# New Mexico Educational Retirement Board

Actuarial Experience Study
Through June 30, 2023

**GRS**

February 9, 2024

Board of Trustees
Educational Retirement Board of New Mexico
701 Camino de los Marquez
Santa Fe, NM 87501

**Subject:**          **Results of 2024 Actuarial Experience Study**

Members of the Board:

We are pleased to present our report on the results of the 2024 Actuarial Experience Study for the New Mexico Educational Retirement Board (ERB).   It includes our recommendations for new actuarial assumptions and methods to be effective for the June 30, 2024 actuarial valuation, and it describes the actuarial impact produced by these recommendations as though they had been effective for the June 30, 2023 actuarial valuation.

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

This study was conducted in accordance with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. The signing actuaries are independent of the plan sponsor. Ms. Woolfrey and Mr. Lyle are Enrolled Actuaries, Fellows of the Society of Actuaries, Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, they are experienced in performing valuations for large public retirement systems.

We wish to thank the Executive Director and staff for their assistance in this project.

Respectfully submitted,
**Gabriel, Roeder, Smith & Company**

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New Mexico Educational Retirement Board

# SECTION A

## EXECUTIVE SUMMARY

# Summary of Recommendations

Our recommended changes to the current actuarial assumptions may be summarized as follows:

*Economic Assumptions*

1. We recommend continuing to use the current nominal investment return assumption of 7.00%.

2. We recommend continuing to use the current inflation assumption of 2.30%.

3. Administrative expenses are currently assumed to be 0.35% of valuation payroll per year. We recommend a modest increase of this assumption to 0.37%, consistent with recent experience.

4. We recommend increasing the general wage inflation assumption to 1.10% above inflation, or 3.40%. This compares to the current assumption of 3.00%.  This assumption is used to project future increases in salary for all members (regardless of service) and to index each cohort of new entrants used in the projections to determine the funding period.  However, to reduce reliance on growth of future payroll, we recommend that new hire payroll used in the open group projection continue to use a growth assumption of 3.0%.

5. We recommend modest increases to the service-based merit component of the salary increase assumption, consistent with observed experience.

6. Consistent with the recommendation to leave the inflation assumption unchanged, we recommend leaving the annual cost of living increase assumption unchanged at 1.80%.

*Mortality Assumptions*

7. We recommend updating the post-retirement mortality assumption to the 2021 TRS of Texas Healthy Pensioner Mortality Tables with some plan-specific adjustments for the post-retirement mortality tables. We also recommend continuing to assume mortality rates will improve in the future using a fully generational approach, and recommend updating the projection scale to the ultimate rates of the most recent Scale MP.

8. We recommend updating post-retirement mortality tables for disabled retirees to the proposed tables for non-disabled retirees, but with a three-year set forward for males and females to reflect the potential impact of their impairment.  Additionally, minimum mortality rates of 4.00% and 2.00% will continue to be applied for males and females, respectively.  We also recommend continuing to assume mortality rates will improve in the future using a fully generational approach and recommend updating the projection scale to the ultimate rates of the most recent Scale MP.

9. We recommend continuing with the current pre-retirement mortality tables for active employees and continuing to assume mortality rates will improve in the future using a fully generational approach and recommend updating the projection scale to the ultimate rates of the most recent Scale MP.

*Other Demographic Assumptions*

10. We recommend modest adjustments to male and female termination rates to better reflect observed plan experience.

11. We recommend modest adjustments to retirement rates for males and females, as well as minor updates to the methodology used to apply those rates, based on observed plan experience.

*Actuarial Methods and Policies*

12. We recommend no change to the current process of estimating the valuation payroll for the upcoming fiscal year.

13. We recommend no change to the actuarial cost method nor the asset smoothing method.

The impact to key actuarial results as of June 30, 2023 are shown below based on current and proposed assumptions:

|  | June 30, 2023 Valuation Current Assumptions | June 30, 2023 Valuation Proposed Assumptions |
|---|---|---|
| Unfunded AAL | $9.6 billion | $9.2 billion |
| Normal Cost Rate with Admin | 14.18% | 14.71% |
| Funded ratio | 62.9% | 63.7% |
| Funding Policy Contribution | 17.85% of pay | 17.47% of pay |
| Funding Period (Open Group) | 26 years | 25 years |

# SECTION B

## INTRODUCTION

# Introduction

A periodic review and selection of the actuarial assumptions is one of many important components of understanding and managing the financial aspects of the New Mexico Educational Retirement Board (ERB). Use of outdated or inappropriate assumptions can result in understated costs which will lead to higher future contribution requirements or perhaps an inability to pay benefits when due; or, on the other hand, produce overstated costs which place an unnecessarily large burden on the current generation of members, employers, and taxpayers.

A single set of assumptions is typically not expected to be suitable forever. As the actual experience unfolds or the future expectations change, the assumptions should be reviewed and adjusted accordingly.

It is important to recognize that the impact from various outcomes and the ability to adjust from experience deviating from the assumption are not symmetric. Due to compounding economic forces, legal limitations, and moral obligations, outcomes from underestimating future liabilities are much more difficult to manage than outcomes of overestimates. That asymmetric risk should be considered when the assumption set, investment policy and funding policy are created. As such, the assumption set used in the valuation process needs to represent the best estimate of the future experience of the retirement system and be at least as likely, if not more than likely, to overestimate the future liabilities versus underestimate them.

Using this strategic mindset, each assumption was analyzed compared to the actual experience of ERB and general experience of other large public employee retirement systems. Changes in certain assumptions and methods are suggested upon this comparison to remove any bias that may exist and to perhaps add in a slight margin for future adverse experience where appropriate. Next, the assumption set as a whole was analyzed for consistency and to ensure that the projection of liabilities was reasonable and consistent with historical trends.

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

**Summary of Process**

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

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

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For others, such as the investment return assumption, the link between past and future results is much weaker. In either case, actuaries should review the plan's assumptions periodically and

determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

The last such actuarial experience investigation was performed following the June 30, 2019 actuarial valuation and the recommendations were adopted on April 17, 2020. For this experience study, we have reviewed ERB's experience for the four-year period from June 30, 2019 through June 30, 2023.  However, for some analysis, such as salary, termination and mortality, we utilized longer experience periods.

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

In an experience study, we first determine the number of deaths, retirements, etc. that occurred during the period. Then we determine the number expected to occur, based on the current actuarial assumptions. The number of "expected" decrements is determined by multiplying the probability of the occurrence at the given age, by the "exposures" at that same age. For example, let's look at a rate of retirement of 15% at age 55. The number of exposures can only be those members who are age 55 and eligible for retirement at that time. Thus, they are considered "exposed" to that assumption. Finally, we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were "perfect", the A/E ratio would be 100%. When it varies much from this figure, it is a sign that new assumptions may be needed. (However, in some cases we prefer to set our assumptions to produce an A/E ratio a little above or below 100%, in order to introduce some conservatism.) Of course, we not only look at the assumptions as a whole, but we also review how well they fit the actual results by gender, by age, and by service.

In many circumstances, we enhance this process by using an amount-weighted analysis. An amount-weighted analysis will generally use amounts such as benefits, pay, or liabilities to complete the analysis. From the perspective of the mortality assumption, there are two reasons for using an amount-weighted approach. First, mortality experience across the U.S. has been shown to vary depending on income level. Amount-weighting takes into account differing benefit levels. Second, selecting an assumption based on headcount-weighting is consistent with estimating expected deaths, but selecting an assumption based on amount-weighting is consistent with minimizing gains and losses associated with expected deaths. By weighting the data by annuity amounts, we are giving more weight to members who have larger annuities (and thus have larger liabilities). The same concepts apply when the amount-weighted approach is applied to other demographic assumptions such as termination and retirement.

