

# Educational Retirement Board of New Mexico

Actuarial Valuation Report  
As of June 30, 2018



November 12, 2018

Board of Trustees  
Educational Retirement Board of New Mexico  
P.O. Box 26129  
Santa Fe, NM 87502-0129

**Subject: Actuarial Valuation as of June 30, 2018**

Dear Members of the Board:

The results of the June 30, 2018 annual actuarial valuation are presented in this report. We certify that the information contained in this report is accurate and fairly presents the actuarial position of the Educational Retirement Board of New Mexico (ERB) as of June 30, 2018.

This report was prepared at the request of the Board and is intended for the Board's use and those designated or approved by the Board. This report may be provided to parties other than the ERB only in its entirety and only with the permission of the Board.

To the best of our knowledge, this report is based on benefit provisions in effect as of June 30, 2018, audited financial information prepared as of that date, member data gathered as of that date, and the actuarial assumptions and methods previously adopted by the Board.

Valuations are prepared annually, as of June 30th of each year, the last day of ERB's plan and fiscal years.

#### **ACTUARIAL VALUATION**

The primary purposes of the valuation report are to determine the adequacy of the current employer contribution rate, to describe the current financial condition of ERB, to analyze changes in ERB's financial condition, and to provide various summaries of the membership data.

This report does not provide information required under Governmental Accounting Standards Board (GASB) Statement Nos. 67 & 68. All of the information required by GASB is provided in a stand-alone report entitled "GASB Reporting and Disclosure Information for ERB Fiscal Year Ending June 30, 2018."

The valuation report provides a "snapshot" of ERB's estimated financial condition as of the valuation date. The valuation does not predict ERB's future financial condition or its ability to pay benefits in the future and it also does not provide any guarantee of future financial soundness of ERB. Over time, ERB's total cost will depend on a number of factors, including the amount of benefits the plan pays, the number of members receiving benefits, the period of time over which benefits are paid, plan expenses, and the amount earned on any assets invested toward the payment of benefits. These amounts and other variables are uncertain and unknowable at the valuation date.

To prepare the valuation report, actuarial assumptions, including those adopted by the Board on April 21, 2017, are used in a forward looking financial and demographic model to present a single scenario from a wide range of possibilities; the results based on that single scenario are included in the valuation. The future is uncertain and the plan's actual experience will differ from those assumptions; these differences may be significant or material because the results are sensitive to the assumptions made, and, in some cases, to the interaction between the assumptions.

Different assumptions or scenarios within the range of possibilities may also be reasonable and results based on those assumptions would be different. As a result of the uncertainty inherent in a forward looking projection over a long period of time, no one projection is uniquely "correct" and many alternative projections of the future could also be regarded as reasonable. Two different actuaries could, quite reasonably, arrive at different results based on the same data and different views of the future.

#### **FINANCING OBJECTIVES**

In accordance with HB 628 (2011 Regular Session) and SB 115 (2013 Regular Session), employer contributions for the current fiscal year are scheduled to be 13.90% of active member payroll, member contributions for employees with annual salary more than \$20,000 are 10.70% of pay, and member contributions for employees with annual salary of \$20,000, or less, are 7.90% of pay.

In addition to the above, certain higher education employers make a contribution equal to 3.00% of the total payroll for their employees who have elected to join the Alternative Retirement Program rather than ERB.

In accordance with the funding policy as set by the Board of Trustees, these rates are intended to be sufficient to pay ERB's normal cost and to amortize ERB's unfunded actuarial accrued liability (UAAL) over a period that should not extend beyond June 30, 2042 (30 years from June 30, 2012). The amortization period, also referred to as the funding period, is the number of years expected to be required to completely amortize the UAAL, assuming that ERB's experience exactly follows all of the actuarial assumptions.

#### **PROGRESS TOWARD REALIZATION OF FINANCING OBJECTIVES**

The funded condition of the plan, as measured by the funded ratio, increased slightly from 2017 to 2018. The increase was primarily due to the recent investment performance, demographic gains and favorable COLA experience.

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) increased from last year. The funded ratio as of June 30, 2017 was 62.9%. It is now 63.5% as of June 30, 2018. Five years ago this ratio stood at 60.1%, and ten years ago the ratio was 71.5%. If the ratio were calculated using the market value of assets rather than the actuarial value of assets, it would be 63.4% as of June 30, 2018, up from 63.0% as of June 30, 2017. During the last fiscal year, the UAAL increased from \$7.4 billion to \$7.5 billion.

The funded status is one of many metrics used to show trends and develop future expectations about the health of a retirement system. The funded status measure itself is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions since it does not reflect normal cost contributions, the timing of amortization payments, or future experience other than expected.

The plan's funding period as of the valuation date is infinite. This is a theoretical calculation of the period that will be required to amortize the UAAL, assuming that the current year's amortization payment increases at the payroll growth rate (3.00% per annum) in the future. The infinite period compares with the 124.6-years period calculated as of the prior actuarial valuation date. An infinite period means that the principal on the UAAL will never be paid down.

This calculation of the funding period is a "snapshot" as of the valuation date and ignores a number of factors: (i) lower normal cost rate in the future since all new members will be eligible for Tier 3 benefits, (ii) the known deferred asset gains and losses that are reflected in the actuarial value of assets and that will be recognized over the next four years, and (iii) future cost-of-living adjustments that may be less than the assumed annual 1.9% increase. The impact of these factors on ERB's funding period is discussed in Section C.

#### **RECENT EVENTS**

The annual return from 2017 to 2018 on the market value of assets was approximately 7.2% and the annual return from that same period on the actuarial value of assets was 7.5%. The return on the actuarial value of assets of greater than the assumed return rate of 7.25% reflects the five-year "smoothing" of gains and losses at work in the asset valuation method; for instance, in 2015 not all the losses were recognized at one time in the actuarial value of assets and likewise, for this valuation, not all of the 2017 gains have been recognized in the actuarial value of assets. The net result of the losses from 2015, 2016 (when compared to the investment return assumption of 7.75%) and 2018, along with the gains from 2014 and 2017 recognized in this valuation, is an overall gain on the actuarial value of assets measured from last year to this year (a return of 7.5% versus the assumed return of 7.25%).

