35
4	2.35	0.50	2.50	5.35
5	2.35	0.50	2.00	4.85
6	2.35	0.50	1.75	4.60
7	2.35	0.50	1.50	4.35
8	2.35	0.50	1.25	4.10
9-17	2.35	0.50	1.00	3.85
18	2.35	0.50	0.75	3.60
19-24	2.35	0.50	0.50	3.35
25-35	2.35	0.50	0.25	3.10
36+	2.35	0.50	0.00	2.85



APPENDIX B-5 – PROPOSED ACTUARIAL ASSUMPTIONS– COUNTY CASH BALANCE

OTHER ASSUMPTIONS

1. Payment Assumptions

As shown in the table below, 50% of all members eligible for retirement are assumed to be paid in the form of an annuity and the other 50% in the form of a lump sum, and 100% of members eligible for all other types of benefits are assumed to be paid in the form of a lump sum. Deferred vested and non-vested members are assumed to take a refund of their account balance as of the valuation date.

Benefit	Assumed Form of Payment
Retirement	50% Lump Sum / 50% Annuity*
Vested	Lump Sum
Non-vested	Lump Sum
Disability	Lump Sum
Death	Lump Sum

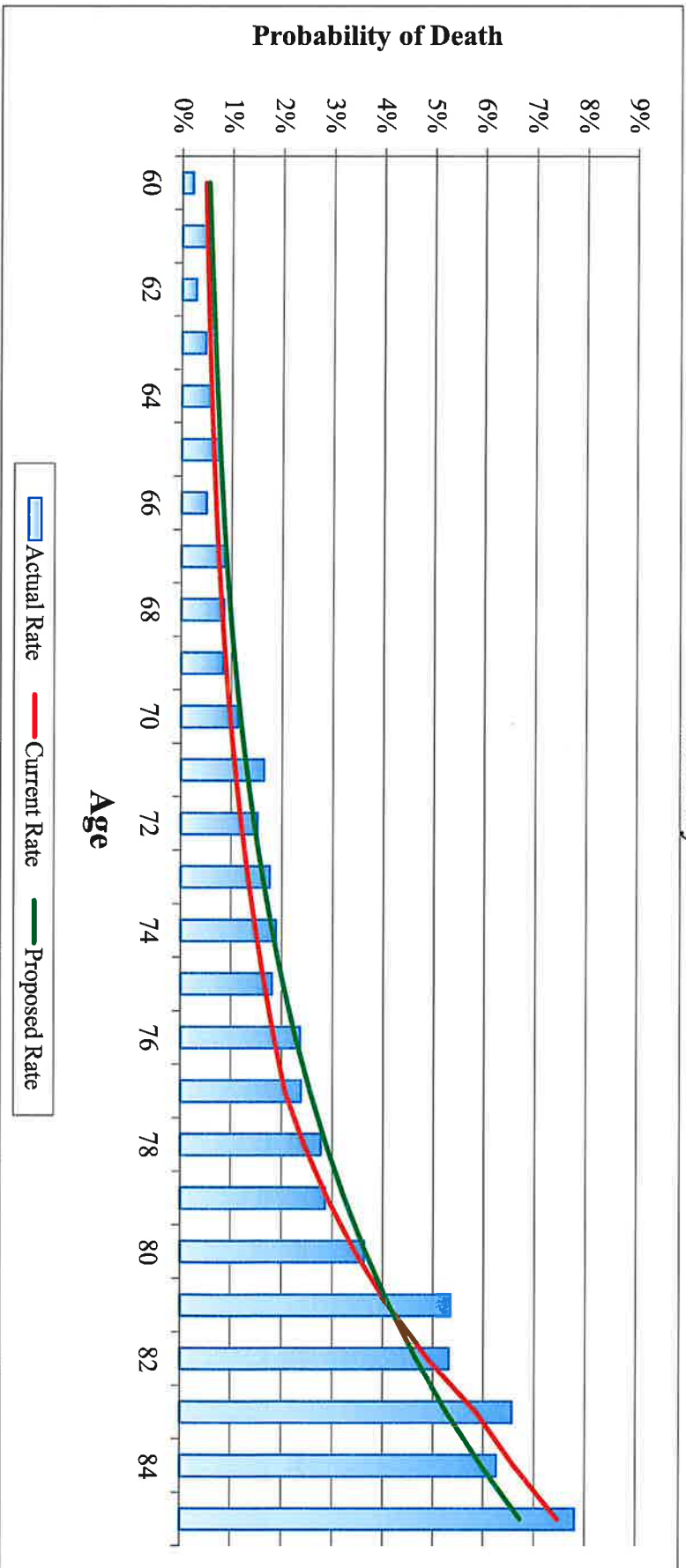
*Five-year certain and life annuity.

2. Cost of Living Adjustment

None assumed, except 2.5% per year is used for retirees electing annuity payments with a COLA feature.



EXHIBIT C-1
Retiree Mortality – Males

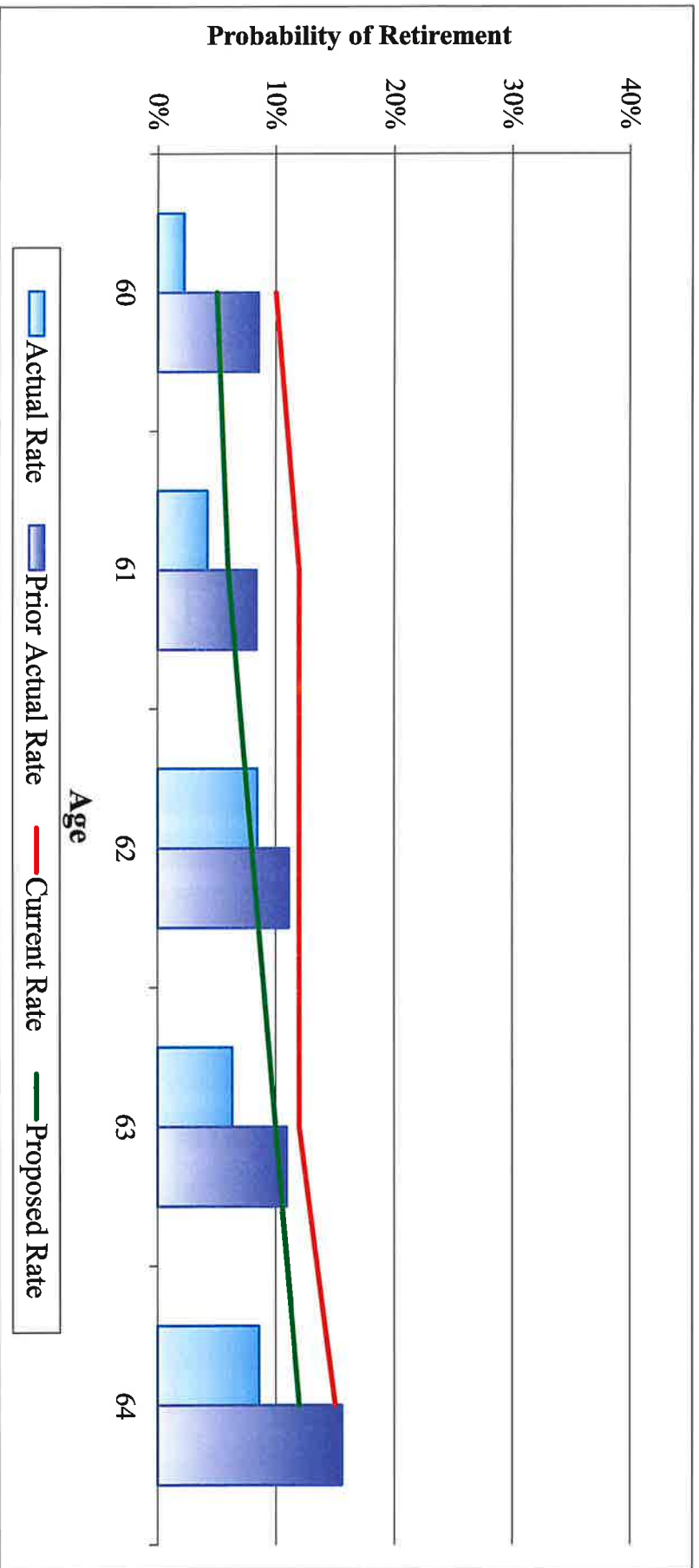


Current Study	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	1,215,916	1,036,384	1,159,790
Actual/Expected		117%	105%

Current + Prior Study	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	1,948,965	1,803,103	1,987,780
Actual/Expected		108%	98%



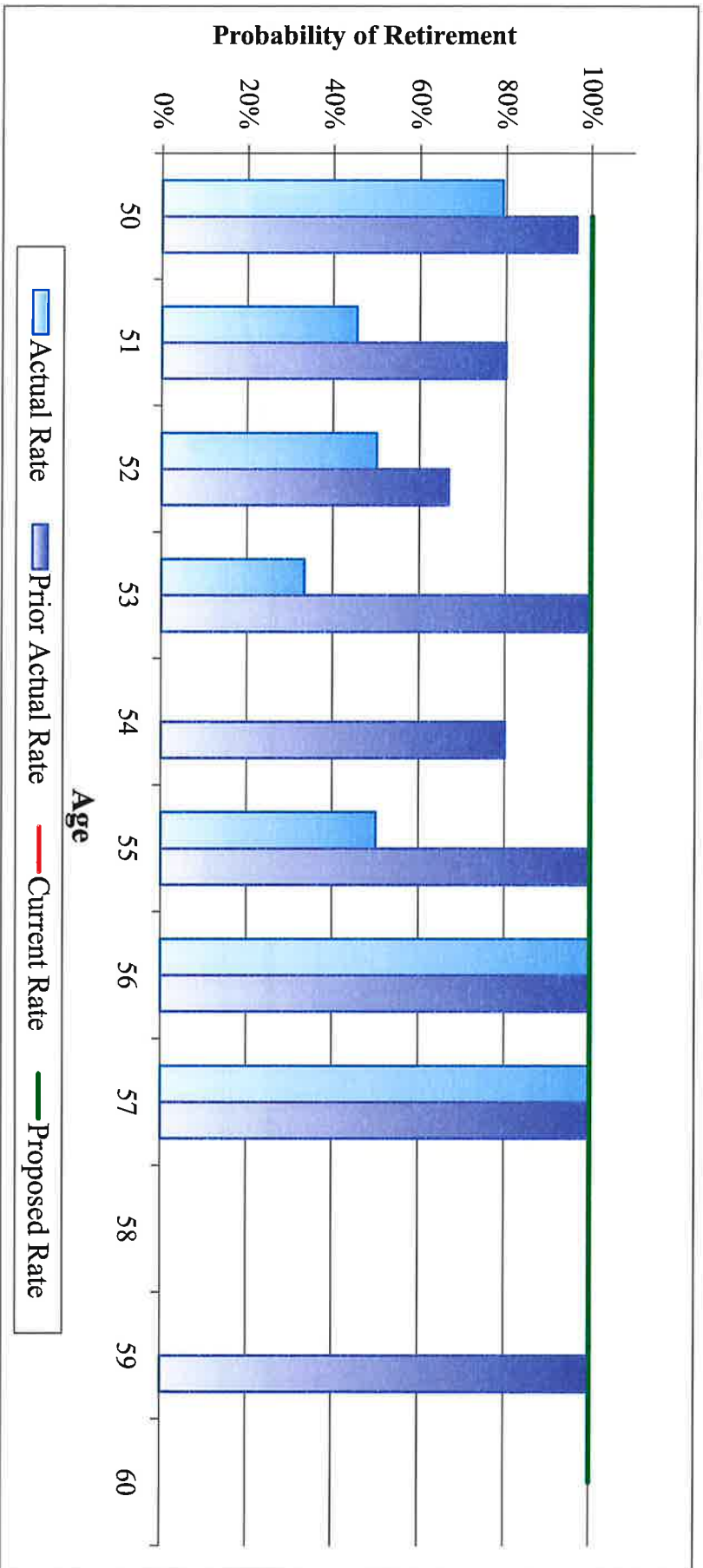
EXHIBIT C-3
Retirement – Schools (Early)



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	234	517	326
Actual/Expected		45%	72%