If the data leads the actuary to conclude that new tables are needed, the actuary may "graduate" or smooth the results, since the raw results can be quite uneven from age to age or from service to service.
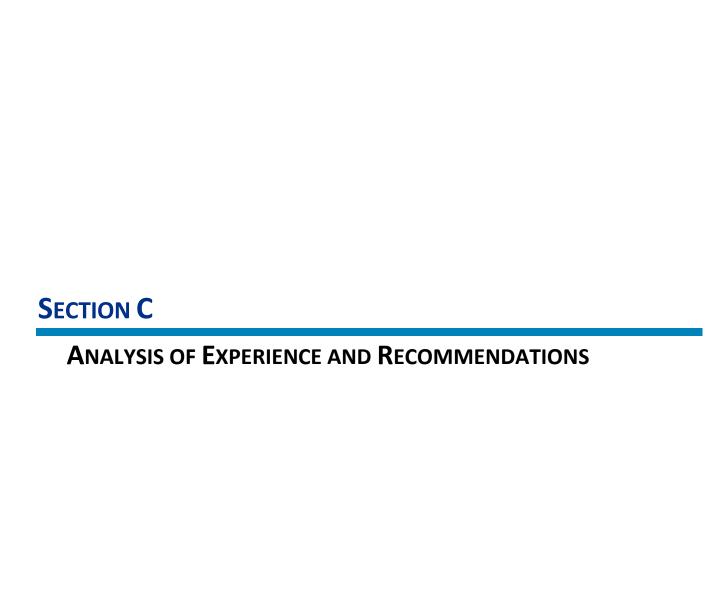
Please bear in mind that, while the recommended assumption set represents our best estimate, there are other reasonable assumptions sets that could be supported. Some reasonable assumption sets would show higher or lower liabilities or costs.

**Section E Exhibits**

The exhibits in Section E should generally be self-explanatory. For example, on page E-3, we show an exhibit analyzing the termination rates for male members by years of service. The second column shows the total number of male members with 18 or fewer years of service who terminated during the study period, weighted by liability.  This excludes members who died, became disabled or retired. Column (3), labeled "Total Count" shows the total exposures of this group, again weighted by liability. This is the number of members who meet the criteria who could have terminated during any of the years. On this exhibit, the exposures exclude anyone eligible for unreduced retirement.  A member is counted in each year they could have terminated, so the total shown is the total exposures for the six-year period. Column (4) shows the probability of termination based on the raw data.

That is, it is the result of dividing the actual number of terminations (col. 2) by the number exposed (col. 3). Column (5) shows the new recommended termination rate.  Column (6) shows the expected number of terminations based on the proposed termination assumptions.  Column (7) shows the Actual-to-Expected ratios under the proposed termination assumptions.

# SECTION C

## ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

# Analysis of Experience and Recommendations

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

## Inflation and Investment Return Assumptions

Actuarial Standards of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, provides guidance to actuaries on giving advice on selecting economic assumptions for measuring obligations for defined benefit plans.  ASOP No. 27 was revised and adopted by the Actuarial Standards Board (ASB) in June 2020.

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

1.  appropriate for the purpose of the measurement,
2.  reflects the actuary's professional judgment,
3.  takes into account historical and current economic data that is relevant as of the measurement date,
4.  is an estimate of future experience; an observation of market data; or a combination thereof,
5.  and has no significant bias except when provisions for adverse deviation or plan provisions that are difficult to measure are included.

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

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period. Generally, the economic assumptions are much more subjective in nature than the demographic assumptions.

## Inflation Assumption

By "inflation," we mean price inflation, as measured by annual increases in the Consumer Price Index (CPI). This inflation assumption underlies most of the other economic assumptions. It impacts investment return, salary increases, and overall payroll growth. The current annual inflation assumption is 2.30%.

The table below shows the average inflation over various periods, ending December 2023.

| | Average Annual Increase in CPI-U Periods Ending Dec. 2019 | Average Annual Increase in CPI-U Periods Ending Dec. 2023 |
|---|---|---|
| Last five (5) years | 1.82% | 4.07% |
| Last ten (10) years | 1.75% | 2.79% |
| Last fifteen (15) years | 2.02% | 2.55% |
| Last twenty (20) years | 2.14% | 2.58% |
| Last twenty-five (25) years | 2.18% | 2.54% |
| Last thirty (30) years | 2.40% | 2.51% |

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

As you can see, recent high inflation has driven up the averages, but long-term averages still remain relatively low.

Forecasts from NEPC (ERB's Investment Consultant)

The December 31, 2023 Capital Market Assumptions for NEPC, ERB's Investment Consultant, are using 2.60% as the price inflation assumption for the next 10 years.

Forecasts from Other Investment Consulting Firms

We examined the 2023 capital market assumption sets for 9 investment consulting firms and the average assumption for inflation was 2.48%, with a range of 2.26% to 2.90%.

Expectations Implied in the Bond Market

Another source of information about future inflation is the market for US Treasury bonds. Simplistically, the difference in yield between non-indexed and indexed treasury bonds should be a reasonable estimate of what the bond market expects on a forward-looking basis for inflation. As of the last quarter of 2023, the difference for 20-year bonds implies that inflation over the next twenty years would average 2.37%. The difference in yield for 30-year bonds implies 2.19% inflation over the next 30 years.

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

Forecasts from Social Security Administration

In the Social Security Administration's 2023 Trustees Report, the Office of the Chief Actuary is projecting a long-term average annual inflation rate of 2.4% under the intermediate cost assumption.

Survey of Professional Forecasters and Fed Policy

The Cleveland Federal Reserve and St. Louis Federal reserve both report 30-year expectations of 2.33% as of January 2024.

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

Recommendation

Although we have been experiencing high inflation of late, we still see strong support for continuing to use 2.30% as the *long-term* inflation assumption for ERB.  We feel ERB would benefit from stability of this assumption and recommend no change.

## Investment and Administrative Expenses

Since the trust fund pays expenses in addition to member benefits and refunds, we must make some assumption about these. Almost all actuaries treat investment expenses as an offset to the investment return assumption. That is, the investment return assumption represents expected return after payment of investment expenses.

In regards to investment expenses, investment consulting firms periodically issue reports that describe their capital market assumptions. The estimates for core investments (i.e., fixed income, equities, and real estate) are generally based on anticipated returns produced by passive index funds that are net of investment related fees.  The investment return expectations for the alternative asset class such as private equity and hedge funds are also net of investment expenses. Therefore, we did not make any adjustments to account for investment related expenses.  Some of the retirement systems may also employ active management investment strategies that result in higher investment expenses compared to strategies that invest in passive index funds.  We have assumed that active management strategies would result in the same returns, net of investment expenses, as passive management strategies.

ERB explicitly recognizes administrative expenses into the anticipated annual payments from the plan. Using an explicit approach maximizes transparency, aligns better with the standards of the Governmental Accounting Standards Board, and maintains a parallel between the investment returns used by the investment consultant and the actuary.   We recommend continued use of this approach.

The following table provides the actual administrative expenses as a percentage of covered payroll for the last four years, along with our recommended assumption.

| FY23 | FY22 | FY21 | FY20 | Average | Recommended Assumption |
|---|---|---|---|---|---|
| 0.33% | 0.39% | 0.41% | 0.35% | 0.37% | 0.37% |

## Investment Return Rate

The investment return assumption is one of the principal assumptions used in any actuarial valuation of a retirement plan. It is used to discount future expected benefit payments to the valuation date in order to determine the liabilities of the plan. Even a small change to this assumption can produce significant changes to the liabilities and contribution rates.  Currently, it is assumed that future investment returns will average 7.00% per year, net of investment and administrative expenses.

The chart below shows the historical annualized history of ERB's market returns through FY 2023.

**Annualized Return**

| Years ending June 30, 2023 | Return |
|---|---|
| 25 | 6.2% |
| 20 | 7.6% |
| 15 | 7.0% |
| 10 | 7.9% |
| 5 | 7.7% |
| 1 | 6.7% |

The returns in the chart above are market returns, net of administrative and investment expenses, as reported in the actuarial valuations.
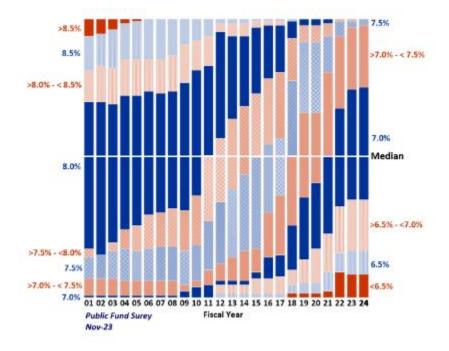
However, for this assumption, past performance, even averaged over a twenty-five-year period, is not a reliable indicator of future performance. The actual asset allocation of the trust fund will significantly impact the overall performance, so returns achieved under a different allocation are not meaningful.