In accordance with the assumption changes discussed below, future investment returns will be compared to the investment return assumption of 7.25%.

#### **BENEFIT PROVISIONS**

There were no modifications to the benefit provisions that were reflected in the actuarial valuation as of June 30, 2018.

#### **ASSUMPTIONS AND METHODS**

Actuarial assumptions and methods are set by the Board of Trustees, based upon recommendations made by the plan's actuary. The Board adopted new assumptions on April 21, 2017 in conjunction with the six-year actuarial experience study period ending June 30, 2016. At that time, the Board adopted a number of economic assumption changes, including a decrease in the inflation assumption from 3.00% to 2.50%. The 0.50% decrease in the inflation assumption also led to decreases in the nominal investment return assumption from 7.75% to 7.25%, the assumed annual wage inflation rate from 3.75% to 3.25%, the payroll growth assumption from 3.50% to 3.00%, and the annual assumed COLA from 2.00% to 1.90%.

We believe the recommended assumptions and methods are internally consistent, are reasonably based on the actual experience of ERB, and comply with the Actuarial Standards of Practice.

The results of the actuarial valuation are dependent upon the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods.

#### **MEMBER AND FINANCIAL DATA**

Member data for retired, active, and inactive participants was supplied as of June 30, 2018 by the ERB staff. 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. Asset information as of June 30, 2018 was also supplied by the ERB staff.

We provided some of the information used in the Comprehensive Annual Financial Report. Specifically, we provided information used in preparing the schedules of Active Member Valuation Data, Retirants and Beneficiaries, Analysis of Financial Experience, Solvency Test, and the Schedule of Retirees & Beneficiaries Added to/and Removed from Rolls that are found in the Actuarial Section; and we provided the Schedule of Changes in the Employers' Net Pension Liability and Related Ratios as well as the Schedule of Employer Contributions in the Financial Section.

#### **CERTIFICATION**

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of New Mexico state law and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board.

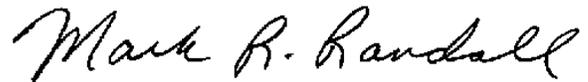
The undersigned are independent actuaries and consultants. All are Enrolled Actuaries and are Members of the American Academy of Actuaries, and meet all of the Qualification Standards of the American Academy of Actuaries. All of the undersigned are experienced in performing valuations for large public retirement systems.

We would like to especially thank the ERB staff for its assistance in the preparation of our report.

Respectfully submitted,



R. Ryan Falls, FSA, EA, MAAA  
Senior Consultant



Mark R. Randall, FCA, EA, MAAA  
Chief Executive Officer



Dana Woolfrey, FSA, EA, MAAA  
Consultant & Actuary

## ACTUARIAL STANDARDS OF PRACTICE DISCLOSURE STATEMENTS

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

This report should not be relied on for any purpose other than the purpose described above. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

The valuation was based upon information furnished by the ERB's staff, concerning ERB benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the ERB's staff.

The developed findings included in this report consider data or other information through June 30, 2018.

This is one of multiple documents comprising the actuarial report. The other document comprising the actuarial report is a PowerPoint presentation presented to the Board of Trustees following the publication of this report.

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## **SECTION A**

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### **EXECUTIVE SUMMARY**

## Executive Summary

Valuation as of:	06/30/2018	06/30/2017
Contribution Rates for Fiscal Year Ending:	06/30/2019	06/30/2018
<b>Membership</b> <ul style="list-style-type: none"> <li>• Number of               <ul style="list-style-type: none"> <li>- Active members</li> <li>- Retirees and beneficiaries</li> <li>- Inactive, vested</li> <li>- Inactive, nonvested</li> <li>- Total</li> </ul> </li> <li>• Payroll</li> </ul>	60,358 48,919 10,621 <u>36,891</u> 156,789 \$ 2.6 billion	59,495 47,340 10,581 <u>36,098</u> 153,514 \$ 2.6 billion
<b>Statutory contribution rates</b> <ul style="list-style-type: none"> <li>• Employer</li> <li>• Member</li> </ul>	13.90% 10.70%	13.90% 10.70%
<b>Assets</b> <ul style="list-style-type: none"> <li>• Market value</li> <li>• Actuarial value</li> <li>• Return on market value</li> <li>• Return on actuarial value</li> <li>• Employer contributions</li> <li>• External cash flow %</li> <li>• Ratio of actuarial to market value</li> </ul>	\$ 13.0 billion \$ 13.0 billion 7.2% 7.5% \$ 388.7 million -3.4% 100.2%	\$ 12.5 billion \$ 12.5 billion 11.8% 8.2% \$ 395.8 million -3.0% 100.0%
<b>Actuarial Information</b> <ul style="list-style-type: none"> <li>• Normal cost %</li> <li>• Unfunded actuarial accrued liability (UAAL)</li> <li>• Funded ratio</li> <li>• Funding period (Closed Group Valuation)</li> <li>• Funding period (Open Group Projection)</li> <li>• Funding Policy Contribution</li> </ul>	13.68% \$ 7.5 billion 63.5% Infinite 70 years 20.78%	13.62% \$ 7.4 billion 62.9% 124.6 years 61 years 20.19%
<b>Gains/(losses)</b> <ul style="list-style-type: none"> <li>• Asset experience</li> <li>• Liability experience</li> <li>• COLA experience</li> <li>• Benefit changes</li> <li>• Assumption/method changes</li> <li>• Total</li> </ul>	\$ 26.2 million 64.3 million 24.5 million 0.0 million 0.0 million <u>0.0 million</u> \$ 115.0 million	\$ 54.0 million 135.5 million 67.9 million 0.0 million (823.1) million <u>(823.1) million</u> \$ (565.7) million

## **SECTION B**

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### **INTRODUCTION**

# Introduction

The results of the June 30, 2018 actuarial valuation of the Educational Retirement Board of New Mexico (ERB) are presented in this report. Table 1 of our report summarizes the key actuarial results. Table 2 analyzes changes in the unfunded actuarial accrued liability. Tables 3 and 4 show more detailed actuarial information. Tables 5a and 5b develop the Funding Policy Contribution and compare to the actual contributions received. Tables 6a, 6b, 6c, 13, 14, 15 and 16 show statistical information about the membership, and Tables 7 through 9b, and Table 11 show information about plan assets. Tables 10a and 10b show the calculation of the actuarial gains and losses. Table 12 shows the solvency test, used by some funds in their annual report. Finally, Appendix 1 is a summary of the benefit and contribution provisions of ERB, Appendix 2 is a summary of the actuarial methods and assumptions, and Appendix 3 is a glossary of terms.