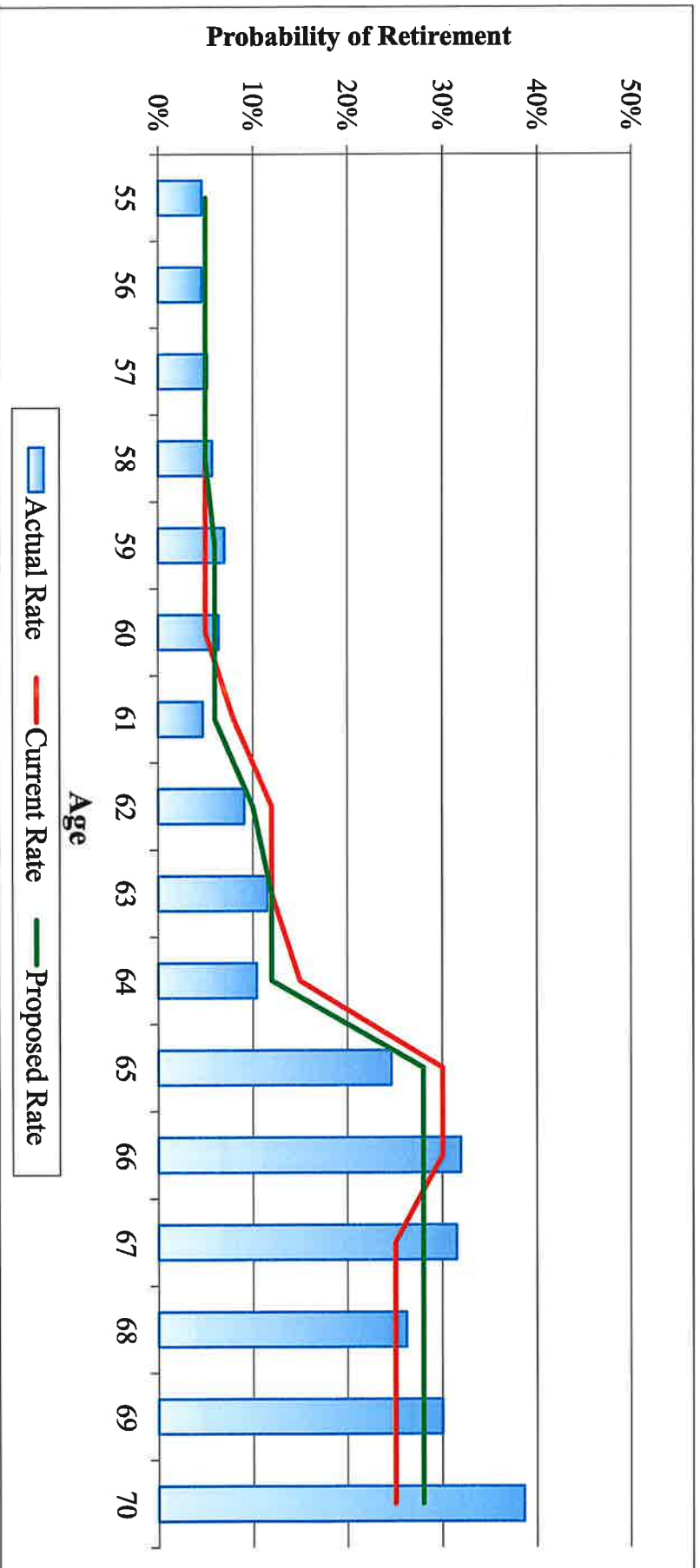
EXHIBIT C-5
Retirement – Patrol (DROP after 25 Years)



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	34	54	54
Actual/Expected		63%	63%



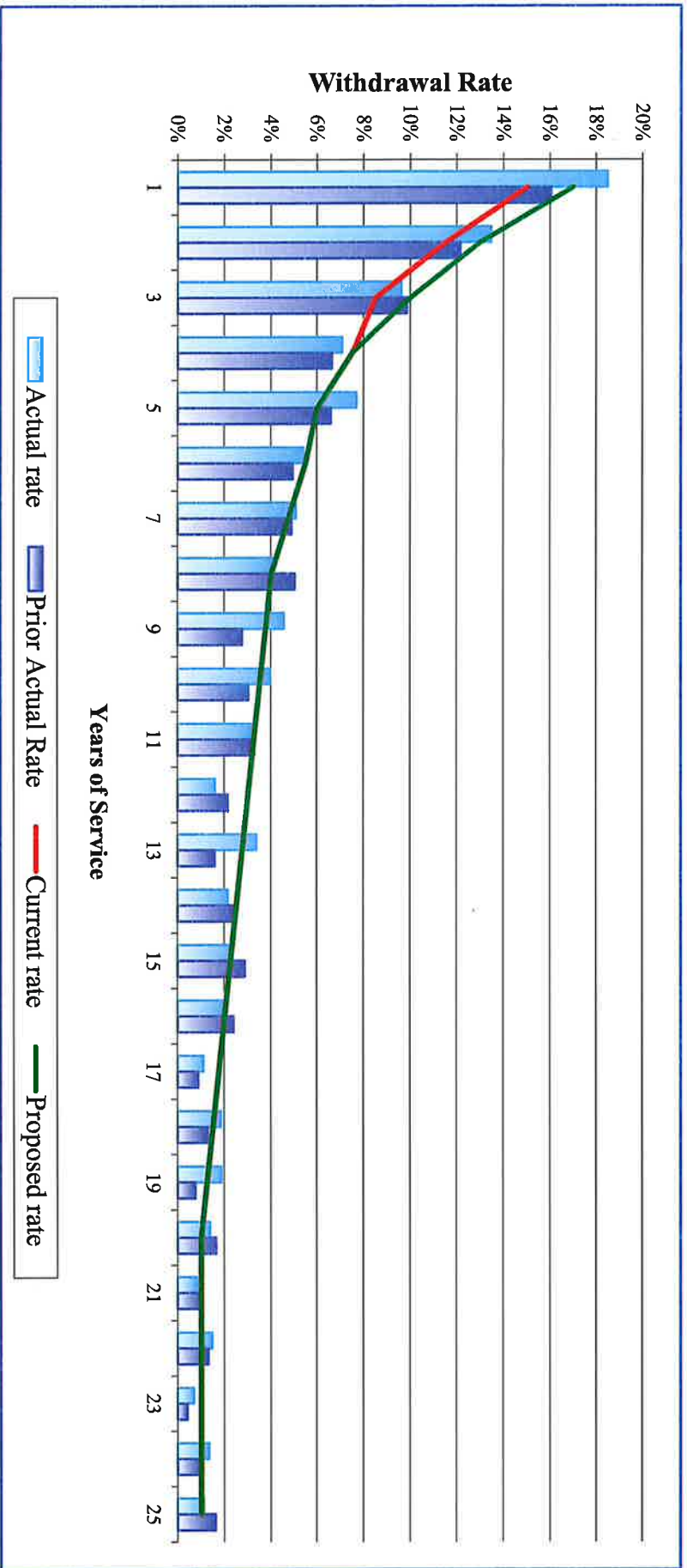
EXHIBIT C-7
Retirement – State



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Weighted Count	1,925	1,968	1,913
Actual/Expected		98%	101%



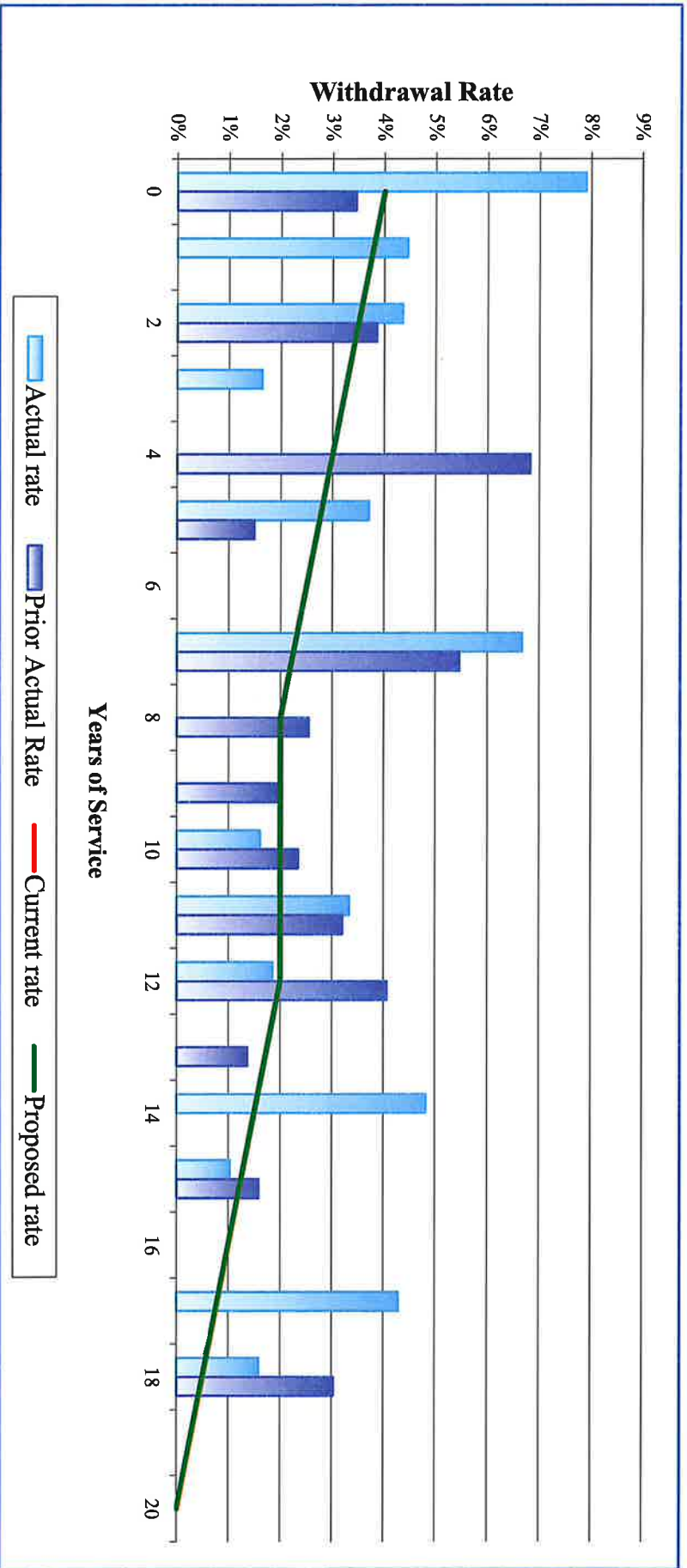
EXHIBIT C-9
Termination of Employment – Schools (Males)



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	2,045	1,809	1,958
Actual/Expected		113%	104%



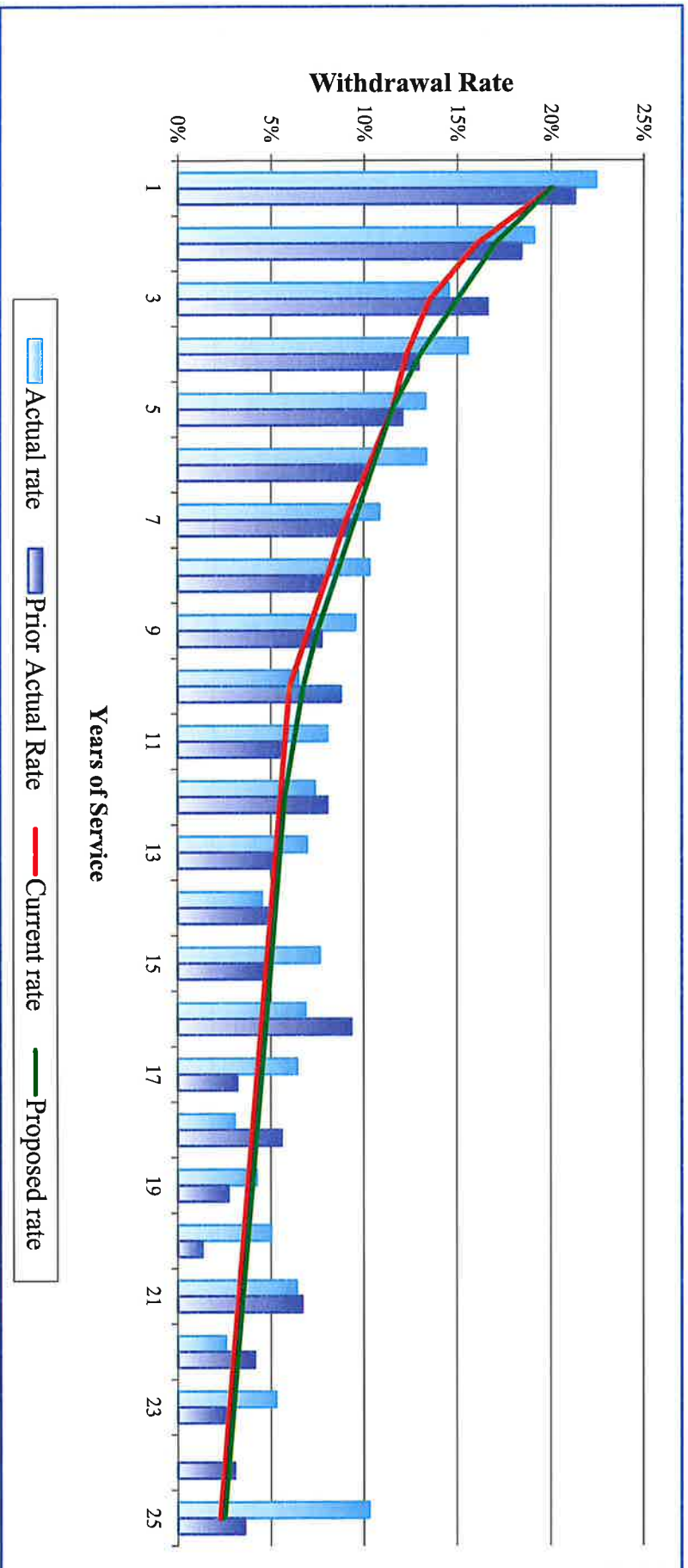
EXHIBIT C-11
Termination of Employment – Patrol