More importantly, the real rates of return for many asset classes, especially equities, vary so dramatically from year to year that even a twenty-five-year period is not long enough to provide reasonable guidance. There are strong reasons to believe the next twenty-five years will be different than the last twenty-five, in large part because current bond yields are significantly lower than they were 25 years ago.

Assumption Comparison to Peers

We do not recommend the selection of an investment return assumption based on prevalent information. However, it is still informative to identify where the investment return assumption for ERB is compared to its peers. The chart below shows the distribution of the investment return assumptions, as reported by NASRA in November, 2023.

The current median and mode rate of return is 7.00%.

Asset Allocation

We believe the most appropriate approach to selecting an investment return assumption is to identify expected returns given the funds' asset allocation mapped to forward-looking capital market assumptions. For this purpose, we have analyzed the ERB Investment Policy Statement with the following Target Weights:

| Asset Class | Target Weight |
|---|---|
| Domestic Equities – Large Cap | 15% |
| Domestic Equities – Small/Mid Cap | 4% |
| International Equities – Developed | 5% |
| International Equities – Emerging Markets | 4% |
| Fixed Income – Opportunistic Credit | 18% |
| Fixed Income – Core Bonds | 6% |
| Alternatives – Real Estate | 8% |
| Alternatives – Real Assets | 12% |
| Alternatives – Private Equity | 17% |
| Alternatives – Global Tactical Asset Allocation | 2% |
| Alternatives – Other | 8% |
| Cash | 1% |
| Total | 100% |

In order to develop an appropriate estimate for an investment return assumption, we have utilized the forward-looking return expectations developed by several investment consulting firms and industry surveys.

Our most recent survey includes 9 sets of expectations.  Based on the average of these sets of expectations, and the proposed 2.30% inflation assumption, the expected compound return over the short term (generally, 7 to 10-year horizon) is **7.50%**, with a range of outcomes from 7.00% to 7.93%.

However, there has been significant movement in capital market assumptions over the last few years, and this assumption is used to determine results used for long-term decision making.  If we had performed this same exercise in the two prior years, we would have obtained significantly different results, leading us to temper our reliance on the 7.50% outcome:

| Capital Market Assumptions | Average Expected Compound Return (7-10 year) Based on Survey Results |
|---|---|
| Current | 7.50% |
| One year prior | 6.27% |
| Two years prior | 6.21% |

The NEPC expected compound return, based on their January 2023 capital market assumptions in the survey and the ERB asset allocation, is 7.3% over the short term and 8.1% over the longer term.

Recommendation

Although the current capital market assumptions could potentially support a higher rate of return, this result represents a very recent shift in expectations, with slightly less recent expectations showing support for lowering the rate of return.  We recommend no change to the investment return assumption of 7.00% per year.  This would be comprised of a 4.70% net real return and a 2.30% inflation assumption.

As with the inflation assumption, we feel there is strong support for the 7.00% assumption and ERB benefits from the stability of these economic assumptions.

## Cost-of-Living Increase Assumption

Every year, ERB provides a cost-of-living adjustment (COLA) to every eligible annuitant. Additionally, this COLA is related to actual inflation. Specifically, there is something called "an adjustment factor" determined based on the following:

- If inflation (CPI-U) is greater than two percent, then the adjustment factor is ½ of the percentage increase of the inflation (CPI), not to exceed four percent, nor be less than two percent.
- Otherwise, the adjustment factor is equal to actual inflation for the year.

Stochastic modeling of this adjustment factor using 2.30% price inflation with 1.0% standard deviation and 5,000 iterations, produced an average adjustment factor of 1.75%.  We recommend continuing to use the 1.80% per year assumption for future COLAs in the determination of the current liabilities.

Certain groups receive less than the adjustment factor in their actual COLA granted depending on the funding level of the plan.  The open group projections anticipate the liability gains that will be created from this policy as the COLA granted is less than the 1.8% assumed COLA while plan funding is less than 100%.

Open group funding projections, which are used to determine the funding period and the actuarial contribution, reflect the reduced anticipated COLAs granted while the funded ratio is less than 100% and make further adjustments to future liabilities to reflect the lesser COLAs.

## Comments on Overall Pay/Wage Experience

In general, we found the pay experience during the last four years since the prior experience study to be fairly anomalous. ERB experienced significant pay increases at all service levels well in excess of the already extraordinarily high inflation during that time. Much of this was legislated and likely reflected a confluence of factors, some likely to be ongoing, some not. Although we used a long experience period (12 years) which should mitigate the impacts of the recent experience, we still suspect that these increases reflect pent up demand for salary increases which extends beyond the 12-year period and will not be sustainable over the long-term. Thus, we have exercised discretion and moderation in our movement of these long-term assumptions. The prior experience study used an 8-year experience period and largely set the assumptions based on these results. Thus, the reader can get a sense of the impact of the most recent four years of experience by comparing the current assumption and the actual experience. Detail regarding the 12-year pay experience is included on the last page of the report.

## General Wage Inflation

A General Wage Inflation (GWI) assumption represents the real wage growth over time in the general economy, or, is the assumption on how much the pay scales themselves will change year to year, not necessarily how much the pay increases received by individuals are, or even necessarily how the payroll in total may change, which can be impacted by population changes, etc. This assumption should be applicable to a local economy, not necessarily one group inside a retirement system. This assumption is also used to index the pay of each group of new entrants used in the open group projections. In an open group projection, projected terminations from the current active population are replaced with projected new entrants. Currently, the wage inflation assumption is 3.00%, composed of 2.30% price inflation and 0.70% productivity growth.

Nationwide Experience

Historically, General Wage Inflation has almost always exceeded price inflation. This is because wage inflation is in theory the result of (a) price inflation, and (b) productivity gains being passed through to wages. Since 1951, for the national economy as a whole, wage inflation has been about 1.00% larger than price inflation each year. The following shows how for the national economy as a whole, wage inflation has outpaced price inflation over various nearer term periods:

| Excess Wage Inflation Over Price Inflation Over Most Recent | |
|---|---|
| 10 years | 1.1% |
| 15 years | 0.8% |
| 20 years | 0.8% |
| 25 years | 1.0% |

ERB Average Pay Experience

GRS finds, both in this study and in prior studies, that growth of historical average ERB pays indicate a low (and in some study years, a negative) productivity assumption. It may be that the covered membership is more heavily distributed to lower paid roles than it has been historically, which accounts for the slow growth in the average pay.

Wage Inflation for Long-Service Employees

Salary increases for longer-service employees are almost entirely driven by wage inflation. Many of the factors that result in pay increases are largely inapplicable or have diminished importance for longer-service employees. Step or service-related increases have ceased or are minimal. Promotions occur with less frequency. Additional training or acquisition of advanced degrees usually occurs early in the career. Thus, longer service employees' wages are assumed to grow at the overall rate of wage inflation. Wage inflation is also the increase in the average wage of all members of the workforce of the employer. Over the 12-year experience period, individual pay increases for long-service ERB members outpaced price inflation by 1.49%. However, as we mentioned, we found these results to be highly driven by recent experience and recommend a measured approach to setting the assumption.

**We are recommending a 1.10% real productivity growth assumption (halfway between the current 0.70% and the 1.49% observed), or a nominal 3.40% GWI assumption.**

This assumption impacts both the base for individual salary increases, as well as the assumed pay for new hires, which affects the open group projection. Although we recommend adopting this 3.40% wage inflation assumption as it pertains to individual salary increases (both in the current active population and developing the normal cost rate of the new hires), we will ultimately recommend a different assumption for the incorporation of new hire pays into the open group projection, which determines overall payroll growth. This will be discussed in the Payroll Growth Rate section.

## Merit Component of Salary Increase Rates

Salary increases are composed of both wage inflation and service-based promotional or merit increases. The pay experience on the last page of the report, as well the discussion that follows, isolate the merit component in developing our overall salary increase assumption.

Currently, ERB uses a service-based schedule of merit increases for those with less than 15 years of service. GRS found that in the first eight years of experience, a 15-year cutoff of this schedule appeared appropriate. As mentioned, in the most recent four years, there were increases significantly in excess of inflation at *all* service levels, largely associated with legislated across the board increases. Given that the recent experience appears anomalous and unsustainable, we recommend continued use of the 15-year service-based schedule of merit increases.