## **SECTION C**

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### **ACTUARIAL INFORMATION**

## Actuarial Information

The determination of the unfunded actuarial accrued liability (UAAL) and the funding period involves the following steps:

- The actuarial present value of future benefits is determined for the present members, including retired members, beneficiaries, inactive members and active members. This amounts to \$23.0 billion, as shown in Table 3 of our report.
- The entry age normal actuarial cost method is used to allocate the actuarial present value of future benefits between the portion due for the current year (the normal cost), prior years (the actuarial accrued liability), and future years (the future normal costs). The actuarial accrued liability is \$20.5 billion, as shown on line 5d in Table 1 of our report.
- Under the entry age normal actuarial cost method, the current and future normal costs are determined as a level percentage of payroll. Table 4 shows an analysis of the normal cost rate. The amount needed to fund the current and future normal costs is 13.68% of payroll inclusive of member contributions. This is the total (member plus employer) contribution rate needed to pay for the average member.
- Part of the normal cost is paid by the employee contributions of 10.70%, leaving 2.98% to be funded by the employers (i.e., the current year's employer normal cost is 2.98% of payroll). This is shown on line 2 in Table 1. The balance of the employer contribution is used as payment on the UAAL. The employer contribution is expected to increase in future years and this will affect the amount of funding available to amortize the UAAL.
- The unfunded actuarial accrued liability (UAAL) is determined by subtracting the actuarial value of assets from the actuarial accrued liability. (The actuarial value of assets is a smoothed market value, as discussed in more detail below.) The UAAL is \$7.5 billion as shown on line 7 in Table 1.
- Since the statutory employer contribution rate is 13.90% and the employer normal cost rate is 2.98%, the difference of 10.92% is used to amortize the UAAL. The 3.00% employer contribution made on behalf of ARP members is also used to amortize the UAAL.

## Actuarial Information (Continued)

- Finally, the funding period is calculated by determining how long it will take to reduce the UAAL to zero, assuming that the current year's amortization contribution increases at the 3.00% payroll growth period each year. This period is currently infinite. (Note, however, that this calculation does not reflect the lower normal cost rate in the future since all new members will be eligible for Tier 3 benefits and future cost-of-living adjustments that may be less than the assumed 1.9% increase. Further, it assumes a 7.25% return on the actuarial value of assets, not the market value. Alternate projections show that it will take approximately 70 years to amortize the unfunded actuarial accrued liability when incorporating the expected decrease in the normal cost rate, the expected reductions in cost-of-living adjustments, and the assumed a 7.25% return on the market value of assets. These alternate projections are referred to as the Open Group Projection in this report).

## **SECTION D**

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### **ANALYSIS OF CHANGES**

## Analysis of Changes

Table 2 shows an analysis of the changes in the UAAL. Since the UAAL is an actuarial present value, with future anticipated benefits discounted using an annual 7.25% interest rate, the UAAL increases each year by the imputed interest rate, less employer contributions made to amortize the UAAL. (Keep in mind that part of the employer contribution is used to pay the normal cost, so only part of each year's contribution is available to amortize the UAAL.)

As shown in Table 2, the UAAL increased by \$533.8 million for imputed interest and decreased by \$320.3 million because of contributions made in excess of the normal cost. This means that the UAAL was expected to increase \$213.5 million before recognizing plan experience. The UAAL as of June 30, 2017 was \$7.4 billion, and the expected UAAL as of June 30, 2018, recognizing actual contributions made, is \$7.6 billion.

A cost-of-living adjustment (COLA) was applied as of July 1, 2018 to retirement benefits for retirees eligible to receive a COLA as defined in Section 22-11-31 of the New Mexico Statutes Annotated. A 2.00% adjustment factor was applied to all disabled retirees who had been retired for at least three years, i.e., members who began receiving a disability retirement benefit in calendar year 2014 or earlier. Since the plan's funded ratio as of June 30, 2017 was 90% or less, all non-disability retirements with 25 or more years of service credit at retirement and whose monthly annuity is less than the median monthly benefit of all non-disability retirees from the prior year (i.e., \$1,611.45 as of June 30, 2018) received an annual adjustment of 1.80%. All remaining non-disability retirements received an annual adjustment of 1.60%. Note that the adjustment is only applied to members who retired in calendar year 2017 or earlier; members who retired in 2018 are ineligible. The overall actual COLA was less than the expected 2.0% which resulted in a net \$24.5 million decrease in UAAL.

The plan experienced an actuarial gain on investments of \$26.2 million. The investment gain resulted from the fact that the return on the actuarial value of assets, 7.5%, was greater than the 7.25% assumed investment return. This gain was the result of recognizing 20% of the losses from FY2015, FY2016 and FY2018, with 20% of the gains from FY2014 and FY2017. The market rate of return in FY2018 was 7.2%. The investment returns stated in this report are calculated net of administrative and investment-related expenses and may differ from the actual rate of return reported by ERB's investment consultants.

There was no benefit change and assumption change since the last actuarial valuation.

As a result of all the above experience, the UAAL increased from \$7.4 billion to \$7.5 billion.