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	26	23	23
Actual/Expected		113%	113%



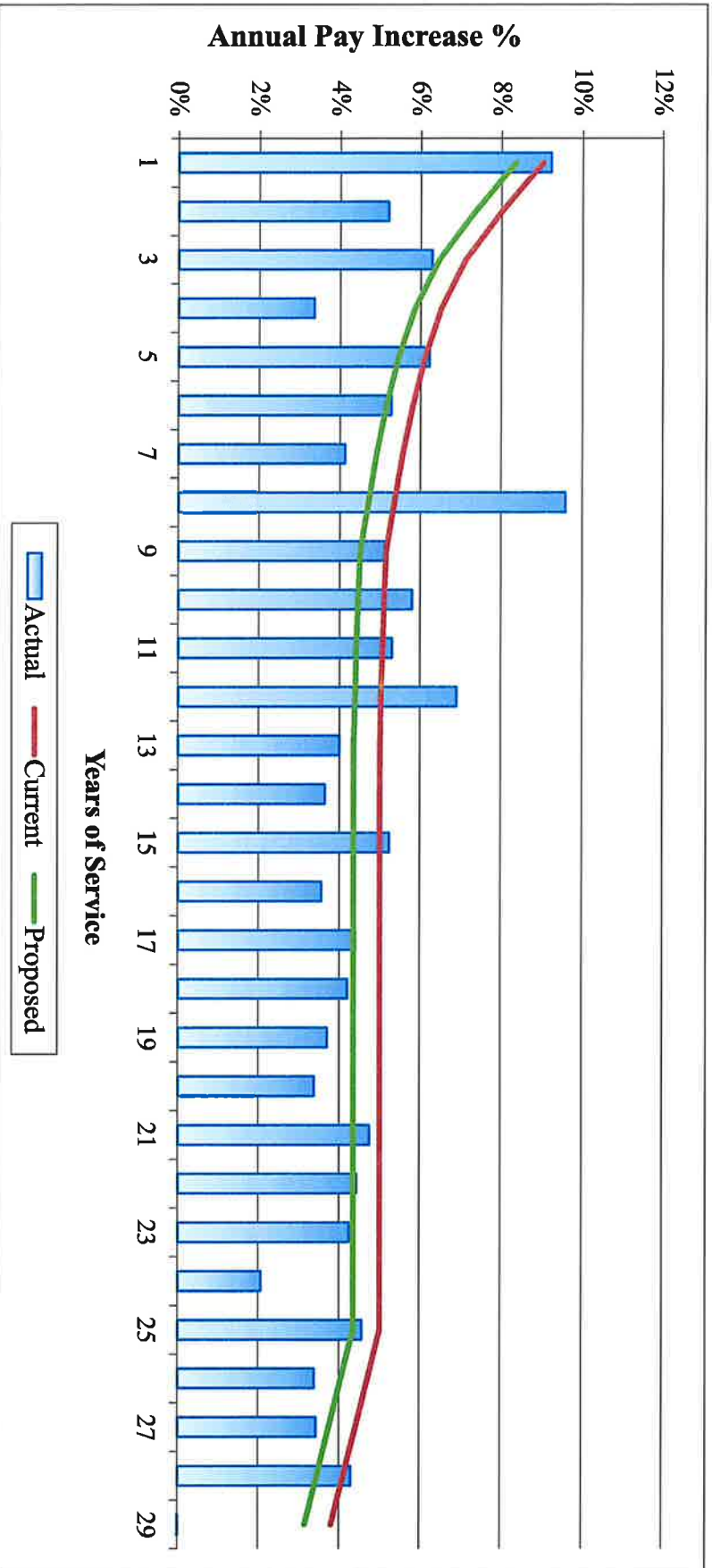
EXHIBIT C-13
Termination of Employment – County



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	1,997	1,686	1,762
Actual/Expected		118%	113%



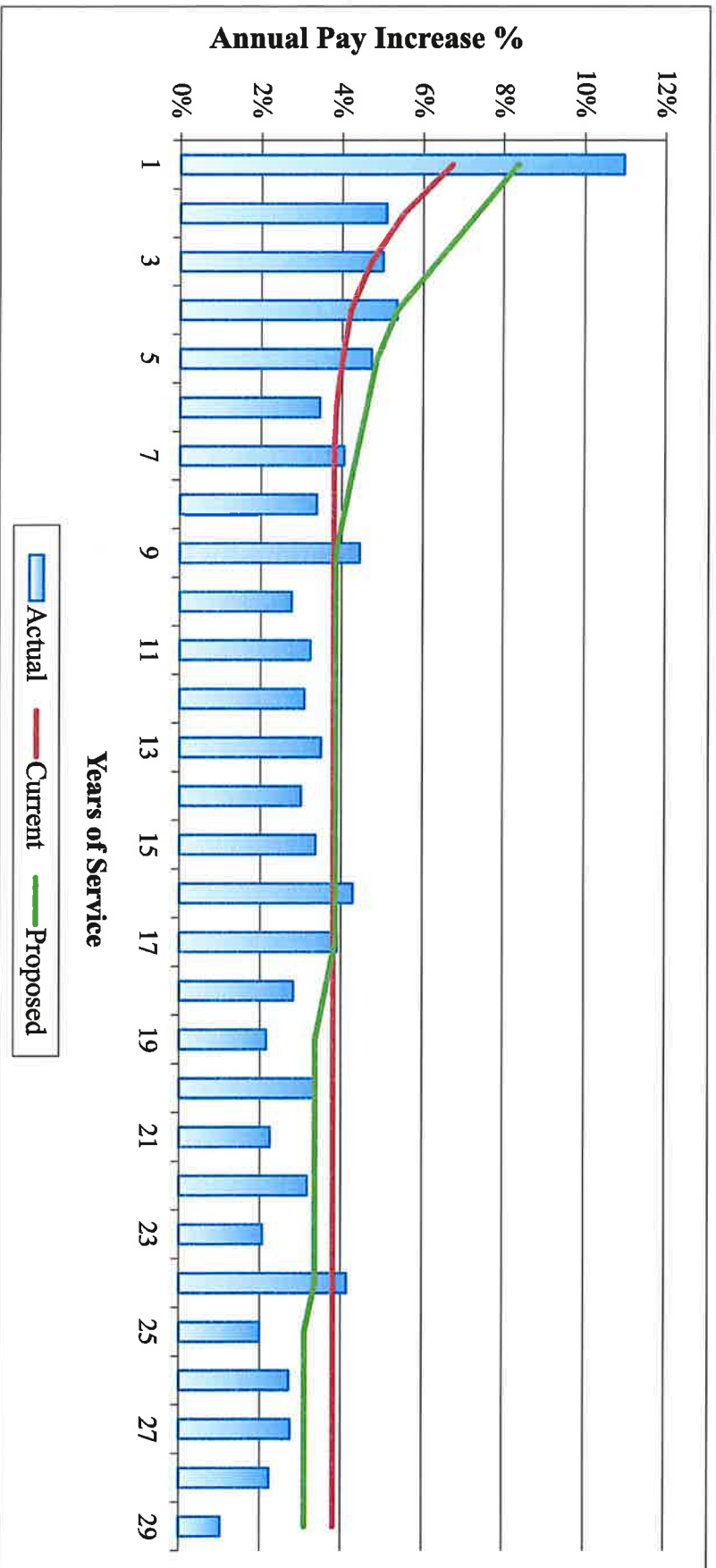
EXHIBIT C-15
Salary Scale – Patrol



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Average Increase	4.52%	5.32%	4.67%
Actual/Expected		85%	97%



EXHIBIT C-17
Salary Scale – County



	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Average Increase	4.41%	4.62%	4.83%
Actual/Expected		95%	91%



APPENDIX D- EXHIBITS OF ACTUAL AND EXPECTED RESULTS

EXHIBIT D-1
Retiree Mortality – Males

Table with 8 columns: Age, Exposure, Actual Deaths, Actual Rate, Current Expected, Current Rate, Proposed Expected, Proposed Rate. Rows include ages 60-85 and a summary row for weighted results for current study.

Weighted results for current study



EXHIBIT D-3
Retirement – Schools (Early)

<u>Age</u>	<u>Exposure</u>	<u>Actual Retirements</u>	<u>Actual Rate</u>	<u>Current Expected</u>	<u>Current Rate</u>	<u>Proposed Expected</u>	<u>Proposed Rate</u>
60	1,276	28	2.232%	127.6	10.000%	63.8	5.000%
61	1,056	45	4.222%	126.7	12.000%	63.3	6.000%
62	873	74	8.461%	104.7	12.000%	69.8	8.000%
63	657	42	6.333%	78.9	12.000%	65.7	10.000%
64	528	45	8.599%	79.2	15.000%	63.4	12.000%
	4,390	234	5.329%	517.1	11.780%	326.1	7.428%



EXHIBIT D-5
Retirement – Patrol (DROP after 25 Years)

<u>Age</u>	<u>Exposure</u>	<u>Actual Retirements</u>	<u>Actual Rate</u>	<u>Current Expected</u>	<u>Current Rate</u>	<u>Proposed Expected</u>	<u>Proposed Rate</u>
50	24	19	79.167%	24.0	100.000%	24.0	100.000%
51	11	5	45.455%	11.0	100.000%	11.0	100.000%
52	6	3	50.000%	6.0	100.000%	6.0	100.000%
53	3	1	33.333%	3.0	100.000%	3.0	100.000%
54	2	-	0.000%	2.0	100.000%	2.0	100.000%
55	2	1	50.000%	2.0	100.000%	2.0	100.000%
56	1	1	100.000%	1.0	100.000%	1.0	100.000%
57	4	4	100.000%	4.0	100.000%	4.0	100.000%
58	1	-	0.000%	1.0	100.000%	1.0	100.000%
59	-	-	0.000%	-	100.000%	-	100.000%
60	-	-	0.000%	-	100.000%	-	100.000%
	54	34	62.963%	54.0	100.000%	54.0	100.000%



EXHIBIT D-7
Retirement – State

<u>Age</u>	<u>Exposure</u>	<u>Actual Retirements</u>	<u>Actual Rate</u>	<u>Current Expected</u>	<u>Current Rate</u>	<u>Proposed Expected</u>	<u>Proposed Rate</u>
55	737	34	4.592%	36.9	5.000%	36.9	5.000%
56	825	38	4.600%	41.3	5.000%	41.3	5.000%
57	919	48	5.189%	45.9	5.000%	45.9	5.000%
58	970	55	5.705%	48.5	5.000%	48.5	5.000%
59	1,071	75	7.024%	53.6	5.000%	64.3	6.000%
60	1,136	73	6.399%	56.8	5.000%	68.2	6.000%
61	1,205	57	4.720%	96.4	8.000%	72.3	6.000%
62	1,313	120	9.105%	157.5	12.000%	131.3	10.000%
63	1,278	147	11.528%	153.3	12.000%	153.3	12.000%
64	1,241	129	10.384%	186.2	15.000%	149.0	12.000%
65	1,201	296	24.619%	360.2	30.000%	336.1	28.000%
66	935	298	31.909%	280.6	30.000%	261.9	28.000%
67	644	203	31.462%	161.0	25.000%	180.3	28.000%
68	491	129	26.200%	122.8	25.000%	137.5	28.000%
69	386	116	30.000%	96.6	25.000%	108.2	28.000%
70	281	109	38.634%	70.2	25.000%	78.7	28.000%
	14,633	1,925	13.155%	1,967.6	13.447%	1,913.5	13.076%



APPENDIX D- EXHIBITS OF ACTUAL AND EXPECTED RESULTS

EXHIBIT D-9
Termination of Employment – Schools (Males)

Table with 8 columns: Duration, Exposure, Actual Terminations, Actual Rate, Current Expected, Current Rate, Proposed Expected, Proposed Rate. Rows 1-25 and a total row at the bottom.