GRS found that after removing the long-service wage inflation for long-service employees, the observed merit increases for those with less than 15 years of service was higher than the current assumption. Knowing that these results were highly impacted by recent experience, we recommend modest increases to the increase schedule.

The overall result, after considering both the changes to base wage inflation and the merit increases an increase of between 0.40% and 0.90% at the various service levels.

## Payroll Growth Rate

The salary increase rates discussed above are assumptions applied to individuals. They are used in projecting future benefits. The GWI assumption above reflects how wages will change in the general economy. The GWI assumption is used in projections and to compare the reasonableness of the assumption set to national trends.

The payroll growth rate is used in determining future payroll and the contributions available to finance the unfunded actuarial accrued liability. The higher the payroll growth assumption, the higher the potential reliance on future payroll and backloading of assumed contributions towards the unfunded liability.

Currently, GRS uses the wage inflation assumption to develop increases in new hire pays used in the open group projection. Wage inflation impacts the salary increases for current actives, but also is used to project average new hire pay going forward. The new hires are incorporated to replace anticipated retirements and terminations from the current active group. Using new hire pays that grow with the current wage inflation assumption of 3.0% in conjunction with the replacement model produces total payroll growth of 2.6% per year over the 26 years remaining in the Board's policy on financing the unfunded liability.

Over the years and recently, some members of the ERB Board have expressed concerns that the number of school-aged children may not experience the same growth that has been observed in the past and could even start to decline. Currently, GRS is awaiting a study from a New Mexico demographer regarding this topic.

In addition, GRS has observed a general trend, based on best practice findings, towards less reliance on backloaded contributions, either through lower payroll growth assumptions used or level dollar (0% payroll growth) contribution approaches.

Lastly, ERB is currently less than 70% funded and has been for almost 20 years and relies on contributions as a rate of pay to improve the plan's funding situation over time. Increased reliance on long-term payroll growth in determining contribution sufficiency should be viewed negatively at this point.

**For these multiple reasons, GRS recommends that ERB leave the new hire payroll growth increase at 3.0%, resulting in an overall open group payroll growth 2.8% per year over the 26-year period.** This can be viewed as an explicit margin for conservatism or simply a change in methodology (shifting slightly towards a level dollar funding policy approach). The still slightly higher average increase (2.8% proposed vs. 2.6% baseline) reflects the increased salary increases for the current actives.

## Demographic Assumptions

Actuaries are guided by the Actuarial Standards of Practice (ASOP) adopted by the Actuarial Standards Board (ASB). One of these standards is ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*. This standard provides guidance to actuaries giving advice on selecting noneconomic assumptions for measuring obligations under defined benefit plans. We believe the recommended assumptions in this report were developed in compliance with this standard.

# Post-Retirement Mortality Rates

ERB's liability depends in part on how long retirees live. If members live longer, benefits will be paid for a longer period of time, and the liability will be larger. Additionally, teachers have longer life expectancies compared to the general population. This experience is also true for the retired teachers and educators in ERB, and it will be important to reflect this in the mortality assumption used in the valuation.

The mortality table currently being used for non-disabled retirees and for beneficiaries receiving benefits is:

Healthy males – 2020 GRS Southwest Region Teacher mortality table for males, set back one year and scaled at 95%. Generational mortality improvements in accordance with the Ultimate MP rates and projected from the year 2020

Healthy females – 2020 GRS Southwest Region Teacher mortality table for males, set back one year and scaled at 95%. Generational mortality improvements in accordance with the Ultimate MP rates and projected from the year 2020

These assumptions are considered "generational" mortality projections. A generational mortality projection does not build in a margin up front, but the mortality is assumed to improve every future year in the valuation projection. Since this form of mortality projection assumes continual mortality improvements, there should be less need to periodically reestablish margin for future mortality improvements in the mortality assumption.

In analyzing the mortality experience, we have weighted the analysis by the amount of the member's monthly annuity.  By weighting the data by annuity amounts, we are giving more weight to members who have larger annuities (and thus have larger liabilities).  Using this method is expected to minimize gains and losses from mortality.

We begin by determining the expected deaths in each year at each age for males and females.  Then we compare the actual to the expected.  The ratio of the actual deaths to the expected deaths (the A/E ratio), weighted by benefit amounts, tells us whether the assumptions are reasonable.  When using a generational approach for mortality improvement, an A/E of 100% is targeted.  However, we will also focus on the pattern across all ages and life expectancy created at individual ages when determining whether the assumption is appropriate.  We will discuss this in two parts, the recommended base mortality assumption, and the recommended mortality improvement assumption.

**Recommended Base Mortality Assumption**

The experience used to examine the fit of the current assumption was for non-disabled retirees for the nine-year period ending June 30, 2023.  Based on benefit-weighted mortality experience, overall actual to expected ratios were 107% and 90% for females and males, respectively, indicating some updates were necessary.

The Society of Actuaries recently conducted a study using specifically public sector data and released new standard tables called Pub-2010.  These tables included a variant of the tables specific to retired teacher experience.  GRS considered these tables, but did not find them to be a particularly good fit. The overall

actual to expected ratios based on these tables (Pub-2010 Amount-weighted Teachers) were 121% and 116% for females and males, respectively.  This poor fit is likely reflective of regional differences as well as the fact that ERB covers certified teachers as well as other staff.

GRS works with teacher retirement systems across the country and, in particular, systems in the Southwest region of the United States. We have generally found that the published mortality tables do not provide a good match to the mortality experience of retired teachers in this region.   ERB is a large enough system to provide sufficient data credibility to make adjustments to standard tables, but not sufficient data to develop their own table.  However, Texas Teachers Retirement System (TRS) has 450,000 retirees and has sufficient data to develop a plan specific table.  Using the table developed for TRS offers ERB many advantages over using a standard table published by the Society of Actuaries including reflecting regional differences and reflecting a mixture of both teachers and staff positions covered under the plan.

Without any adjustment, the overall actual to expected ratios based on these tables (TRS specific) were 98% and 88% for females and males, respectively.  After reflecting a one-year setback for males, the ratios were 98% and 99%, respectively, which we consider to be a good fit.  Thus, we recommend, ERB adopt the 2021 TRS of Texas Healthy Pensioner Mortality Tables with a one-year setback for males.

**Recommended Mortality Improvement Assumption**

The current mortality assumption includes a fully generational approach to projecting mortality improvement. Because of this strategy of building in continuous mortality improvement, life expectancies for today's younger active members are expected to be materially longer than those of today's retirees, and this has a significant impact on actuarial liabilities and contribution requirements.

Each year the Society of Actuaries issues a new mortality projection scale (Mortality Projection (MP)-2014, MP-2015, MP-2016, etc.).  The MP tables are a two-dimensional improvement assumption that is a function of the age and calendar year.  After approximately 15 years, all MP tables reflect the same improvement rate at each future calendar year (the ultimate mortality improvement rates). In order to balance the two objectives of reflecting the most recent data available, while maintaining stability of results from year to year, GRS recommends the use of the ultimate mortality improvement rates in the MP tables for all years, which we will refer to as U-MP.  In 2020, for the first time since the initial issuance of the MP tables, the ultimate rates were updated so we recommend updating the mortality projection assumption to these most recent ultimate rates, which we will call U-MP2020.

## Disabled Mortality Rates

Because the rate of disability incidence is so low for ERB and the disabled mortality rates apply to a very small subsection of plan participants, this is a minor assumption that has little impact on the liabilities of ERB.  We recommend using the healthy post-retirement tables, set forward three years for males and females (two year set forward as compared to one-year setback on healthy males), with a minimum mortality rate of 4.0% and 2.0%, for males and females, respectively. Additionally, we recommend continuing to apply future mortality improvements using the ultimate mortality improvement rates in the MP tables.

## Active Mortality Rates

Active mortality is also a minor assumption. Incidence of active deaths is very low in comparison to terminations and retirements. For active mortality rates, we recommend continued use of the Pub-2010 Teacher Employee mortality tables with future mortality improvements modeled using the ultimate mortality improvement rates in the MP tables.

## Disability Rates

Disability is a low-incidence, low impact assumption. We recommend no change to this assumption at this time.

## Retirement Rates

We currently use retirement rates that vary by age, service, and gender. In analyzing the preliminary retirement experience, GRS determined that there were some situations in which members were projected to be ineligible at time of decrement, but were in retirement status as of the next valuation. GRS determined that there were two primary situations that were causing this:

1. Use of integer age and service could result in a situation where the member did not meet the Rule of 75 when their combined fractional age and service did, in fact, meet the Rule of 75. GRS modified their eligibility testing to check the combined fractional age and service for Rule of 75 eligibility.