**SECTION E**

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**FUNDING POLICY**

## Funding Policy

The Board of Trustees has established a funding policy with a goal of eliminating the UAAL by June 30, 2042 (30 years from June 30, 2012). This funding policy does not directly impact the level of funding on an annual basis since the members and the employers all contribute a fixed percentage of payroll. However, the funding policy contribution amount provides the Board of Trustees with a valuable benchmark which can be used to determine whether the total contribution being received by ERB is sufficient to meet the long-term goal of eliminating the UAAL by June 30, 2042.

Table 5a of our report calculates the Funding Policy Contribution and Table 5b tracks how closely the contributions received during the past fiscal year compared to the Funding Policy Contribution. As noted on Table 5b, ERB only received 71% of the contributions necessary to meet their Funding Policy.

## **SECTION F**

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### **COMMENTS ON BENEFIT PROVISIONS**

## Comments on Benefit Provisions

Appendix 1 of our report summarizes the provisions of ERB. This valuation reflects benefits promised to members by statute. There are no ancillary benefits - retirement type benefits not required by statutes but which might be deemed an ERB liability if continued beyond the availability of funding by the current funding source.

The overall percentage increase of the Consumer Price Index resulted in a base adjustment of two percent during the preceding fiscal year. Additionally, the ERB funded status was less than 100%. As a result of these two factors, ERB granted a reduced COLA on July 1, 2018 which resulted in an actuarial gain of \$24.5 million.

## **SECTION G**

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### **COMMENTS ON ACTUARIAL ASSUMPTIONS AND METHODS**

## Comments on Actuarial Assumptions and Methods

Actuarial assumptions and methods are set by the Board of Trustees, based upon recommendations made by the plan's actuary. The Board adopted new assumptions on April 21, 2017 in conjunction with the six-year actuarial experience study period ending June 30, 2016. At that time, the Board adopted a number of economic assumption changes, including a decrease in the inflation assumption from 3.00% to 2.50%. The 0.50% decrease in the inflation assumption also led to decreases in the nominal investment return assumption from 7.75% to 7.25%, the assumed annual wage inflation rate from 3.75% to 3.25%, the payroll growth assumption from 3.50% to 3.00%, and the annual assumed COLA from 2.00% to 1.90%.

There were no assumption changes since prior valuation.

We believe the recommended assumptions are internally consistent and are reasonably based on the actual experience of ERB. Appendix 2 of our report summarizes the current actuarial assumptions being utilized in the preparation of the actuarial valuations.

In addition to the actuarial assumptions, the actuary also makes use of an actuarial funding method to allocate costs to particular years. In common with most public sector retirement plans, ERB uses the entry age normal actuarial cost method. This method produces a relatively level pattern of funding over time, and thereby provides equity between various generations of taxpayers. We continue to believe this method is appropriate for ERB.

## **SECTION H**

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### **ASSETS**

# Assets

ERB assets are held in trust. The ERB staff has provided the asset information as of June 30, 2018 used in this valuation.

Table 7 of our report shows a reconciliation of the assets from the beginning of the prior year to the valuation date.

Table 8 shows the development of the actuarial value of assets (AVA). The AVA is a “smoothed” market value. A smoothed value is used in order to dampen some of the year-to-year fluctuations that would occur if the market value were used instead. The method used phases in differences between the actual and expected market returns over five years. The expected return is determined using the 7.25% assumption and the plan’s market value, adjusted for contributions received and benefits and refunds paid. Both the actual and expected returns are computed net of investment and administrative expenses.

Note that the actuarial value is currently 100.2% of the market value. The dollar amount of the difference between the actuarial value and market value is the value of the deferred losses, and totals \$26.3 million. Over any short time period, a disparity between actuarial value and market value may appear, but over the long term, we would expect the actuarial value and the market value to continue to track each other fairly closely.

Table 9a shows that the investment return rate for FY2018 on market value was 7.2%, while it was 7.5% on the actuarial value of assets. Table 9b shows historical return rates since the current actuarial asset method was adopted.

Finally, Table 11 shows a history of cash flows to the trust, and the net cash flow measured as a percentage of the assets. The net cash flow is slightly negative, 3.4% of market value. A slightly negative cash flow like this is typical for a mature defined benefit plan where the annual investment earnings are expected to finance a large portion of the annual benefit payments.

It should be noted that the actual rate of return on the market value of assets of 7.2% that is stated in this report is based on a simplifying assumption that all contributions and benefit payments occur in the middle of the year. Additionally, this return is calculated net of administrative and investment-related expenses. This methodology is consistent with other procedures incorporated into this actuarial valuation. However, this actual rate of return may differ from the actual rate of return reported by ERB’s investment consultants which are based on more sophisticated methods.

## SECTION I

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### MEMBER DATA

## Member Data

Membership data was provided in electronic files by the ERB staff. Data for active members includes gender, birthdate, service, salary paid in the prior year, and accumulated contributions. Data for inactive, nonretired members was similar, but includes the member's accrued benefit as well. For retired members, data includes status (service retiree, disabled retiree or beneficiary), gender, birthdate, pension amount, form of payment, beneficiary gender and birthdate if applicable, and date of retirement.

While not verifying the correctness of the data at the source, we performed various tests to ensure the internal consistency of the data and its overall reasonableness.

Tables 6a and 6b summarize the data for all members. Table 6c is a history of key statistical information about active members, and Table 13 is a history of statistical information about retirees. Table 14 is an age/service distribution of active members and their average pay. Table 15 is a reconciliation that tracks changes in the plan population from last year to this year.

The number of active members increased since last year, from 59,495 to 60,358.

Total payroll increased 0.7% since last year. For all comparative purposes, payroll is the amount supplied by the ERB staff (i.e., the 2017-2018 member pay). However, this figure is increased by one year's expected pay increase to determine the member's rate of pay as of July 1, 2018. Pay is assumed to change only at the beginning of a school/fiscal year.