APPENDIX D- EXHIBITS OF ACTUAL AND EXPECTED RESULTS

EXHIBIT D-11
Termination of Employment – Patrol

Table with 8 columns: Duration, Exposure, Actual Terminations, Actual Rate, Current Expected, Current Rate, Proposed Expected, Proposed Rate. Rows 0-20 and a total row.



APPENDIX D- EXHIBITS OF ACTUAL AND EXPECTED RESULTS

EXHIBIT D-13
Termination of Employment – County

Table with 8 columns: Duration, Exposure, Actual Terminations, Actual Rate, Current Expected, Current Rate, Proposed Expected, Proposed Rate. Rows 1-25 and a summary row at the bottom.



APPENDIX D- EXHIBITS OF ACTUAL AND EXPECTED RESULTS

EXHIBIT D-15
Salary Scale – Patrol

Table with 8 columns: Duration, Initial Salary (Millions), Subsequent Salary (Millions), Actual Rate, Current Expected (Millions), Current Rate, Proposed Expected (Millions), Proposed Rate. Rows 1-31 and a final summary row.



APPENDIX D- EXHIBITS OF ACTUAL AND EXPECTED RESULTS

EXHIBIT D-17
Salary Scale – County

Table with 8 columns: Duration, Initial Salary (Millions), Subsequent Salary (Millions), Actual Rate, Current Expected (Millions), Current Rate, Proposed Expected (Millions), Proposed Rate. Rows 1-40 show salary scale details, and a final row shows totals: 817.6, 853.7, 4.41%, 852.8, 4.30%, 857.1, 4.83%.

Appendix B

Presentation of Actuarial Experience Study to the Retirement Committee



Cavanaugh Macdonald
CONSULTING, LLC

The experience and dedication you deserve

Nebraska Public Employees Retirement System 2020 Actuarial Valuations and Experience Study

Presentation to the Nebraska Public Employees Retirement Committee

January 27, 2021



www.CavMacConsulting.com



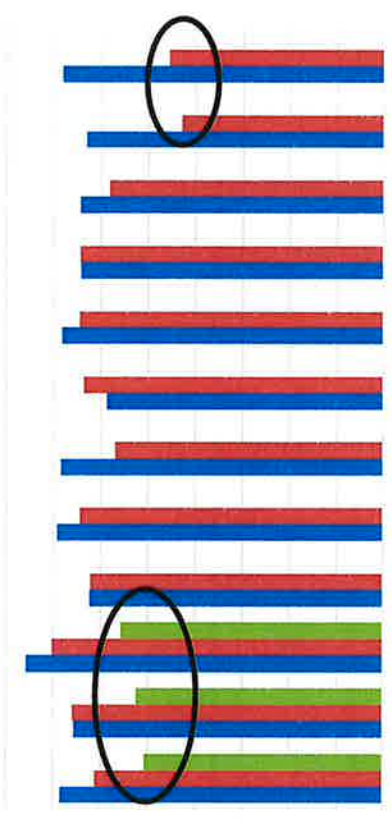
Purposes of an Actuarial Valuation

- Measure assets and liabilities
- Determine actuarial contribution rates and funding requirements for the plan year ending June 30, 2021 (additional State contribution made July 1, 2021)
- Analyze experience (actual vs. expected) in last year
- Assess and disclose key risks
- Analyze future trends using the projection modeling tool



Judges Court Fee Assumption for 2020 Valuation

- Court fees for FY 2020
 - Expected court fees: \$3,946,292
 - Actual court fees: \$3,548,379
 - Shortfall in fees: \$ 397,913 (about 10% lower)
- Pandemic likely contributed to the lower fees



- Assumed 85% of FY 2020 fees, \$3,016,122, as the estimated court fees for FY 2021



Change in Funded Ratio (Actuarial Assets/Actuarial Accrued Liability)

	Judges	State Patrol	Schools
Funded Ratio, July 1, 2019	98.08 %	87.34%	90.29 %
▪ Expected change	0.39%	0.67%	0.68%
▪ Actual contributions vs. ARC	(0.20%)	0.00%	0.38%
▪ Investment experience	(1.02 %)	(0.93%)	(0.94 %)
▪ Liability experience	0.09%	1.05%	1.24%
▪ Other experience	0.00%	0.00%	0.00%
Funded Ratio, July 1, 2020	97.34%	88.13%	91.65%

Additional State Contribution - Judges

(\$ in thousands)



	July 1, 2020	July 1, 2019
Actuarial Contribution Rate		
• Normal Cost	24.23%	24.23%
• Amortization of UAAL	<u>1.72%</u>	<u>1.33%</u>
• Total Contribution	25.95%	25.56%
Statutory Member Rate	(8.35%)	(7.99%)
Non-member Required Contribution Rate	17.60%	17.57%
Actuarial Required Employer Contribution		
• Projected Pay for Actives	\$ 25,249	\$ 24,446
• Total Required Contribution	4,444	4,295
• Expected Court Fees	3,016	3,946
• Additional Required State Contribution	\$ 1,428	\$ 349

Numbers may not add due to rounding.

Additional State Contribution - School

(\$ in millions)



	July 1, 2020	July 1, 2019
Actuarial Contribution Rate		
• Normal Cost	13.30%	13.35%
• Amortization of UAAL	<u>4.75%</u>	<u>5.07%</u>
• Total Contribution Rate	18.05%	18.42%
Statutory Member Rate	(9.78%)	(9.78%)
Statutory Employer Rate (101% of member rate)	(9.88%)	(9.88%)
Statutory State Rate	(2.00%)	(2.00%)
Additional Required State Contribution		
• Contribution Shortfall/(Margin)	(3.61%)	(3.24%)
• Projected Pay for Fiscal Year	\$ 2,152	\$ 2,093
• Additional Required State Contribution	0	0

Purpose of Experience Study



- Provides the basis for analyzing existing assumptions and developing any recommended changes
- Actuary's role is to perform the analysis and make recommendations for each assumption
- As fiduciaries, the Board is responsible for the selection of actuarial assumptions
 - Board can adopt all, none, or some of actuary's recommendations

Selection of Assumptions



What Are They?

Economic

- Price Inflation
- Investment Return
- COLA
- Interest Crediting Rate (CB Plans)
- General Wage Increase
- Individual Salary Increases
- Covered Payroll Growth

Demographic

- Retirement Rates
- Disability
- Termination
- Mortality
- Lump Sum Election Rate for CB Plans

Who Selects Them?

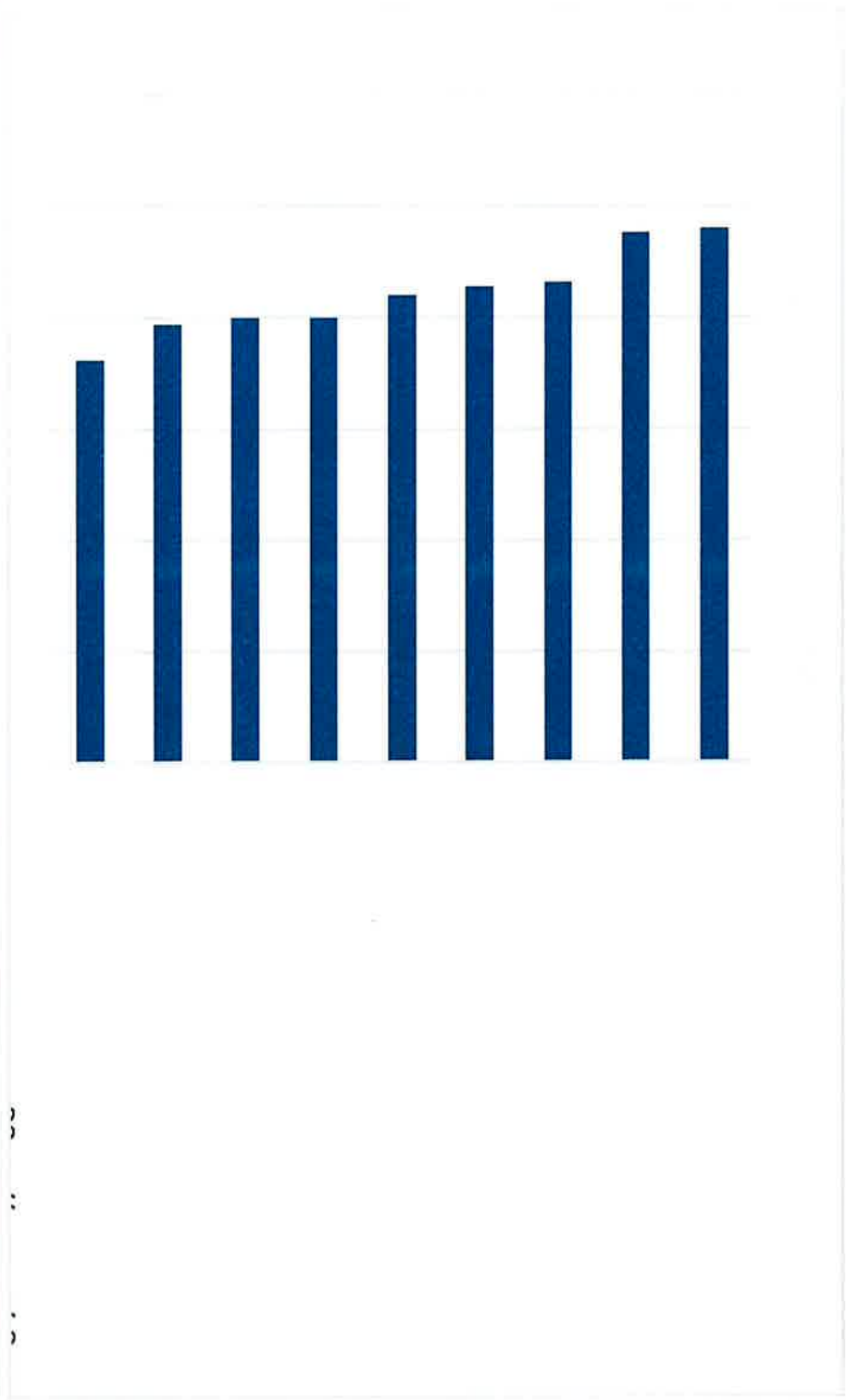
Economic

- Board
- Actuary
- Other Advisors

Demographic

- Board Approves
- Mostly Actuary since data driven

Selected Metrics of Expected Rates of Inflation



We recommend the inflation assumption be lowered from 2.75% to an ultimate rate of 2.35%

Summary of Recommended Economic Assumptions



	Current	Proposed	Change
Price inflation	2.75%	2.35%	(0.40%)
Investment return	7.50%	7.00%	(0.50%)
General wage inflation	3.50%	2.85%	(0.65%)
Covered payroll growth	3.50%	2.85%	(0.65%)
Cost of living	2.25%	2.00%	(0.25%)
Interest crediting rate for Cash Balance Plans	6.25%	6.00%	(0.25%)

Current Mortality Assumption



- Due to limited member data in most of the plans, combined experience for all plans is studied, and the same mortality assumption is used for all groups
- Current assumption:
 - RP-2014 White Collar Mortality Table, with two-year age setback, with different scaling for males and females
 - Future mortality improvements anticipated using customized scale with 0.50% ultimate rate in 2035