2. Members with 23.75 years of service as of one valuation were retired with 25 years of service in the next valuation. ERB staff indicated that one day worked during a quarter qualified a member for the entire quarter and often careful examination of the data at time of hire provided sufficient evidence to support granting the final quarter needed to meet the 25-year requirement. GRS modified their eligibility testing to assume eligibility for 25 years of service retirement with 24.75 years of service.

GRS re-ran valuation results for the prior five years in order to measure the experience on this new basis so that plan experience was in alignment with the valuation system and methodology.

GRS modified the retirement rates for the observed experience over the four-year period. In general, GRS simplified the rates as compared to the prior rates. Although there were age and service bands where notable changes to the rates were made, the overall impact to the results was modest.

| Female Retirement - Actual to Expected Ratios - Current Assumption | | | | | | |
|---|---|---|---|---|---|---|
| Eligibility | Eligibility Service | | | | | |
| Age | 5-9 | 10-14 | 15-19 | 20-24 | 25 | 25+ |
| 45-49 | | | | | 98% | 81% |
| 50-54 | | | | 92% | 99% | 78% |
| 55-59 | | | 70% | 87% | 101% | 65% |
| 60-64 | | 61% | 84% | 82% | 94% | 71% |
| 65-69 | 119% | 96% | 93% | 73% | 108% | 81% |

| Overall | | | | | | 80% |
|---|---|---|---|---|---|---|

| Female Retirement - Actual to Expected Ratios - Proposed Assumption | | | | | | |
|---|---|---|---|---|---|---|
| **Eligibility** | **Eligibility Service** | | | | | |
| **Age** | **5-9** | **10-14** | **15-19** | **20-24** | **25** | **25+** |
| 45-49 | | | | | 98% | 101% |
| 50-54 | | | | 92% | 99% | 94% |
| 55-59 | | | 99% | 93% | 103% | 81% |
| 60-64 | | 94% | 85% | 83% | 94% | 82% |
| 65-69 | 108% | 101% | 99% | 97% | 106% | 96% |

| Overall | | | | | | 90% |
|---|---|---|---|---|---|---|

| Male Retirement - Actual to Expected Ratios - Current Assumption | | | | | | |
|---|---|---|---|---|---|---|
| **Eligibility** | **Eligibility Service** | | | | | |
| **Age** | **5-9** | **10-14** | **15-19** | **20-24** | **25** | **25+** |
| 45-49 | | | | | 99% | 153% |
| 50-54 | | | | 99% | 102% | 109% |
| 55-59 | | | 134% | 124% | 130% | 81% |
| 60-64 | | 72% | 67% | 56% | 97% | 84% |
| 65-69 | 101% | 80% | 90% | 85% | 103% | 97% |

| Overall | | | | | | 90% |
|---|---|---|---|---|---|---|

| Male Retirement - Actual to Expected Ratios - Proposed Assumption | | | | | | |
|---|---|---|---|---|---|---|
| **Eligibility** | **Eligibility Service** | | | | | |
| **Age** | **5-9** | **10-14** | **15-19** | **20-24** | **25** | **25+** |
| 45-49 | | | | | 99% | 127% |
| 50-54 | | | | 99% | 102% | 109% |
| 55-59 | | | 103% | 95% | 104% | 81% |
| 60-64 | | 90% | 88% | 79% | 97% | 100% |
| 65-69 | 101% | 80% | 90% | 95% | 103% | 97% |

| Overall | | | | | | 95% |
|---|---|---|---|---|---|---|

Currently, members who joined ERB by July 1, 2010 are eligible for a Normal Retirement Benefit upon the earliest of age 65 with 5 years of service, Rule of 75 (with at least age 60), or 25 years of service. Members who joined ERB after June 30, 2010 are eligible for a Normal Retirement Benefit upon the earliest of age 67 with 5 years of service, Rule of 80 (with at least age 65), or 30 years of service. It should be noted that members who joined ERB after June 30, 2013 that retire with 30 years of service will have their benefit reduced prior to age 55. There is still limited retirement experience for this group. GRS is hopeful that there will be sufficient experience to do *some* tier specific rate setting in the next experience study, but recommends continued use of the pre-2010 member rates at this time, adjusted for post-2010 eligibilities and accounting for pent up demand when they are eligible for retirement at a later date.

## Termination Rates

Termination rates reflect members who leave for any reason other than death, disability, or service retirement. They apply whether the termination is voluntary or involuntary, and whether the member takes a refund or keeps their account balance on deposit. The current termination rates reflect the member's gender and service. This assumption is more significant than the disability assumption, since the counts are so much higher, but less significant than the retirement assumption since these members leave at younger ages with smaller benefits and less liability.

On a liability-weighted basis, the termination experience showed that the current rates are already a good fit for ERB and only modest changes were needed.

The results are shown grouped below and additional detail is provided in Appendix E ($ in 100,000s ):

| Termination Rates – Females (Liability Weighted) | | | | | |
|---|---|---|---|---|---|
| | | *Current Assumption* | | *Proposed Assumption* | |
| Service Years | Actual terms | Expected terms | A/E ratio | Expected terms | A/E ratio |
| 1-4 | 203 | 223 | 91% | 223 | 91% |
| 5-9 | 338 | 328 | 103% | 328 | 103% |
| 10-18 | 486 | 512 | 95% | 493 | 99% |
| Totals | 1,026 | 1,063 | **97%** | 1,044 | **98%** |

| Termination Rates – Males (Liability Weighted) | | | | | |
|---|---|---|---|---|---|
| | | *Current Assumption* | | *Proposed Assumption* | |
| Service Years | Actual terms | Expected terms | A/E ratio | Expected terms | A/E ratio |
| 1-4 | 119 | 130 | 92% | 126 | 94% |
| 5-9 | 186 | 177 | 105% | 180 | 103% |
| 10-18 | 198 | 209 | 95% | 201 | 99% |
| Totals | 503 | 516 | **98%** | 507 | **99%** |

## Other Assumptions

There are other assumptions made in the course of a valuation, such as the percentage of members who are married, the age difference between husbands and wives (both of which only impact the death benefit liability), the likelihood that a terminating employee will take a refund, etc., all of which have a minor impact on liabilities. We reviewed these, and believe these are generally realistic or conservative, therefore we recommend no changes to these other assumptions.

# Actuarial Methods

**Actuarial Cost Method**

We recommend continuing to use the Individual Entry Age Normal (IEAN) actuarial cost method.  IEAN will generally produce level contribution amounts for each member as a percentage of salary from year to year, and allocates costs among various generations of taxpayers in a reasonable manner. It is by far the most commonly used actuarial cost method for large public retirement systems and the method used for accounting disclosures under GASB Statement No. 67.

For a plan that receives contributions as a fixed percent of payroll, the IEAN method does, however, eliminate the ability to perform a simple and algebraic calculation of the funding period and contribution requirements. Thus, the funding period will be determined based on an open group projection.  The open group projection incorporates the fact that the normal cost rate will trend down over time and reduced COLAs may be paid in the future based on the funded status of the plan. Otherwise, the projection is built to assume no gains or losses on the actuarial accrued liability.

**Asset Valuation (Smoothing) Method**

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

We believe the method used to determine the actuarial value of assets (AVA) is appropriate, since it does a good job of smoothing asset gains and losses, and reduces fluctuations in the funding period. The current method smooths the differences between the expected returns (based on the annual investment return assumption) and actual returns, net of expenses, over a five-year period. This method of determining the actuarial value of assets is very common and does not have a bias relative to market. In other words, we expect the ratio of the AVA to MVA to average about 100% over the very long term. Therefore, we recommend no change to this method.

# SECTION D

## SUMMARY OF ASSUMPTIONS AND METHODS

# Summary of Assumptions and Methods
## Incorporating the Recommended Assumptions

The assumptions and methods applied in this actuarial valuation *may be* adopted by the Board of Trustees on February 24, 2024 based on the experience investigation that covered the period ending June 30, 2023.

I.  *Valuation Date*

    The valuation date is June 30 of each plan year.  This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. *Actuarial Cost Method*

    The contribution rate is set by statute for both employees and for the employers. The funding period is determined, as described below, using the Individual Entry Age Normal actuarial cost method.