Average pay decreased 0.7% since last year. Average pay for members active in both this valuation and the last year's valuation increased 1.2%. The difference between these two figures is due to the effect of retirements and terminations, and their replacement by new members who generally earn less.

**SECTION J**

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**RISK ASSESSMENT**

# Risk Assessment

## ***Risks Associated with Measuring the Actuarial Accrued Liability and Actuarially Determined Employer Contribution***

The determination of the actuarial accrued liability and the actuarially determined employer contribution (ADEC) requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the System's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the System's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions from the State may not be made in accordance with the current arrangement or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

## Risk Assessment (Continued)

The Funding Policy Contribution calculated in Tables 5a and 5b may be considered as a minimum contribution that complies with the Board's funding policy and State statute. The timely receipt of the Funding Policy Contribution is critical to support the financial health of the System. Users of this report should be aware that contributions made consistent with the Funding Policy Contribution do not necessarily guarantee benefit security.

### ***Plan Maturity Measures***

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	<b>2018</b>	<b>2017</b>
Ratio of the market value of assets to total payroll	4.7	4.6
Ratio of actuarial accrued liability to payroll	7.5	7.3
Ratio of actives to retirees and beneficiaries	1.2	1.3
Ratio of net cash flow to market value of assets	-3.4%	-3.0%
Duration of the actuarial accrued liability	12.7	12.8

### ***Ratio of Market Value of Assets to Payroll***

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

### ***Ratio of Actuarial Accrued Liability to Payroll***

The ratio of liability to payroll may be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

### ***Ratio of Actives to Retirees and Beneficiaries***

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

## Risk Assessment (Continued)

### ***Ratio of Net Cash Flow to Market Value of Assets***

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

### ***Duration of Actuarial Accrued Liability***

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

### ***Additional Risk Assessment***

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

## **SECTION K**

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### **SUPPORTING EXHIBITS**

## Supporting Exhibits

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# Table 1

## Actuarial Information

	June 30, 2018	June 30, 2017
	(1)	(2)
1. Payroll		
a. Supplied by System (annualized)	\$ 2,609,168,136	\$ 2,591,195,672
b. Adjusted for one-year's pay increase	2,734,614,052	2,714,621,555
2. Normal cost rate (payable monthly)		
a. Total normal cost rate	13.68%	13.62%
b. Less: member contribution rate	(10.70%)	(10.70%)
c. Employer normal cost rate	2.98%	2.92%
3. Employer normal cost (Item 2c * Item 1b)	\$ 81,491,499	\$ 79,266,949
4. Actuarial accrued liability for active members		
a. Actuarial present value of future benefits	\$ 9,584,153,441	\$ 9,550,619,183
b. Less: actuarial present value of future normal cost	(2,511,510,101)	(2,478,105,389)
c. Actuarial accrued liability	\$ 7,072,643,340	\$ 7,072,513,794
5. Total actuarial accrued liability for:		
a. Retirees and beneficiaries	\$ 12,575,650,668	\$ 12,001,060,252
b. Inactive members	809,702,094	797,123,586
c. Active members (Item 4c)	7,072,643,340	7,072,513,794
d. Total	\$ 20,457,996,102	\$ 19,870,697,632
6. Actuarial value of assets	\$ 12,996,625,320	\$ 12,507,831,342
7. Unfunded actuarial accrued liability (UAAL) (Item 5d - Item 6)	\$ 7,461,370,782	\$ 7,362,866,290
8. Amortization payment for next fiscal year		
a. Employer contribution rate	13.90%	13.90%
b. Less: Employer normal cost rate (Item 2c)	(2.98%)	(2.92%)
c. Amortization rate	10.92%	10.98%
d. Amortization contribution (Item 8c * Item 1b)	\$ 298,619,854	\$ 298,065,447
e. Expected ARP contribution	6,037,541	6,008,537
f. Total	\$ 304,657,395	\$ 304,073,984
9. Funding period based on current 13.90% employer contribution requirement, with payments increasing at assumed payroll growth rate	Infinite	124.6 years

## Table 2

### Analysis of Change in Unfunded Actuarial Accrued Liability (UAAL)

Basis (1)	Year Ending	
	June 30, 2018 (2)	June 30, 2017 (3)
1. UAAL at prior valuation	\$ 7,362.9	\$ 6,630.5
2. Increases/(decreases) due to:		
a. Interest on UAAL	533.8	513.9
b. Amortization payments <sup>1</sup>	(320.3)	(347.2)
c. Liability experience	(64.3)	(135.5)
d. Asset experience	(26.2)	(54.0)
e. Actual COLA More/(Less) than Expected	(24.5)	(67.9)
f. Changes in actuarial assumptions and methods	0.0	823.1
g. Benefit changes	0.0	0.0
h. Total	\$ 98.5	\$ 732.4
3. Current UAAL (1+2h)	\$ 7,461.4	\$ 7,362.9

Note : Dollar amounts in millions

<sup>1</sup> Actual contributions reduced by normal cost, and adjusted for timing.

### Table 3

#### Actuarial Present Value of Future Benefits

	<u>June 30, 2018</u>	<u>June 30, 2017</u>
	(1)	(2)
1. Active members		
a. Service retirement benefits	\$ 8,763,696,038	\$ 8,749,623,951
b. Refunds and deferred termination benefits	655,745,232	637,499,099
c. Survivor benefits	83,673,412	83,132,247
d. Disability retirement benefits	81,038,759	80,363,886
e. Total	<u>\$ 9,584,153,441</u>	<u>\$ 9,550,619,183</u>
2. Retired members		
a. Service retirement	\$ 11,992,877,936	\$ 11,447,657,804
b. Disability retirement	101,642,895	98,265,726
c. Beneficiaries	481,129,837	455,136,722
d. Total	<u>\$ 12,575,650,668</u>	<u>\$ 12,001,060,252</u>
3. Inactive members		
a. Vested terminations	\$ 631,623,326	\$ 627,457,767
b. Nonvested terminations	172,053,798	163,589,892
c. Unallocated contributions	6,024,970	6,075,927
d. Total	<u>\$ 809,702,094</u>	<u>\$ 797,123,586</u>
4. Total actuarial present value of future benefits	\$ 22,969,506,203	\$ 22,348,803,021