Future Mortality Improvement



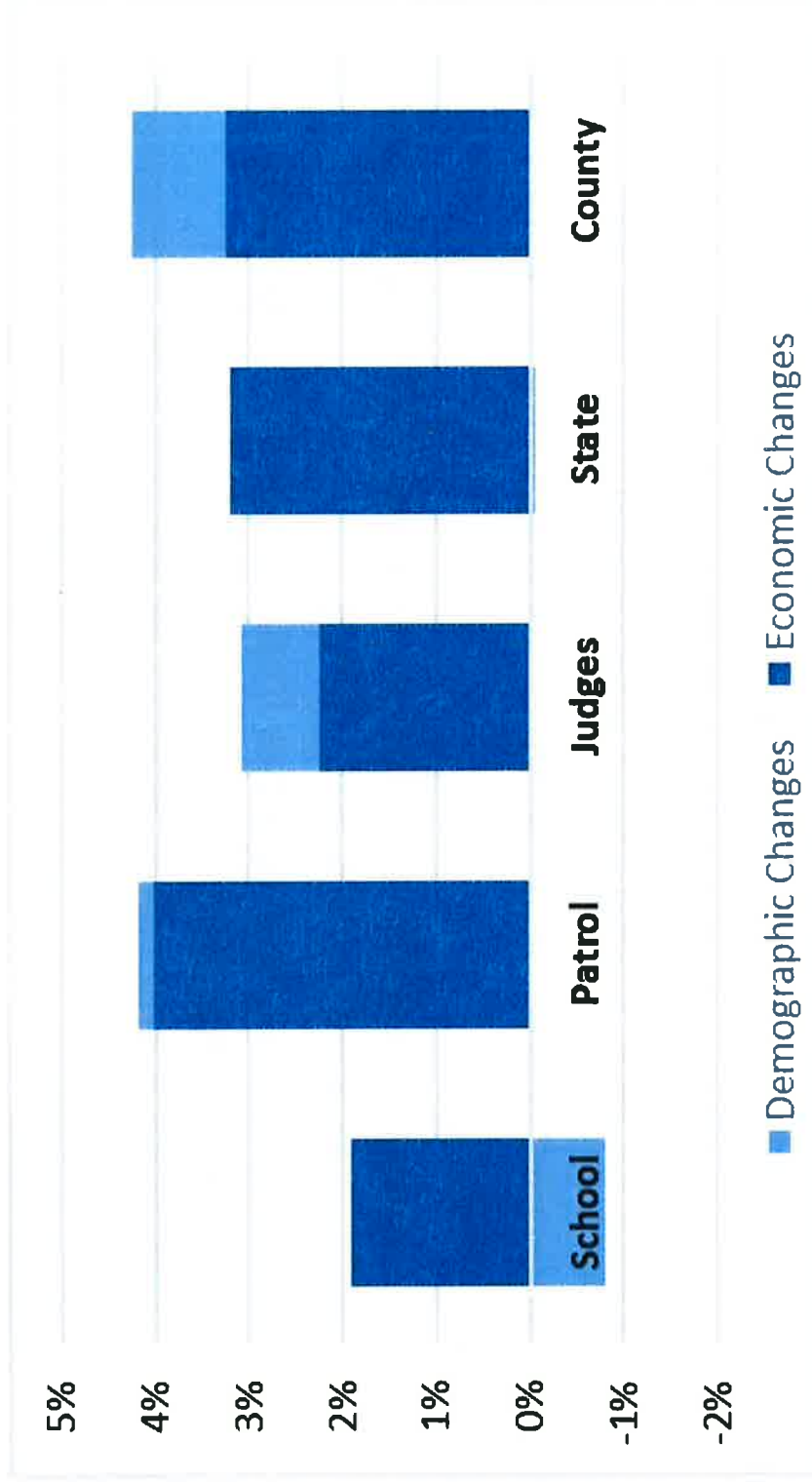
- Currently using a mortality improvement scale to anticipate future improvements in life expectancy
 - Customized scale using Society of Actuaries' tool with 0.5% ultimate rate in 2035
- Updated mortality improvement scales published since 2015 reflect lower rates of improvement.
- **Recommended mortality improvement scale: 75% of the ultimate improvement rate in the MP-2019 Scale**
 - Net impact is reflecting slightly more improvement than the current assumption

Summary of Recommended Demographic Assumptions



	State	County
Merit salary scale	X	X
Mortality (same for all plan)	X	X
Retirement	X	X
Lump sum election		X
Termination of employment	X	X

Liability Impact of Assumption Changes



Phase-in of Economic Assumptions



	Current	2021 Valuations	2022 Valuations	2023 Valuations	2024 Valuations
Price inflation	2.75%	2.65%	2.55%	2.45%	2.35%
Real rate of return	<u>4.75%</u>	<u>4.65%</u>	<u>4.65%</u>	<u>4.65%</u>	<u>4.65%</u>
Investment return	7.50%	7.30%	7.20%	7.10%	7.00%
General wage inflation	3.50%	3.25%	3.05%	2.95%	2.85%
Covered payroll growth	3.50%	3.15%	3.05%	2.95%	2.85%
Cost of living (Tier 1)	2.25%	2.15%	2.10%	2.05%	2.00%
Interest crediting rate for Cash Balance Plans	6.25%	6.15%	6.10%	6.05%	6.00%

Demographic assumption changes implemented immediately.

Amortization Policy



- Layered amortization can produce “tail volatility” when large charge and credit layers expire at different times
- For the Board to manage this tail volatility, if it occurs, they need authority to make decisions on the UAAL amortization policy as experience unfolds
- No concerns at the present time but this change is an important tool to have in the future as amortization periods on current bases get shorter
- CMC recommended the Board ask for legislation to grant them the authority to modify the amortization policy to manage tail volatility when appropriate and recommended by the actuary
- Changes to the amortization policy are in LB 17

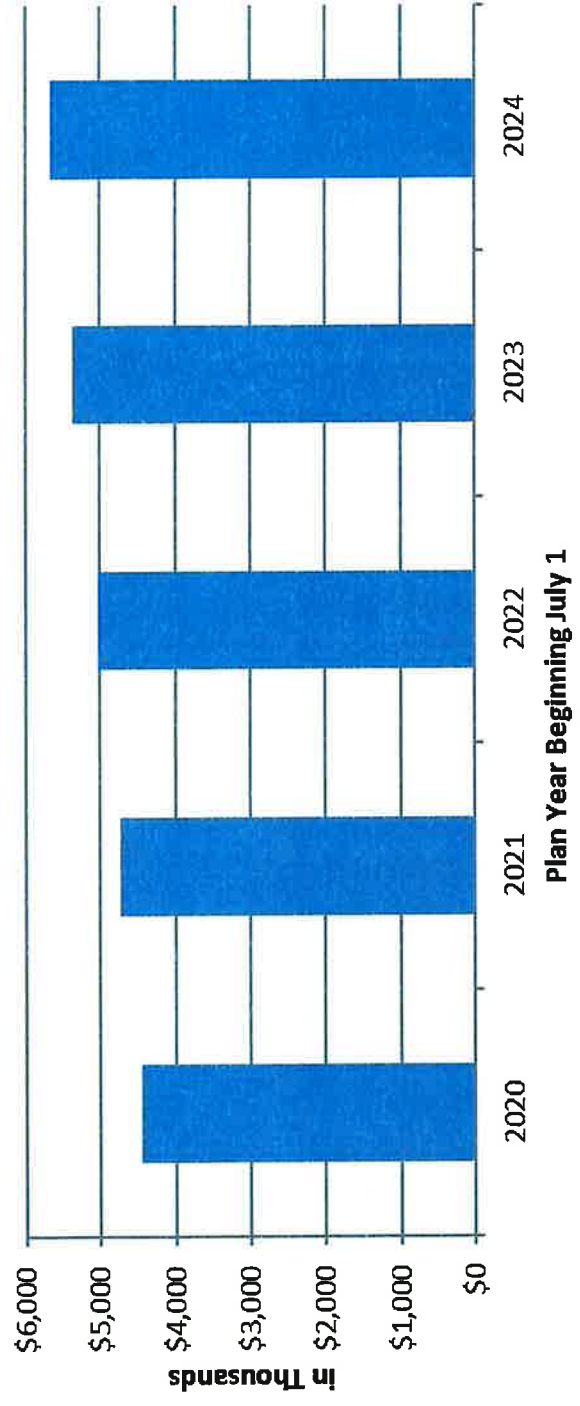
Cost Impact of Change to 25 Year Amortization (Patrol)



July 1	Current: 30-Year Layers			25-Year Layers			
	Actuarial Rate	EE/ER Rate	Additional Appropriation	Actuarial Rate	EE/ER Rate	Additional Appropriation	
2021	47.45%	32.40%	15.05%	47.60%	32.40%	15.20%	
2022	49.30%	32.48%	16.82%	49.61%	32.48%	17.13%	
2023	51.19%	32.56%	18.63%	51.68%	32.56%	19.12%	
2024	53.87%	32.66%	21.21%	54.60%	32.66%	21.94%	
2025	54.21%	32.78%	21.43%	54.97%	32.78%	22.19%	
2026	54.46%	32.90%	21.56%	55.22%	32.90%	22.32%	
2027	54.41%	33.08%	21.33%	55.17%	33.08%	22.09%	
							Difference
							0.15%
							0.31%
							0.49%
							0.73%
							0.76%
							0.76%

Reflects the phase-in of economic assumptions and recognition of deferred investment experience.

Projected Short Term Contributions Judges System



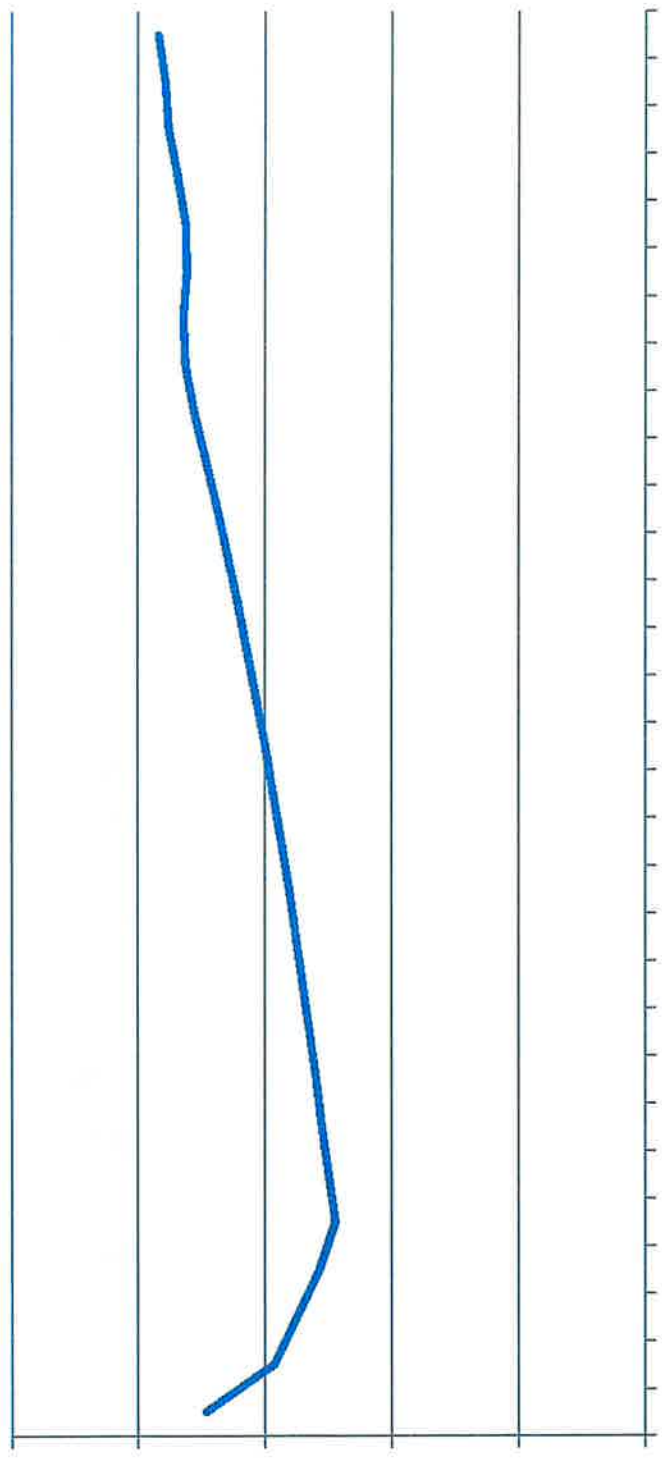
Projection of Additional Contribution and Appropriations					
(\$ in 000's)	2020	2021	2022	2023	2024
Court Fees	3,016	3,194	3,371	3,548	3,548
Additional State Contributions	1,428	1,531	1,662	1,808	2,106

Assumes court fees increase to \$3.5M by 2023.