    The Individual Entry Age Normal actuarial cost method assigns the plan's total unfunded liabilities (the actuarial present value of future benefits less the actuarial value of assets) to various periods. The unfunded actuarial accrued liability is assigned to years prior to the valuation, and the normal cost is assigned to the year following the valuation. The remaining costs are the normal costs for future years. Then each year's contribution is composed of (i) that year's normal cost, plus (ii) a payment used to reduce the unfunded actuarial accrued liability.

    The normal contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the rate of contribution which, if applied to the compensation of each individual member during the entire period of anticipated covered service, would be required to meet the cost of all benefits payable on his behalf. The salary-weighted average of these rates is the normal cost rate. This calculation reflects the plan provisions that apply to each individual member. The employer normal cost rate is equal to (i) the normal cost rate, minus (ii) the member contribution rate.

    The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs. The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over the actuarial value of assets.

    The balance of the employers' contributions--the remainder after paying their share of the normal cost--is used to reduce the unfunded actuarial accrued liability. The funding period is the length of time required for the unfunded actuarial accrued liability to be completely eliminated, assuming that the portion used to reduce the unfunded liability remains level as a percentage of total payroll.  New entrant pay is assumed to increase 3.00% per year for each new group of new entrants incorporated into the open group projection. The contribution made by employers to ERB on behalf of employees who elected to participate in the Alternative Retirement Plan is also used to eliminate the unfunded actuarial accrued liability. It is assumed that contributions are made monthly at the end of the month.

*III.* *Actuarial Value of Assets*

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). Returns are measured net of all investment and administrative expenses.

*IV.* *Actuarial Assumptions*

A. Economic Assumptions

1. Investment return:  7.00% per year, net of investment-related expenses (composed of an assumed 2.30% inflation rate and a 4.70% real rate of return)

2. Salary increase rate: Inflation rate of 2.30% plus productivity increase rate of 1.10% plus step-rate/promotional as shown

| Years of Service | Annual Step-Rate/Promotional Component Rates of Increase | Total Annual Rate of Increase |
|---|---|---|
| 0 | 6.00% | 9.40% |
| 1 | 3.75% | 7.15% |
| 2 | 3.25% | 6.65% |
| 3 | 2.75% | 6.15% |
| 4 | 2.25% | 5.65% |
| 5 | 2.00% | 5.40% |
| 6 | 1.75% | 5.15% |
| 7 | 1.25% | 4.65% |
| 8 | 1.00% | 4.40% |
| 9 | 0.75% | 4.15% |
| 10-11 | 0.50% | 3.90% |
| 12-14 | 0.25% | 3.65% |
| 15 or more | 0.00% | 3.40% |

3. Cost-of-living increases: 1.80% per year, compounded annually.  Note that increases are deferred until July 1 following the year a member retires, or the year in which a member attains the age of 65 (67 for Tier 3 and Tier 4), whichever is later or, for disabled retirees, until July 1 of the third year following retirement.

4. Payroll growth: 2.80% per year (with no allowance for membership growth)

5. Contribution accumulation: The accumulated member account balance with interest is estimated at the valuation date by assuming that member contributions increased 5.50% per year for all years prior to the valuation date.  Contributions are credited with 4.00% interest, compounded annually, applicable to the account balances in the past as well as the future.

B. Demographic Assumptions

1. Mortality after termination or retirement -

   a. Healthy males – 2021 TRS of Texas Healthy Pensioner Mortality Tables, set back one year. Generational mortality improvements in accordance with the Ultimate MP scales are projected from the year 2021.

   b. Healthy females – 2021 TRS of Texas Healthy Pensioner Mortality Tables.  Generational mortality improvements in accordance with the Ultimate MP scales are projected from the year 2021.

   c. Disabled males – 2021 TRS of Texas Healthy Pensioner Mortality Tables, set forward two years with minimum rates at all ages of 4.0%.  Generational mortality improvements in accordance with the Ultimate MP scales are projected from the year 2021.

   d. Disabled females – 2021 TRS of Texas Healthy Pensioner Mortality Tables, set forward three years with minimum rates at all ages of 2.0%.  Generational mortality improvements in accordance with the Ultimate MP scales are projected from the year 2021.

2. Mortality rates of active members – Pub-2010 Teachers Active Employee Mortality table. Generational mortality improvements in accordance with the Ultimate MP scales are projected from the year 2010.

3. Disability Incidence –As shown below for selected ages (rates are only applied to eligible members, which are members with at least 10 years of service)

| Age | Occurrence of Disability per 100 Members | |
| --- | --- | --- |
| | Males | Females |
| 25 | .007 | .010 |
| 30 | .007 | .010 |
| 35 | .042 | .020 |
| 40 | .091 | .050 |
| 45 | .133 | .080 |
| 50 | .168 | .120 |
| 55 | .182 | .168 |

4.  Retirement - Select and ultimate as shown below for selected ages (rates are only applied to members eligible for retirement):

**Retirement Per 100 Members**

| | Males - Years of Service | | | | | | |
|---|---|---|---|---|---|---|---|
| Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25 | 26+ |
| 45 | 0 | 0 | 0 | 0 | 0 | 25 | 18 |
| 50 | 0 | 0 | 0 | 0 | 0 | 25 | 18 |
| 55 | 0 | 0 | 0 | 0 | 7 | 25 | 18 |
| 60 | 0 | 0 | 0 | 17 | 17 | 25 | 21 |
| 62 | 0 | 0 | 25 | 17 | 17 | 25 | 21 |
| 65 | 0 | 40 | 35 | 30 | 30 | 25 | 25 |
| 67 | 0 | 25 | 25 | 25 | 25 | 25 | 25 |
| 70 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

| | Females - Years of Service | | | | | | |
|---|---|---|---|---|---|---|---|
| Age | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25 | 26+ |
| 45 | 0 | 0 | 0 | 0 | 0 | 25 | 12 |
| 50 | 0 | 0 | 0 | 0 | 0 | 25 | 15 |
| 55 | 0 | 0 | 0 | 0 | 6 | 25 | 20 |
| 60 | 0 | 0 | 0 | 20 | 15 | 25 | 25 |
| 62 | 0 | 0 | 25 | 25 | 25 | 30 | 25 |
| 65 | 0 | 28 | 28 | 28 | 25 | 35 | 35 |
| 67 | 0 | 28 | 28 | 28 | 25 | 35 | 25 |
| 70 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

The retirement assumption was further modified for members who joined after June 30, 2010.  The probability of retirement upon first eligibility for Normal Retirement reflects the accumulated probability of retirement from the first eligibility for members who joined ERB by June 30, 2010 (generally, 25 years of service or Rule of 75) to their actual first eligibility for Normal Retirement (generally, 30 years of service or Rule of 80).

**Early Retirement Per 100 Members – Members joined after June 30, 2010**

| | Years of Service | | | | | |
|---|---|---|---|---|---|---|
| | Males | | | Females | | |
| Age | 15-19 | 20-24 | 25-29 | 15-19 | 20-24 | 25-29 |
| 55 | | | 7 | | | 6 |
| 60 | | 17 | 17 | | 15 | 15 |
| 62 | 17 | 17 | 17 | 25 | 25 | 25 |
| 65 | 30 | 30 | 30 | 28 | 25 | 25 |

5. Termination (for causes other than death, disability or retirement):

| Completed Service | Terminations per 100 Members | |
|---|---|---|
| | Males | Females |
| 0 | 26.0 | 24.0 |
| 1 | 22.0 | 20.0 |
| 2 | 18.0 | 16.5 |
| 3 | 14.0 | 13.5 |
| 4 | 11.5 | 11.5 |
| 5 | 10.0 | 10.0 |
| 6 | 9.0 | 9.0 |
| 7 | 7.5 | 7.5 |
| 8 | 7.0 | 7.0 |
| 9 | 6.2 | 6.0 |
| 10 | 5.3 | 5.3 |
| 11 | 4.6 | 4.5 |
| 12 | 4.0 | 4.2 |
| 13 | 3.4 | 3.5 |
| 14 | 3.1 | 3.0 |
| 15 | 2.5 | 2.7 |
| 16 | 2.2 | 2.5 |
| 17 | 2.0 | 2.0 |
| 18 | 1.8 | 1.8 |
| 19 and over | 0.0 | 0.0 |

Rates are not applied after the member is eligible for reduced or unreduced retirement benefits.