## Table 4

### Analysis of Normal Cost

	<u>June 30, 2018</u>	<u>June 30, 2017</u>
	(1)	(2)
1. Gross normal cost rate (payable monthly)		
a. Service retirement benefits	9.42%	9.44%
b. Refunds and deferred termination benefits	4.00%	3.92%
c. Disability retirement benefits	0.15%	0.15%
d. Survivor benefits	0.11%	0.11%
e. Total	<u>13.68%</u>	<u>13.62%</u>
2. Less: member contribution rate	<u>(10.70%)</u>	<u>(10.70%)</u>
3. Employer normal cost rate	2.98%	2.92%

## Table 5a

### Calculation of Funding Policy Contribution (For Following Fiscal Year)

	<u>June 30, 2018</u> (1)	<u>June 30, 2017</u> (2)
1. Funding period (years)	24	25
2. Amortization contribution percentage		
a. Amortization payment	\$ 492,923,139	\$ 474,932,980
b. Less: expected payment for ARP members	<u>6,037,541</u>	<u>6,008,537</u>
c. Net (a-b)	\$ 486,885,598	\$ 468,924,443
d. Expected payroll	2,734,614,052	2,714,621,555
e. Amortization contribution percentage (c/d)	17.80%	17.27%
3. Funding Policy Contribution for Employers		
a. Employer normal cost rate	2.98%	2.92%
b. Amortization percentage	<u>17.80%</u>	<u>17.27%</u>
c. Total	20.78%	20.19%
d. Statutory rate	13.90%	13.90%
e. Funding Policy Contribution ( greater of (c,d) )	20.78%	20.19%

## Table 5b

### Actual Contributions as Percentage of Funding Policy Contribution for Year Ending June 30, 2018

1. Actual employer contributions	
a. On behalf of active ERB members	\$ 372,271,869
b. On behalf of return-to-work retirees	10,590,424
c. On behalf of ARP members	<u>5,861,690</u>
d. Total	\$ 388,723,983
2. Statutory employer contribution rate	13.90%
3. Imputed fiscal year payroll for active ERB members (Item 1a / Item 2)	\$ 2,678,214,885
4. Funding Policy Contribution for Employers	
a. Employer's funding policy contribution for active ERB members as percent of payroll	20.19%
b. Employer's funding policy contribution for active ERB members (Item 4a * Item 3)	\$ 540,731,585
c. Funding policy contribution (Item 4b + Item 1c)	\$ 546,593,275
5. Percentage of Funding Policy Contribution Received in Prior Year (Item 1d / Item 4c)	71.1%

## Table 6a

### Active Membership Data

	June 30, 2018	June 30, 2017
	(1)	(2)
1. Active members		
<u>Tier 1</u>		
a. Number	30,634	33,031
b. Total payroll supplied by System (annualized)	\$ 1,537,117,105	\$ 1,640,950,717
c. Average salary	\$ 50,177	\$ 49,679
d. Average age	51.0	50.6
e. Average service	15.9	15.2
<u>Tier 2</u>		
a. Number	6,958	7,456
b. Total payroll supplied by System (annualized)	\$ 292,008,833	\$ 305,797,460
c. Average salary	\$ 41,967	\$ 41,014
d. Average age	44.7	43.9
e. Average service	6.3	5.4
<u>Tier 3</u>		
a. Number	22,766	19,008
b. Total payroll supplied by System (annualized)	\$ 780,042,198	\$ 644,447,495
c. Average salary	\$ 34,263	\$ 33,904
d. Average age	40.4	40.0
e. Average service	2.4	2.0
<u>Total</u>		
a. Number	60,358	59,495
b. Total payroll supplied by System (annualized)	\$ 2,609,168,136	\$ 2,591,195,672
c. Average salary	\$ 43,228	\$ 43,553
d. Average age	46.3	46.4
e. Average service	9.7	9.8

## Table 6b

### Inactive Membership Data

	June 30, 2018 (1)	June 30, 2017 (2)
1. Vested inactive members (excluding pending refunds)		
a. Number	10,621	10,581
b. Total annual deferred benefits	\$ 85,346,677	\$ 85,121,543
c. Average annual deferred benefit	\$ 8,036	\$ 8,045
2. Nonvested inactive members and vested pending refunds		
a. Number	36,891	36,098
b. Employee assessments with interest due	\$ 172,053,798	\$ 163,589,892
c. Average refund due	\$ 4,664	\$ 4,532
3. Service retirees		
a. Number	44,796	43,282
b. Total annual benefits	\$ 1,046,020,056	\$ 995,244,176
c. Average annual benefit	\$ 23,351	\$ 22,994
4. Disabled retirees		
a. Number	844	840
b. Total annual benefits	\$ 9,204,564	\$ 8,884,121
c. Average annual benefit	\$ 10,906	\$ 10,576
5. Beneficiaries		
a. Number	3,279	3,218
b. Total annual benefits	\$ 53,436,984	\$ 50,598,425
c. Average annual benefit	\$ 16,297	\$ 15,724

Note: Retirement benefits include impact of July 1 cost-of-living increases.