Projections: Judges System

Projected Funded Ratio

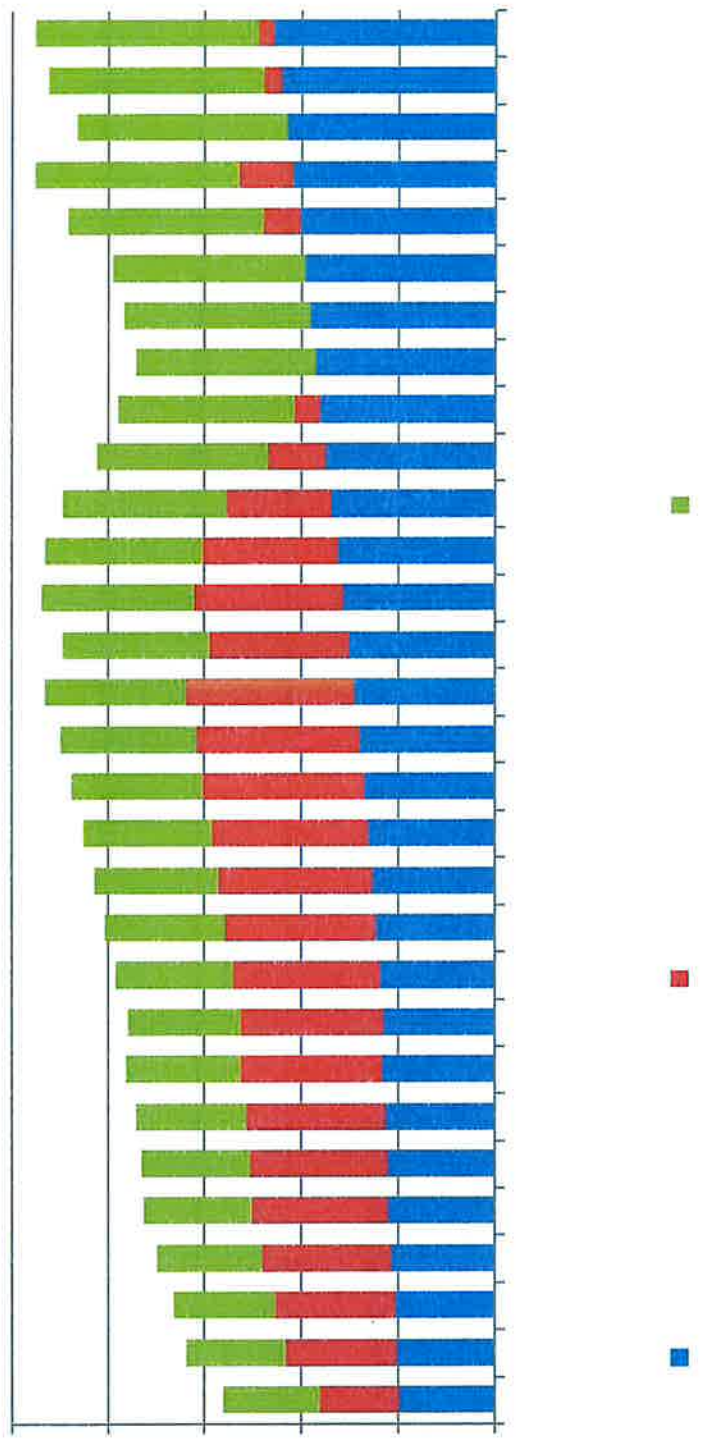


Assumes assumptions are met in all future years.



Projections: State Patrol System

Estimated Employer Contributions

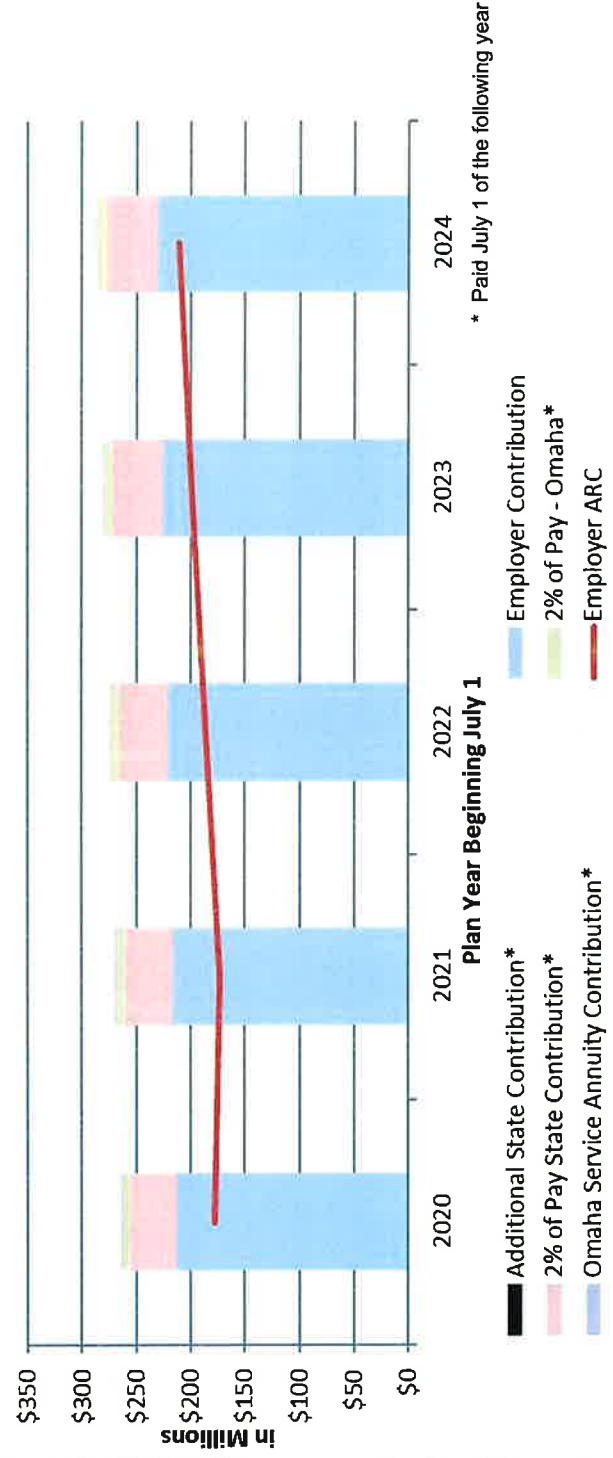


Additional employer contributions are expected to be needed in most future years.

Assumes assumptions are met in all future years.



Short Term Contribution Projections School System

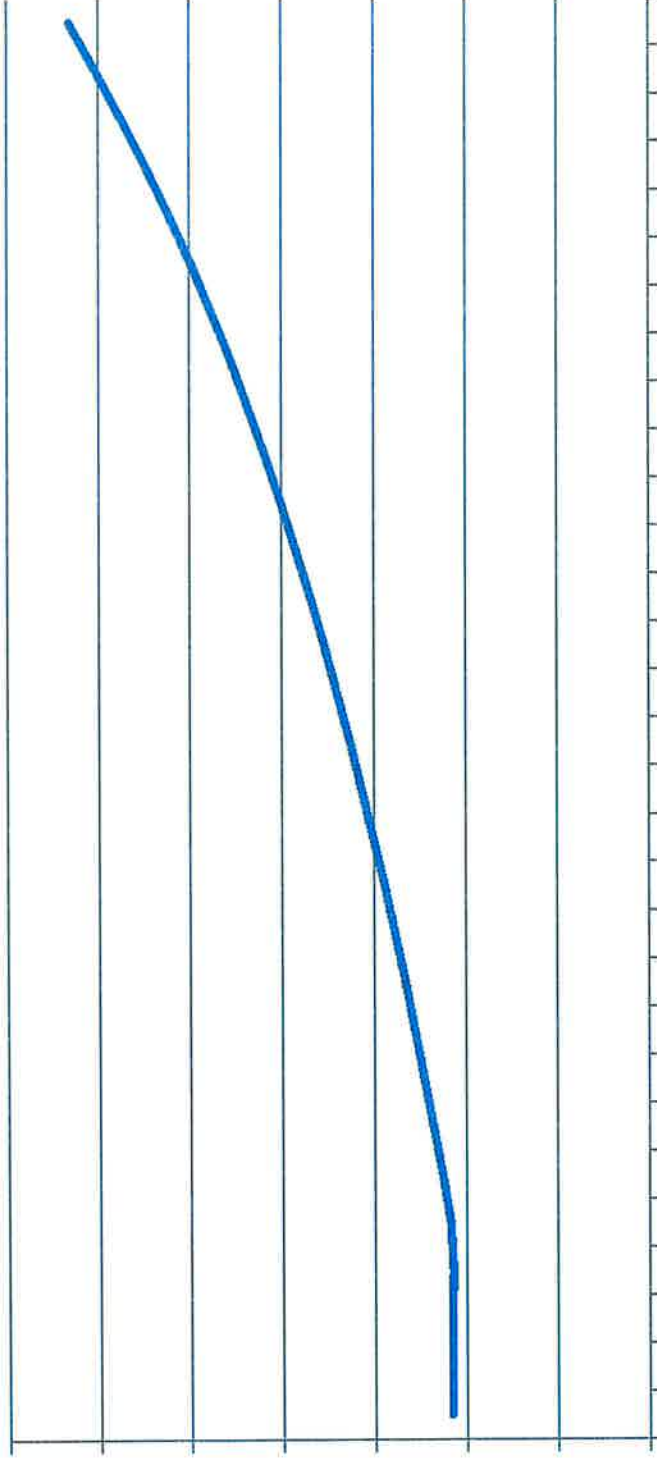


Projection of Additional Contribution and Appropriations						
(\$ in millions)	2020	2021	2022	2023	2024	
Omaha Service Annuity Contribution	1.2	1.1	1.1	1.1	1.2	
2% of Pay - Omaha	7.4	7.6	7.7	7.9	8.1	
2% of Pay State Contribution	43.0	43.9	44.8	45.8	46.8	
Employer Contribution	212.5	216.9	221.3	226.0	230.9	
Additional State Contributions	0.0	0.0	0.0	0.0	0.0	



Projections: School System

Projected Funded Ratio

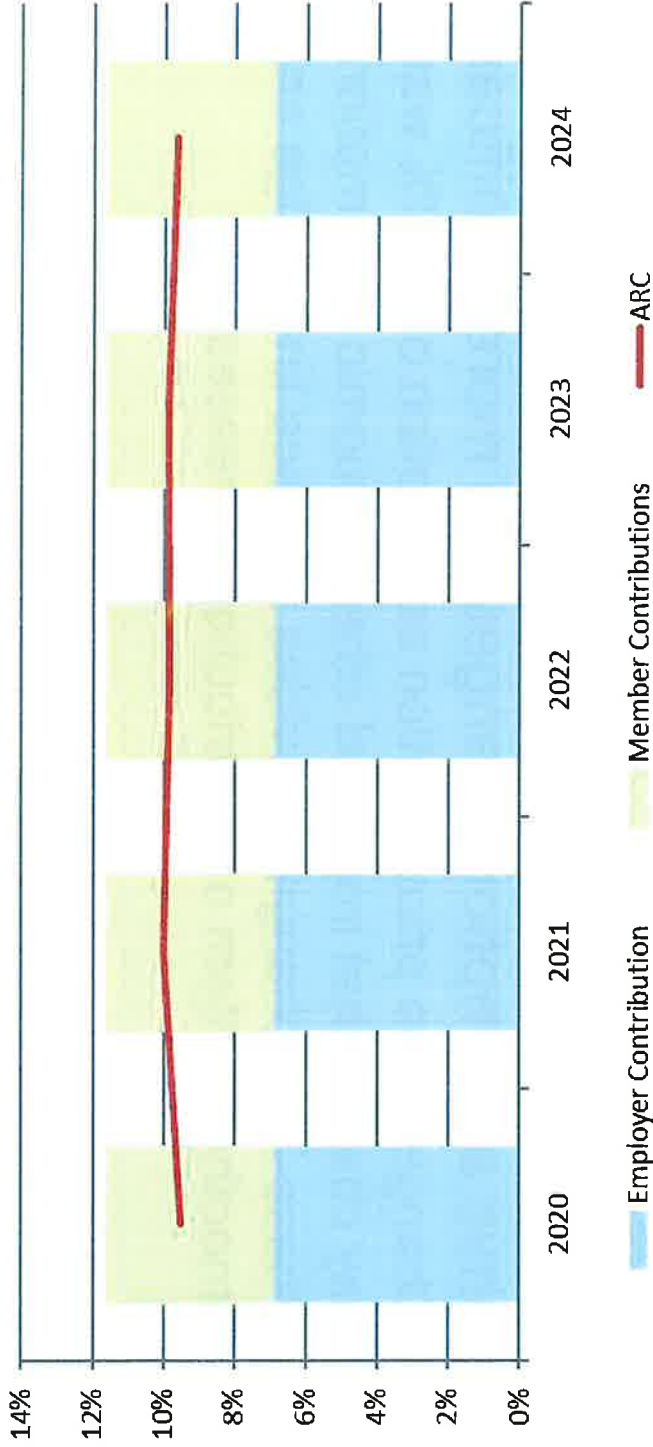


Assumes assumptions are met in all future years.