C. Other Assumptions

1. Age difference: Males are assumed to be three years older than females. All beneficiaries are assumed to be spouses.

2. Percent electing annuity on death: It is assumed that beneficiaries of deceased members will elect to receive the refund of contributions with interest, unless the member is eligible for early or normal retirement, in which case the beneficiary will elect to receive the survivor annuity.

3. Percent electing deferred termination benefit: All vested active members terminating prior to eligibility for a retirement benefit are assumed to elect the more valuable of (i) an immediate refund, or (ii) a deferred annuity commencing when the member is eligible for an unreduced retirement benefit.

4. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt when eligible for an unreduced benefit (or attained age if later).

5. Investment and administrative expenses: The assumed investment return rate is intended to be the net rate of return after payment of all investment-related expenses. Administrative Expenses are assumed to be 0.35% of valuation payroll per year.

6. Percent married: For valuation purposes 100% of members are assumed to be married.

7. Decrement timing: Retirement and termination are assumed to occur at end of year while death and disability are assumed to occur middle of year to approximate incidence throughout the year.

8. Eligibility age and service: Eligibility age and service are calculated at decrement time and rounded for death and disability and truncated for retirement and termination. In cases where fractional age and service sum to 75/80 or greater, depending on tier, but the truncated integer ages do not produce Rule of eligibility, eligibility service is incremented by one. In cases where fractional service is 24.75/29.75 at retirement decrement time, 25/30-year eligibility is assumed.

*V.* *Valuation Data*

Participant data was supplied on an electronic file for (i) active members, (ii) inactive members, who are entitled to either a future deferred benefit or a refund of their employee contributions and the accumulated interest, and (iii) members and beneficiaries receiving benefits.

The data for active and inactive, non-retired members included birth date, gender, years of service, salary, and accumulated employee contributions (without interest). For retired members and beneficiaries, the data included date of birth, gender, beneficiary or joint annuitant date of birth (where applicable), current monthly benefit, date of retirement, and a form of payment code.

Salary supplied for the current year was the total earnings for the year preceding the valuation date. The valuation payroll is estimated by increasing the payroll supplied by ERB staff by one year's expected pay increase and adjusted for partial year pays for new hires. New hires without pay information are populated with an average non-zero new hire pay.

We have not subjected this data to any auditing procedures, but have examined the data for reasonableness and consistency with the prior year's data.

# Section E

## Summary of Data and Experience

## Non-Disabled Post-Retirement Mortality – Male
### Benefit-Weighted
### Nine-Year Period Ending June 30, 2023

| Age | Counts | | Annuities | | Crude Rates | Sample Rates* | | Expected Deaths** | | A/E Ratio | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Deaths | Exposure | Deaths | Exposure | | Old | New | Old | New | Old | New |
| 40-44 | - | 17 | $ - | $ 0.2 | 0.0000 | 0.0007 | 0.0007 | $ 0.0 | $ 0.0 | 0% | 0% |
| 45-49 | - | 312 | - | 6.8 | 0.0000 | 0.0012 | 0.0011 | 0.0 | 0.0 | 0% | 0% |
| 50-54 | 9 | 2,180 | 0.2 | 58.0 | 0.0041 | 0.0021 | 0.0021 | 0.1 | 0.1 | 180% | 178% |
| 55-59 | 45 | 6,689 | 0.9 | 176.1 | 0.0051 | 0.0036 | 0.0039 | 0.7 | 0.7 | 138% | 124% |
| 60-64 | 128 | 15,776 | 2.7 | 404.3 | 0.0067 | 0.0054 | 0.0069 | 2.3 | 2.8 | 117% | 95% |
| 65-69 | 275 | 28,832 | 5.5 | 680.7 | 0.0080 | 0.0098 | 0.0101 | 6.8 | 6.9 | 80% | 79% |
| 70-74 | 528 | 28,555 | 10.2 | 674.4 | 0.0151 | 0.0176 | 0.0149 | 11.9 | 10.1 | 86% | 101% |
| 75-79 | 634 | 19,982 | 12.7 | 480.6 | 0.0265 | 0.0318 | 0.0270 | 15.2 | 12.9 | 84% | 99% |
| 80-84 | 721 | 12,972 | 14.8 | 312.7 | 0.0475 | 0.0573 | 0.0514 | 17.7 | 15.9 | 84% | 94% |
| 85-89 | 752 | 7,295 | 17.4 | 173.2 | 0.1007 | 0.1035 | 0.0937 | 17.6 | 16.0 | 99% | 109% |
| 90-94 | 544 | 3,073 | 12.0 | 68.1 | 0.1754 | 0.1872 | 0.1781 | 12.2 | 11.5 | 98% | 104% |
| 95-99 | 176 | 691 | 3.3 | 13.9 | 0.2398 | 0.3395 | 0.2692 | 4.3 | 3.5 | 77% | 94% |
| 100-104 | 26 | 75 | 0.4 | 1.2 | 0.3212 | 0.4784 | 0.4145 | 0.6 | 0.5 | 67% | 85% |
| 105-109 | 1 | 2 | 0.0 | 0.0 | 0.5045 | 0.4824 | 0.5474 | 0.0 | 0.0 | 105% | 98% |
| Other | - | - | - | - | N\A | | | - | - | 0% | 0% |
| Totals | 3,839 | 126,451 | $ 80.2 | $ 3,050.3 | 0.0263 | 0.0293 | 0.0266 | $ 89.5 | $ 81.1 | 90% | 99% |

# Non-Disabled Post-Retirement Mortality – Female
## Benefit-Weighted
## Nine-Year Period Ending June 30, 2023

| Age | Counts | | Annuities | | Crude Rates | Sample Rates* | | Expected Deaths** | | A/E Ratio | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Deaths | Exposure | Deaths | Exposure | | Old | New | Old | New | Old | New |
| 40-44 | - | 24 | $ - | $ 0.2 | 0.0000 | 0.0004 | 0.0005 | $ 0.0 | $ 0.0 | 0% | 0% |
| 45-49 | 1 | 553 | 0.0 | 12.9 | 0.0025 | 0.0007 | 0.0008 | 0.0 | 0.0 | 302% | 280% |
| 50-54 | 5 | 4,306 | 0.1 | 113.7 | 0.0007 | 0.0012 | 0.0016 | 0.1 | 0.2 | 55% | 37% |
| 55-59 | 53 | 15,515 | 1.1 | 386.3 | 0.0029 | 0.0020 | 0.0039 | 0.8 | 1.5 | 138% | 74% |
| 60-64 | 175 | 40,462 | 3.5 | 929.3 | 0.0038 | 0.0029 | 0.0046 | 2.9 | 4.3 | 123% | 82% |
| 65-69 | 429 | 67,162 | 8.5 | 1,380.1 | 0.0061 | 0.0055 | 0.0062 | 7.7 | 8.8 | 110% | 96% |
| 70-74 | 675 | 59,361 | 11.9 | 1,154.8 | 0.0103 | 0.0104 | 0.0109 | 11.9 | 12.5 | 100% | 96% |
| 75-79 | 837 | 38,338 | 13.8 | 678.3 | 0.0203 | 0.0197 | 0.0199 | 13.2 | 13.5 | 104% | 102% |
| 80-84 | 944 | 23,584 | 15.5 | 381.4 | 0.0407 | 0.0374 | 0.0418 | 14.1 | 15.7 | 110% | 99% |
| 85-89 | 1,105 | 13,597 | 15.9 | 208.8 | 0.0763 | 0.0710 | 0.0807 | 14.6 | 16.5 | 109% | 96% |
| 90-94 | 885 | 5,996 | 12.6 | 86.7 | 0.1449 | 0.1350 | 0.1448 | 11.2 | 12.0 | 112% | 105% |
| 95-99 | 424 | 1,674 | 5.2 | 21.4 | 0.2437 | 0.2571 | 0.2282 | 5.1 | 4.6 | 101% | 112% |
| 100-104 | 94 | 270 | 1.2 | 3.5 | 0.3411 | 0.4918 | 0.3851 | 1.5 | 1.3 | 79% | 96% |
| 105-109 | 8 | 15 | 0.1 | 0.2 | 0.4770 | 0.5068 | 0.5103 | 0.1 | 0.1 | 94% | 97% |
| Other | - | - | - | - | N\A | | | - | - | 0% | 0% |
| Totals | 5,635 | 270,857 | $ 89.5 | $ 5,357.5 | 0.0167 | 0.0156 | 0.0170 | $ 83.4 | $ 91.0 | 107% | 98% |