## Table 6c

### Historical Summary of Active Member Data

Year Ending June 30,	Active Members		Covered Payroll		Average Salary		Average Age	Average Service
	Number	Percent Increase	Amount in \$ Millions	Percent Increase	\$ Amount	Percent Increase		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	42,015	---	\$622	---	\$14,810	---	40.9	10.7
1984	40,385	-3.9%	670	7.7%	16,600	12.1%	42.0	9.9
1986	45,311	12.2%	786	17.3%	17,353	4.5%	41.7	9.7
1988	45,492	0.4%	863	9.8%	18,968	9.3%	43.9	10.1
1990	48,858	7.4%	1,033	19.7%	21,146	11.5%	42.6	8.5
1992	51,161	4.7%	1,150	11.3%	22,486	6.3%	43.0	8.9
1993	52,296	2.2%	1,191	3.6%	22,774	1.3%	43.2	8.9
1994	53,744	2.8%	1,259	5.7%	23,420	2.8%	43.3	9.0
1995	54,840	2.0%	1,356	7.7%	24,735	5.6%	43.2	9.0
1996	55,782	1.7%	1,414	4.3%	25,341	2.4%	43.7	9.1
1997	56,685	1.6%	1,449	2.5%	25,556	0.8%	43.9	9.1
1998	58,097	2.5%	1,543	6.5%	26,555	3.9%	44.0	9.0
1999	58,615	0.9%	1,637	6.1%	27,936	5.2%	44.3	9.2
2000	60,090	2.5%	1,796	9.7%	29,884	7.0%	44.5	9.1
2001	60,155	0.1%	1,820	1.3%	30,248	1.2%	44.9	9.2
2002	61,091	1.6%	1,979	8.7%	32,387	7.1%	45.2	9.3
2003	62,614	2.5%	2,032	2.7%	32,460	0.2%	45.3	9.3
2004	62,901	0.5%	2,142	5.4%	34,061	4.9%	45.6	9.4
2005	63,362	0.7%	2,209	3.1%	34,865	2.4%	45.6	9.3
2006	61,829	-2.4%	2,219	0.5%	35,896	3.0%	45.7	9.2
2007	62,687	1.4%	2,341	5.5%	37,347	4.0%	45.9	9.3
2008	63,698	1.6%	2,492	6.4%	39,118	4.7%	46.1	9.4
2009	63,819	0.2%	2,586	3.8%	40,517	3.6%	46.3	9.6
2010	63,295	-0.8%	2,576	-0.4%	40,695	0.4%	46.5	9.7
2011	61,673	-2.6%	2,524	-2.0%	40,923	0.6%	46.8	10.0
2012	60,855	-1.3%	2,495	-1.1%	41,004	0.2%	47.0	10.0
2013	61,177	0.5%	2,517	0.9%	41,141	0.3%	47.0	9.9
2014	61,173	0.0%	2,539	0.9%	41,503	0.9%	46.6	9.8
2015	60,998	-0.3%	2,610	2.8%	42,793	3.1%	46.5	9.7
2016	60,057	-1.5%	2,612	0.1%	43,493	1.6%	46.4	9.8
2017	59,495	-0.9%	2,591	-0.8%	43,553	0.1%	46.4	9.8
2018	60,358	1.5%	2,609	0.7%	43,228	-0.7%	46.3	9.7

## Table 7

### Reconciliation of Plan Net Assets

	Year Ending	
	June 30, 2018 (1)	June 30, 2017 (2)
1. a. Value of assets at beginning of year (Value reported in prior valuation)	\$ 12,509,355,755	\$ 11,532,837,951
b. Adjustment	155	0
c. Value of assets at beginning of year after adjustment	\$ 12,509,355,910	\$ 11,532,837,951
2. Revenue for the year		
a. Contributions		
i. Member contributions (Including redeposits and service purchases)	\$ 290,007,133	\$ 295,982,532
ii. Employer contributions	382,862,293	390,010,264
iii. Employer contributions for ARP members	5,861,690	5,833,531
iv. Total	\$ 678,731,116	\$ 691,826,327
b. Net investment income		
i. Investment income	\$ 983,777,322	\$ 1,450,321,215
ii. Investment expenses	(84,213,747)	(103,106,221)
iii. Net investment income	\$ 899,563,575	\$ 1,347,214,994
c. Total revenue	\$ 1,578,294,691	\$ 2,039,041,321
3. Expenditures for the year		
a. Refunds	\$ 37,844,105	\$ 33,344,692
b. Benefit payments	1,069,597,322	1,019,330,496
c. Administrative and miscellaneous expenses	9,908,319	9,848,329
d. Total expenditures	\$ 1,117,349,746	\$ 1,062,523,517
4. Increase in net assets (Item 2 - Item 3)	\$ 460,944,945	\$ 976,517,804
5. Value of assets at end of year (Item 1 + Item 4)	\$ 12,970,300,855	\$ 12,509,355,755

## Table 8

### Development of Actuarial Value of Assets

	Year Ending June 30, 2018		
1. Market value of assets at beginning of year	\$ 12,509,355,910		
2. Net new investments			
a. Contributions	\$ 678,731,116		
b. Benefits and refunds paid	(1,107,441,427)		
c. Subtotal	(428,710,311)		
3. Market value of assets at end of year	\$ 12,970,300,855		
4. Net earnings (3-1-2c)	\$ 889,655,256		
5. Assumed investment return rate	7.25%		
6. Expected return	\$ 891,387,555		
7. Excess (Shortfall) return (4-6)	\$ (1,732,299)		
8. Excess return on assets for last four years :			
<u>Period End</u>	<u>Excess Return</u>	<u>Percent Deferred</u>	<u>Deferred Amount</u>
(1)	(2)	(3)	(4)
a. June 30, 2015	(449,815,293)	20%	\$ (89,963,059)
b. June 30, 2016	(523,770,842)	40%	(209,508,337)
c. June 30, 2017	457,554,617	60%	274,532,770
d. June 30, 2018	(1,732,299)	80%	(1,385,839)
			\$ (26,324,465)
9. Actuarial value of assets (Item 3 - Item 8)	\$ 12,996,625,320		
10. Actuarial value as percentage of market value			100.2%

## Table 9a

### Estimation of Yields

	Year Ending	
	June 30, 2018 (1)	June 30, 2017 (2)
A. Market value yield		
1. Beginning of year market assets	\$ 12,509,355,755	\$ 11,532,837,951
2. Investment income (including realized and unrealized gains and losses)	\$ 889,655,256	\$ 1,337,366,665
3. End of year market assets	\$ 12,970,300,855	\$ 12,509,355,755
4. Estimated dollar weighted market value yield	7.2%	11.8%
B. Actuarial value yield		
1. Beginning of year actuarial assets	\$ 12,507,831,342	\$ 11,905,958,700
2. Actuarial return	\$ 917,504,289	\$ 962,721,503
3. End of year actuarial assets	\$ 12,996,625,320	\$ 12,507,831,342
4. Estimated actuarial value yield	7.5%	8.2%