County Cash Balance Plan

Impact of Experience Study Changes on Contribution Rates



Based on the January 1, 2020 valuation. Assumes assumptions are met in all future years.



Actuarial Certification

I, Patrice A. Beckham, FSA, am a consulting actuary with Cavanaugh Macdonald Consulting, LLC. I am a member of the American Academy of Actuaries, Fellow of the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. I am available to answer any questions or provide additional information as needed.

Sincerely,

A handwritten signature in blue ink that reads 'Patrice Beckham' in a cursive script.

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Appendix C

Transcript of January 27,
2021 Hearing –
Presentation of Actuarial
Experience Study

Transcript Prepared by Clerk of the Legislature Transcribers Office
Nebraska Retirement Systems Committee January 27, 2021
Rough Draft

Does not include written testimony submitted prior to the public hearing per our COVID-19
Response protocol

LINDSTROM: [RECORDER MALFUNCTION] Retirement Systems Committee hearing. My name is Brett Lindstrom. I'm from Omaha, Nebraska, representing District 18 and serve as Vice Chair of the Retirement Committee. For the safety of our committee members, staff, pages, and public, we ask those attending our hearings to abide by the following. Due to social distancing requirements, seating in the hearing room is limited. We ask that you only enter the hearing room when it's necessary for you to attend the bill hearing in process. The bills will be taken up in the order posted outside the hearing room. The list will be updated after each hearing to identify which bill is currently being heard. The committee will pause between each bill to allow time for the public to move in and out of the hearing room. We request that everyone utilize the identified entrance and exit doors to the hearing room. We request that you wear a face covering while in the hearing room. Testifiers may remove their face covering during the testimony to assist committee members and transcribers to clearly hear-- clearly hearing and understanding the testimony. Pages will sanitize the front table and chair between testifiers. Public hearings for which attendance reaches seating capacity or near capacity, the entrance door will be monitored by a sergeant of arms who will allow people to enter the hearing room based on-- based upon seating availability. Persons waiting to enter a hearing room are asked to observe social distancing and wear a face covering while waiting in the hallway or outside the building. To better facilitate today's proceedings, I ask that you abide by the following procedures. Please silence or turn off your cell phones. Move to the front of the row when you are ready to testify. Order of testimony will go introducer, proponents, opponents, neutral, and closing. Testifiers, please sign in, hand your blue sheet to the committee clerk when you come up to testify. Spell your name before the-- spell your name for the record before testifying. Please be concise. It is-- today we'll probably not go with a clock. If you will be testifying at the microphone, we want to go on record or have a position on a bill being heard today, there are white sheets in the entrance where you may leave your name and other pertinent information. These sign-in sheets will be exhibits in the permanent record at the end of today's hearing. We ask that you please limit or-- we ask that you please limit or eliminate handouts. Written material may be distributed to committee members as exhibits only while testimony is being offered. Hand them to the page for

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reflected in the 2020 valuation results. Those will be implemented in the 2021. And then at the very end we always share some projections with you about what future trends look like and we'll do that using the new assumptions. Doesn't make sense to use the old ones. All right, slide 3. Just kind of a reminder. We come every year and visit with you about the valuation. But what the valuation is all about is monitoring the funding progress of the plans. These are very, very long-term obligations. The streams of benefit payments go out 75, 80, 85 years. So we can't just set a contribution rate and check in, in 10 or 20 years. We're monitoring it to make sure if we need to make changes, additional money goes in or if changes need to occur in benefits that those happen in a timely fashion. So we measure assets and liabilities. Assets, we do use a smoothing method. It's market related, but it smooths the difference between the expected return and the actual return over five years, which is just a mechanism to give the highs and lows of the market time to average out. Probably don't need to talk about market volatility this year as everybody understands it. The difference, the liabilities then, of course, are the present value of those future benefit payments. So we compare those two and that difference has to be funded by contributions and investment income in the future for the system to be actuarially sound. So one of the key pieces of information that comes out of the valuation is that actuarial contribution rate. And then if there is any additional state contribution that is due, it's for the plan year ending June 30, 2021, but it's actually made usually early July, which would be fiscal year '22 for the state's budget. The valuation also gives us an opportunity to look back over the last 12 months and measure the actual experience, what actually occurred versus what was anticipated by assumptions. And as you know, we use a lot of different assumptions. They're our best estimate, but we know they're going to vary from year to year, even if they're correct or accurate over the longer term. So that keeps those assumptions and the experience in front of us. If, if we see a consistent loss, for example, on mortality, loss, loss, loss, it's, you know, foreshadowing when the Experience Study comes, we're likely going to have to change that assumption. And then in addition, we prepare that modeling tool. Again, we use that to look at trends. We use it to stress test the results. What if these, you know, if all assumptions aren't nice and pretty, what are the implications? And what are the-- what are the risks to funding the plan? That's really where the actuarial

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very difficult to anticipate court fees I think for anybody. It's not just us. So the, the general assumption has always been whatever we received in the year that just ended, we'll use that amount for the current year. And that's what we did for fiscal year '20. We used the actual fiscal year '19 court fees, which were \$3.9 million. You can see the actual court fees for fiscal year '19 were \$3.5 million. So we were short about \$400,000. And this little graph, the fiscal year '19 court fees by month are the dark blue and then fiscal year '20 are red. And you can kind of see, especially when you get to May and June, that the fiscal year '20 court fees are much lower and that's likely at least partially impacted by the pandemic.

LINDSTROM: Yeah.

PATRICE BECKHAM: But we got a little nervous because when we were doing this in the fall, the, you know, the pandemic is still going on. So the question was, well, has that trend continued? You know, what should we be using as an estimate for fiscal year '21, knowing that we're still dealing with the pandemic? And we at that point, we only had information for fiscal year '21 for July, August and September. Those are the green bars on the far left side. But you can see they're considerably lower than the red bars, which were fiscal year '20. So we felt like we needed to, to change that methodology, that assumption. So for fiscal year '21, our assumption is that the court fees will be 85 percent of what they were in fiscal year '20, which is about \$3 million. And then you'll see when we get to the projections, we're assuming they ramp back up hoping and praying things get back to some normalcy in the next three years. All right, slide 6, I mentioned earlier that we use an asset valuation method or an asset smoothing method to try to take out some of the volatility related to returns on market value. So in this graph, the blue line is the return on market value. And you can see it's extremely volatile. As I said, it's rarely close to the black line. The red line here is the return on the smooth value, the actuarial value. And you can see that it does indeed kind of smooth out some of the peaks and valleys. It still moves because the, the market values are so different. You know, you have a minus 20 and almost, you know, plus 24 in this 20-year period. So, so that's why we use an asset smoothing method. It's very common for public plans to use that because everybody's in the same boat with trying to, to budget for these contributions. If you had used pure market value, you'd see extreme volatility in the contributions and particularly for

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PATRICE BECKHAM: It's been very well funded for a long time.

LINDSTROM: Yeah, just--

PATRICE BECKHAM: I can have that really quick. It's been above 85 percent since 2001.

LINDSTROM: Above 85?

PATRICE BECKHAM: And close to 90 for most of that.

LINDSTROM: Yeah.

PATRICE BECKHAM: Remember with smoothing you recognize over five years. So the ugliness that happened in fiscal year '09, drug it down a little bit.

LINDSTROM: I was going to say, as long as I've been sitting here, it's been in the high 90s.

PATRICE BECKHAM: Very strong.

LINDSTROM: I know that we've-- Senator Kolterman has introduced bills that deals with the funding of the judges and, and the Governor has included the full ARC payment in his budget and additional fees as well so.

PATRICE BECKHAM: Right.

LINDSTROM: Yeah.

PATRICE BECKHAM: And that's why it's well-funded.

LINDSTROM: Yeah.

PATRICE BECKHAM: These plans will work if you put the money in to fund them.

LINDSTROM: Yeah.

PATRICE BECKHAM: All right. So Slide 8 is, you know, again, what impacted the actuarial required contribution. And again, you've got all the information for all three of the plans. I won't go through

Transcript Prepared by Clerk of the Legislature Transcribers Office
Nebraska Retirement Systems Committee January 27, 2021
Rough Draft

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KATE ALLEN: Excuse me, Pat. I have several questions from Senator Clements.

PATRICE BECKHAM: OK.

KATE ALLEN: His first question is what factors caused the 1.24 percent liability experience improvement for schools?

PATRICE BECKHAM: No, is that the-- the 1.24, is that what?

KATE ALLEN: Yes.

PATRICE BECKHAM: Let me. With three systems, I don't ever trust my memory. They're all very different.

KATE ALLEN: I'm not sure if he's looking ahead or if he's looking at the--

PATRICE BECKHAM: Actually, I think that is on slide 7.

KATE ALLEN: OK.

PATRICE BECKHAM: And if the senator has the actual report, the valuation report, there's a detailed analysis of gain and loss by source on that page. But we had again, we had the COLA. The COLA was much lower. I mean, most of the people in pay status get the two-- 2.5 percent COLA and it was .52 so, so that was a \$125 million gain. That's a big one. We also had a gain on mortality and a gain on salary. They had a small gain on retirement, so I would say the big ones were salary, first COLA salary, mortality and those were significant. Salary gain was \$100 million as well.

KATE ALLEN: OK. His second question is I see the actuary is recommending a change from 7.5 to 7 percent assumed investment rate. When will the 7 percent rate be in effect?

PATRICE BECKHAM: If I could defer that till this-- the slides on Experience Study, I think we will answer that very completely.

KATE ALLEN: OK. And then I'll follow up with another question when you get to that.

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process is trying to fund and put money away to pay the ultimate benefits. And it's the assumptions that help us estimate and put a value on those future benefit payments. So it's very, very important. There are a number of slides to go over. But I will tell you, the board has spent five board meetings discussing this and they've spent a lot of time. And I would just like to publicly acknowledge that and commend them. They're very thoughtful. They're very thorough. They dig into this and they give it the time it deserves and it's not always the case. So we're going to hit the high points today because, again, you probably don't want to spend five hours talking about this. So I will try to condense it and we will keep moving.

LINDSTROM: Where?

PATRICE BECKHAM: Slide 13 again, why this is done? I mean, it's statutorily required, but even when it was not, public systems do periodic experience studies. It's good governance, it's good policy. It gives us the basis for analyzing what's actually happened, evaluating that assumption, deciding if we need to make a change and if so, what that change should be. The actuary's role is really to perform the analysis. A lot of number crunching involved here, a lot of subjective analysis. And so we go through all that. We make a recommendation. But the board or the, the, the trustees have the fiduciary responsibility to actually select the assumptions. And it's a huge responsibility. Usually they adopt, I mean, broadly boards adopt the recommendations of the actuary, but it does not always happen. I've had a few times in my career where recommendations were not adopted, but it is the board's ultimate decision and it's their responsibility. And we recognize that and respect it. On page 14, again, we're comparing what actually happened during the study period. We have a four-year study period. Often we'll look back to the prior Experience Study. So we kind of, we're looking over eight years if we feel like we'd like to have a little bit more data. So compare what actually happened to what was expected to happen. And that measure indicates if the current assumption's doing a pretty good job at anticipating experience. If it's-- if it's way off, then we need to make an adjustment. Past experience is a-- is a pretty good indicator for certain assumptions. Mortality, you know, it's not a voluntary thing. It's not particularly helpful for investment return because that one is, is wild and much more forward looking. And I think it's important to just recognize that this, this process, because it's so

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expected return for each of those asset allocations and then how they sort of are correlated with each other. What will that return, real rate of return be? And we add that to inflation for the nominal return. Since inflation is so important, I included this slide on Slide 17, which just shows all the sources of expected rates of inflation that we use in the Experience Study. This is very much a forward-looking measurement. What's happened in the past 10, 20, 30 years is not necessarily a good indication of what will happen in the next 30. It is a long, a long-term assumption. The current assumption is 2.75, which was actually lowered, I believe, from 3.25 in the last Experience Study. But as we look at all the data, we felt like it needed to be lowered, but we were uncomfortable going all the way to 2 percent. I'm hoping that's right, because that'll be my retirement years, but I'm not [INAUDIBLE]. So, so we wanted to make a meaningful change. But bear in mind that inflation could come back and be higher in the future. And particularly, these plans do have cost of living adjustments that we would want to not be overly aggressive. So we're--

LINDSTROM: I have a quick question. How, how far back do you go when you're looking at dropping that? You know when I'm looking at all the indicators that we're obviously at, as interest rates are as low as maybe they're ever going to be or certainly--

PATRICE BECKHAM: [INAUDIBLE]

LINDSTROM: --in the last couple of years.