# Termination Experience – Male
## Liability-Weighted
## Nine-Year Period Ending June 30, 2023

| | | | | Assumed Rate | | Expected Terminations | | Actual/Expected | |
|---|---|---|---|---|---|---|---|---|---|
| Service | Actual Terminations | Total Count | Actual Rate | Current | Proposed | Current | Proposed | Current (2) / (7) | Proposed (2) / (8) |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 0 | 1 | 22 | 0.0504 | 0.3000 | 0.2600 | 7 | 6 | 16% | 19% |
| 1 | 19 | 140 | 0.1355 | 0.2400 | 0.2200 | 33 | 31 | 57% | 61% |
| 2 | 29 | 163 | 0.1803 | 0.1900 | 0.1800 | 31 | 29 | 95% | 101% |
| 3 | 35 | 232 | 0.1515 | 0.1400 | 0.1400 | 32 | 32 | 110% | 110% |
| 4 | 36 | 297 | 0.1196 | 0.1150 | 0.1150 | 34 | 34 | 105% | 105% |
| 5 | 40 | 369 | 0.1090 | 0.1000 | 0.1000 | 37 | 37 | 109% | 109% |
| 6 | 39 | 422 | 0.0922 | 0.0900 | 0.0900 | 38 | 38 | 102% | 102% |
| 7 | 36 | 467 | 0.0765 | 0.0750 | 0.0750 | 35 | 35 | 102% | 102% |
| 8 | 37 | 516 | 0.0710 | 0.0650 | 0.0700 | 34 | 36 | 108% | 102% |
| 9 | 35 | 544 | 0.0635 | 0.0600 | 0.0620 | 33 | 34 | 105% | 102% |
| 10 | 32 | 588 | 0.0537 | 0.0530 | 0.0530 | 31 | 31 | 102% | 102% |
| 11 | 29 | 632 | 0.0456 | 0.0460 | 0.0460 | 29 | 29 | 99% | 99% |
| 12 | 26 | 680 | 0.0381 | 0.0410 | 0.0400 | 28 | 27 | 93% | 96% |
| 13 | 25 | 727 | 0.0345 | 0.0340 | 0.0340 | 25 | 25 | 100% | 100% |
| 14 | 23 | 742 | 0.0316 | 0.0310 | 0.0310 | 23 | 23 | 102% | 102% |
| 15 | 19 | 763 | 0.0251 | 0.0280 | 0.0250 | 21 | 19 | 91% | 101% |
| 16 | 17 | 788 | 0.0220 | 0.0250 | 0.0220 | 20 | 17 | 86% | 102% |
| 17 | 13 | 791 | 0.0167 | 0.0220 | 0.0200 | 17 | 16 | 78% | 83% |
| 18 | 14 | 802 | 0.0172 | 0.0190 | 0.0180 | 15 | 14 | 92% | 99% |
| Totals | 504 | 9,684 | | | | 523 | 513 | 96% | 98% |

## Termination Experience – Female
### Liability-Weighted
### Nine-Year Period Ending June 30, 2023

| | | | | Assumed Rate | | Expected Terminations | | Actual/Expected | |
|---|---|---|---|---|---|---|---|---|---|
| Service | Actual Terminations | Total Count | Actual Rate | Current | Proposed | Current | Proposed | Current (2) / (7) | Proposed (2) / (8) |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 0 | 2 | 34 | 0.0445 | 0.2400 | 0.2400 | 8 | 8 | 19% | 19% |
| 1 | 34 | 256 | 0.1310 | 0.2000 | 0.2000 | 51 | 51 | 66% | 66% |
| 2 | 47 | 288 | 0.1624 | 0.1650 | 0.1650 | 48 | 48 | 98% | 98% |
| 3 | 58 | 415 | 0.1392 | 0.1350 | 0.1350 | 56 | 56 | 103% | 103% |
| 4 | 63 | 524 | 0.1207 | 0.1150 | 0.1150 | 60 | 60 | 105% | 105% |
| 5 | 68 | 612 | 0.1110 | 0.1000 | 0.1000 | 61 | 61 | 111% | 111% |
| 6 | 65 | 718 | 0.0902 | 0.0900 | 0.0900 | 65 | 65 | 100% | 100% |
| 7 | 65 | 854 | 0.0756 | 0.0750 | 0.0750 | 64 | 64 | 101% | 101% |
| 8 | 71 | 1,000 | 0.0709 | 0.0700 | 0.0700 | 70 | 70 | 101% | 101% |
| 9 | 70 | 1,137 | 0.0615 | 0.0600 | 0.0600 | 68 | 68 | 103% | 102% |
| 10 | 67 | 1,269 | 0.0528 | 0.0550 | 0.0530 | 70 | 67 | 96% | 100% |
| 11 | 63 | 1,395 | 0.0452 | 0.0470 | 0.0450 | 66 | 63 | 95% | 100% |
| 12 | 64 | 1,545 | 0.0411 | 0.0420 | 0.0420 | 65 | 65 | 98% | 98% |
| 13 | 60 | 1,700 | 0.0350 | 0.0360 | 0.0350 | 61 | 60 | 98% | 100% |
| 14 | 53 | 1,841 | 0.0289 | 0.0320 | 0.0300 | 59 | 55 | 90% | 96% |
| 15 | 53 | 1,958 | 0.0271 | 0.0280 | 0.0270 | 55 | 53 | 96% | 100% |
| 16 | 50 | 2,029 | 0.0245 | 0.0250 | 0.0250 | 51 | 51 | 97% | 98% |
| 17 | 39 | 2,068 | 0.0188 | 0.0220 | 0.0200 | 45 | 41 | 86% | 94% |
| 18 | 38 | 2,108 | 0.0178 | 0.0190 | 0.0180 | 40 | 38 | 94% | 99% |
| | | | | | | | | | |
| Totals | 1,026 | 21,750 | | | | 1,063 | 1,044 | 97% | 98% |

# Salary Experience
## Twelve-Year Period Ending June 30, 2023

| Service Index | Current Salary Scales | | Actual Experience (12 Years) | | | Proposed Salary Scale | |
|---|---|---|---|---|---|---|---|
| | Total | Step Rate/ Promotional | Total | Above inflation | Steprate/ Promotional | Total | Steprate/ Promotional |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1 | 6.50% | 3.50% | 7.95% | 5.40% | 3.92% | 7.15% | 3.75% |
| 2 | 5.75% | 2.75% | 8.40% | 5.86% | 4.37% | 6.65% | 3.25% |
| 3 | 5.25% | 2.25% | 7.17% | 4.63% | 3.14% | 6.15% | 2.75% |
| 4 | 4.75% | 1.75% | 6.42% | 3.88% | 2.39% | 5.65% | 2.25% |
| 5 | 4.50% | 1.50% | 6.16% | 3.62% | 2.13% | 5.40% | 2.00% |
| 6 | 4.25% | 1.25% | 5.92% | 3.38% | 1.89% | 5.15% | 1.75% |
| 7 | 4.00% | 1.00% | 5.59% | 3.05% | 1.56% | 4.65% | 1.25% |
| 8 | 3.75% | 0.75% | 4.96% | 2.41% | 0.93% | 4.40% | 1.00% |
| 9 | 3.50% | 0.50% | 4.79% | 2.25% | 0.76% | 4.15% | 0.75% |
| 10 | 3.25% | 0.25% | 4.52% | 1.97% | 0.49% | 3.90% | 0.50% |
| 11 | 3.25% | 0.25% | 4.66% | 2.11% | 0.63% | 3.90% | 0.50% |
| 12 | 3.25% | 0.25% | 4.34% | 1.79% | 0.31% | 3.65% | 0.25% |
| 13 | 3.25% | 0.25% | 4.37% | 1.83% | 0.34% | 3.65% | 0.25% |
| 14 | 3.25% | 0.25% | 4.26% | 1.72% | 0.23% | 3.65% | 0.25% |
| 15+ | 3.00% | 0.00% | 4.03% | 1.49% | 0.00% | 3.40% | 0.00% |