PATRICE BECKHAM: Yeah.

LINDSTROM: I guess never say never, right? I mean, they can always go lower. And then with what the federal government and I don't know whether, is it \$26 trillion or whatever it is now, and it looks like there's going to be another stimulus/infrastructure deal that's going to put another trillion-plus I'm guessing. And you know, all signs point to inflation increasing. So I guess my question is to decrease it, I'm assuming you're just looking at the rolling average over the last seven years or five years. Or how do they come to a conclusion when everything to me says inflation is going to go up I guess is my [INAUDIBLE]

PATRICE BECKHAM: Yeah.

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LINDSTROM: Well, yeah, historically I was always-- is it 3.1 I think over the long, long term, somewhere in that range I believe.

PATRICE BECKHAM: Yeah.

LINDSTROM: But in the last 15, 20 years it's more in the 2, 2.5.

PATRICE BECKHAM: Yeah, it's been really low even for the last 20. Now you've got my curiosity piqued.

LINDSTROM: Not to sidetrack you there.

PATRICE BECKHAM: I know.

LINDSTROM: It's just that stuff kind of fascinates me.

PATRICE BECKHAM: You know, it's like it doesn't take much for me. [INAUDIBLE] Anyway, I'm going to find out for you before we're done. But I want to keep moving in case we run out of time. So slide 19 again, it's 18. I'm sorry, 18 is investment return. We need to spend a little time on this one. So when we lower the price of inflation, we automatically impact investment returns because of the building block. OK, so again, price inflation is down 40 basis points. Based on the information that we got from Aon, we also used something called the Horizon Actuarial Survey that has the capital market assumptions for about 30 other investment consultants. And about 12 of those have long-term 20- or 30-year expectations. Based on that information, we felt like the real rate of return needed to come down. Again, there's no right answer. So a lot of times, well, let's move in that direction. We do this every four years. We've got, you know, we have time to keep adjusting it down if that trend continues so that we decrease that 15 basis points. And then you'll notice the second to the bottom row that says adjustment for administrative fees. Right now, the 7.5 is net of both investment and administrative expenses. So it takes money to operate NPERS and pay benefits and all that. So those administrative expenses right now are netted out of the investment return. We recommended a change where the administrative expenses will be part of the actuarial contribution so they're not netted out of investment return. So that's five basis points. And that's why you see in the proposed that's zero. So we're really moved from 7.55 to 7 if you think about the kind of take, taking out the

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percent assumed rate? And I don't know if you've done any of those calculations.

PATRICE BECKHAM: Well, the 6.5 would vary, you know, by each of the systems--

KATE ALLEN: Yeah.

PATRICE BECKHAM: --because it has a different impact on them. Again, in the valuation reports, we do a sensitivity analysis where we change the investment return assumption. Unfortunately, I see the one here is just 7 is as low as we go. We would have to calculate that impact. And then it always comes with the is it-- is inflation changing because that then changes the cost of living assumption, the salary increase assumption. But if he wanted to know just change only the 7 to 6.5, we'd have to run the numbers and get back to you on that.

KATE ALLEN: And the other question, Senator Kolterman asked, if you just kind of review where our assumed rates have been and I know you mentioned it had been that we've gone from a 7.5 now with the proposal down to 7. And prior to that, can you talk about what those rates have been?

PATRICE BECKHAM: Right. And on slide 6 where we showed the historical asset returns, we actually had the assumption, that goes back to 2001, which is before my time. But it was 8 percent from 2001 through the 2017 valuation. And then it dropped 7.5. And now we'll be, I'll give it away, we're going to phase it, phase down to 7 over the next four years. OK. So it was 8 percent for a long time. You had a lot of company. That was the most common investment return assumption, the median. And there's hardly anybody left at 8. Out of 125 plans, I think there might be 2 that are still there. Did we cover them, Kate?

KATE ALLEN: And he also wanted me to make the comment, the current investment returns this year should help as well. In other words, the Investment Council continues to do a great job and also the PERB board and their management team are doing, I mean, they really did quite a job this year with five--

PATRICE BECKHAM: Yes.

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actuarial world. So slide 22, again, for the first time ever, super exciting, we've been recognized by the Society of Actuaries that public plans are important and they published a set of mortality tables that were constructed based on strictly public plan data. It's called the Pub-2010 Mortality Tables, different tables by occupation, first time that's ever happened. So teachers, public safety, general employees. And then again, there's a correlation between the size of the benefit of mortality, not a causation, but a correlation. Higher benefits tend to have, those people have better mortality. So there's three different levels. So this is a great resource for us as a starting place for all of our systems. And even though it didn't have a big impact, we wanted to move to the Pub-2010 tables, kind of for best, best practice. And you can see our recommendations there that the general employees was the one that fit the best above median, indicating our mortality in Nebraska's, you know, a little bit better. And then set back one year means a 65-year-old here exhibits mortality of a 64-year-old so, again, better mortality than what the standard table has, good news. Again, there's a projection improvement scale. I want to go into that. Basically, we're updating that going with this MP-2019 scale, which was the most recent one when we did the study. And again, it's reflecting slightly more improvement than what the old scale had. And I think, you know, that's a good thing, not dramatically more, but a little bit more. So page 24, you've got a summary of the, the changes in the demographic assumptions by plan. Again for school, a number of changes in particular, retirement. Mortality changed for all of them. On the next page you can see for state and county. Again, state and county are very resilient because they're not-- the benefits aren't based on the final, final salary at the end of a career. They kind of ebb and flow and they kind of-- things balance out there really nicely. So 26, this is just a description of that.

KATE ALLEN: Pat, before you move on, Senator Clements had a question.

PATRICE BECKHAM: Sure.

KATE ALLEN: It's on slide 17. Are Nebraska property tax increases included in the inflation statistics? If not, I agree with being above many of the other inflation metrics is his comment.

PATRICE BECKHAM: Is the Nebraska. what did you--

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numbers but, but relevant. These-- each one of these for each of the '21 through '24 valuations is the set of economic assumptions that we will be using in the valuation, which illustrate really how we're moving from 7.5 down to 7. I think that question came earlier, Kate. And all the other ones that are, are touched by that change in inflation that will go down, including the cost of living for tier one, the, the interest crediting rate on the cash balance plans, the wage increase, it's all driven by that change in price inflation. All right. Any questions on the assumptions? We're going to change gears a little bit and--

KATE ALLEN: I don't see any.

PATRICE BECKHAM: You don't see any. OK, great. So the-- you know, we talked earlier that we have a difference between actuarial accrued liability and actuarial assets, and that difference has to be funded in addition to what you're going to pay to-- to-- for the benefits of people that are actively working. And that is called the amortization policy, the unfunded liability amortization policy. And it's in statute in Nebraska. So for school, Patrol, and judges, we use layered amortization, which just means every year when we calculate the difference between actual and expected return or we change assumptions, we set up a separate little piece of UAAL and we fund it over 30 years for school, Patrol, and judges, a closed 30-year period. Interestingly, state and county are layered, but a different payment level dollar payments instead of level percent of payroll and close 25 years versus 30. And I was not around when that happened, but it's slightly different for whatever reason. What we're seeing in the industry and actuarial standards in particular is that 30-year amortization is considered to be really too long, especially when you're using level percent of payroll financing because you've got lower dollar amounts in the earlier years and then they ramp up over time. So in the early part of the period, you're not even paying the interest on the unfunded liability. And I think that-- we call that negative amortization. I think that's what's driving this criticism of 30 years. So we think that that should change. I would say if we look across the industry, 20 is probably becoming the new standard. But, you know, you have to look at each system and each state situation differently. And a lot of the recommendations that come out are for plans that are-- have sort of a variable contribution rate. So in Nebraska, we're kind of trying to fund with quasi fixed contribution

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KATE ALLEN: So I just want to kind of give you a time check.

PATRICE BECKHAM: Perfect. The next-- the next two is the same thing, just the other system. So you can-- you can look at those at your, your leisure. Important thing on schools is there's still a margin. It's bottom line. I'm going to hit projections real quick so that you have a little bit of time for LB17. Slide 35 is the projection for judges just over the next, you know, four years as we implement, phase in the new set of economic assumptions. Again, you'll see under court fees we are projecting that those will increase to \$3.5 million. Kind of getting back to our, excuse me, our standard assumption that court fees this year will be about what they were the year before. But you can see that the additional state contributions will increase from \$1.4 million to 2.1 over this time period. And a lot of that's driven by the economic assumptions. Thirty-six, you've seen this slide before. We've got court fees in blue; member contributions in green; and then the additional state contributions is the red piece. We've talked about this before, too, that contributions are developed as a percent of payroll, that court fees have nothing to do with payroll. And so we-- as the total amount goes up and court fees don't, it forces more and more into the additional state contribution. And I know that's been a topic of discussion before. Side 37, projected funded ratio if all assumptions are met. If all assumptions are met and you put in the actuarial contribution rate, it will move the system to full funding. And that's what's happening here. We don't quite get there by 2049, but in another year or two we would be there and that's the way it's supposed to work for actuarial funding. Slide 38, again, the short-term projected contributions for Patrol. These numbers, again, probably more interesting part here, additional state contributions in the 2020 valuation was \$4.1 million. By the time all this shakes out in 2024, it'll be up to \$7.1 million. This-- Patrol was hit the hardest by the change in the assumptions. And then slide 39, again, this is the longer term projection. You'll see the red piece is the additional state contributions, which we pretty much expect there to, to be a requirement for at least the next 20 years. And we talked about tail volatility. You see that at the end of this, the slide where the red pops in and out over about the last six or eight years. So when the board can deal with managing that, some of that can be smoothed down. That's exactly why we want to get that in statute. Funded ratio on page 40, again, it's going to move to 100

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actuarial required contribution. The money coming in, employer and member, is higher than that, a couple percent. That's what helps those plans be so resilient when bad things, experience happens. It's less favorable. County looks similar. I'm going to wrap up on slide 46. We, we've talked about this. That basically demographic assumption changes were more fine tuning, but more significant changes in the economic assumptions. I think those were necessary. They're important. They actually set the plan up to be more successful because we should have fewer actuarial losses from experience that is less favorable than assumed. But the really last bullet is really key. Even after all the assumption changes, all five plans are very well funded and they're all projected to get to full funding. The, the state has a policy of contributing the additional contributions. So really, I think everything's great. This was a lot of work, I'll be honest, for us and for the board. I feel really good about where we ended up. And I think the phase-in is a very logical approach and it does no harm to the funding and the system. So.

LINDSTROM: Sounds good. Thank you very much, appreciate it.

PATRICE BECKHAM: And Senator Lindstrom, I just have to say, the last 30 years, actual inflation has been 2.44. Since 1913 now it's been 3.11.

LINDSTROM: Very good.

PATRICE BECKHAM: [INAUDIBLE]

LINDSTROM: Got to dig deep in the history memory banks there. All right. Thank you so much.

PATRICE BECKHAM: Thank you.

LINDSTROM: And that will end the hearing on the report on the valuation and Experience Study. We will now move to LB17. We'd like to welcome Tyler Mahood, Senator Kolterman's legislative aide.

TYLER MAHOOD: Good afternoon, Senator Lindstrom, and those watching this public hearing online. My name is Tyler Mahood, M-a-h-o-o-d, and I am Senator Kolterman's legislative aide. Unfortunately, due to COVID protocols, Senator, Senator Kolterman is unable to be here today. So I am here to introduce LB17 on his behalf. LB17 would change the current