## Table 9b

### History of Investment Return Rates

Plan Year Ending June 30 of	Market	Actuarial
(1)	(2)	(3)
1995	18.5%	11.5%
1996	12.2%	12.0%
1997	20.3%	13.4%
1998	19.6%	15.0%
1999	11.3%	16.4%
2000	13.1%	15.1%
2001	-11.1%	9.5%
2002	-8.8%	3.3%
2003	2.7%	0.1%
2004	15.3%	0.8%
2005	9.6%	1.1%
2006	12.0%	6.4%
2007	16.7%	11.6%
2008	-6.0%	9.3%
2009	-17.7%	2.2%
2010	17.7%	2.0%
2011	19.0%	4.2%
2012	1.6%	2.2%
2013	10.8%	5.6%
2014	14.2%	12.0%
2015	3.7%	9.7%
2016	3.1%	6.7%
2017	11.8%	8.2%
2018	7.2%	7.5%
Average Returns (all returns net of administrative and investment-related expenses)		
Last 5 years	7.9%	8.8%
Last 10 years	6.6%	6.0%
Last 15 years	7.5%	5.9%
Last 20 years	5.8%	6.6%

## Table 10a

### Investment Experience Gain or Loss

Item (1)	Year Ending	
	June 30, 2018 (2)	June 30, 2017 (3)
1. Actuarial assets, beginning of year	\$ 12,507,831,342	\$ 11,905,958,700
2. Total contributions during year	\$ 678,731,116	\$ 691,826,327
3. Benefits and refunds paid	\$ (1,107,441,427)	\$ (1,052,675,188)
4. Assumed net investment income		
a. Beginning of year assets	\$ 906,817,772	\$ 922,711,799
b. Contributions	24,604,003	26,808,270
c. Benefits and refunds paid	<u>(40,144,752)</u>	<u>(40,791,164)</u>
d. Total	\$ 891,277,023	\$ 908,728,905
5. Expected actuarial assets, end of year (Sum of items 1 through 4)	\$ 12,970,398,054	\$ 12,453,838,744
6. Actual actuarial assets, end of year	\$ 12,996,625,320	\$ 12,507,831,342
7. Asset gain (loss) for year (Item 6 - Item 5)	\$ 26,227,266	\$ 53,992,598

## Table 10b

### Total Experience Gain or Loss

Item (1)	Year Ending	
	June 30, 2018 (2)	June 30, 2017 (3)
A. Calculation of total actuarial gain or loss		
1. Unfunded actuarial accrued liability (UAAL), previous year	\$ 7,362,866,290	\$ 6,630,469,561
2. Normal cost for the previous year	\$ 369,731,456	\$ 357,631,074
3. Less: contributions for the year	\$ (678,731,116)	\$ (691,826,327)
4. Interest at 7.25 %		
a. On UAAL	\$ 533,807,806	\$ 513,861,391
b. On normal cost	13,402,765	13,858,204
c. On contributions	(24,604,003)	(26,808,270)
d. Total	\$ 522,606,568	\$ 500,911,325
5. Expected UAAL (Sum of Items 1 - 4)	\$ 7,576,473,198	\$ 6,797,185,633
6. Actual UAAL	\$ 7,461,370,782	\$ 7,362,866,290
7. Total gain (loss) for the year (Item 5 - Item 6)	\$ 115,102,416	\$ (565,680,657)
B. Source of gains and losses		
8. Asset gain (loss) for the year	\$ 26,227,266	\$ 53,992,598
9. Liability experience gain (loss) for the year	\$ 64,316,103	\$ 135,517,910
10. Actual COLA (More) Less than Expected	\$ 24,559,047	\$ 67,954,426
11. Assumption change	\$ 0	\$ (823,145,591)
12. Benefit change	\$ 0	\$ 0
13. Total	\$ 115,102,416	\$ (565,680,657)

## Table 11

### History of Cash Flow

Year Ending June 30, (1)	Contributions <sup>1</sup> (2)	Expenditures				Total (6)	External Cash Flow for the Year <sup>2</sup> (7)	Market Value of Assets (8)	External Cash Flow as Percent of Market Value (9)
		Benefit Payments (3)	Refunds (4)	Administrative Expenses (5)					
2001	315.2	(340.6)	(36.6)	(3.5)	(380.7)	(65.5)	6,667.0	-1.0%	
2002	328.6	(367.5)	(28.5)	(5.8)	(401.8)	(73.2)	6,011.2	-1.2%	
2003	337.9	(396.1)	(28.3)	(4.3)	(428.7)	(90.8)	6,083.4	-1.5%	
2004	355.6	(422.4)	(26.4)	(2.6)	(451.4)	(95.8)	6,911.5	-1.4%	
2005	371.0	(455.0)	(27.2)	(5.3)	(487.5)	(116.5)	7,451.1	-1.6%	
2006	408.5	(494.1)	(28.3)	(5.2)	(527.6)	(119.1)	8,219.3	-1.4%	
2007	449.5	(540.1)	(27.5)	(5.6)	(573.2)	(123.7)	9,455.8	-1.3%	
2008	496.2	(578.8)	(29.5)	(6.1)	(614.4)	(118.2)	8,770.0	-1.3%	
2009	538.8	(617.7)	(29.7)	(8.7)	(656.1)	(117.3)	7,113.7	-1.6%	
2010	566.8	(656.2)	(28.8)	(11.5)	(696.5)	(129.7)	8,232.5	-1.6%	
2011	559.0	(701.8)	(35.1)	(11.4)	(748.3)	(189.3)	9,588.6	-2.0%	
2012	545.6	(754.6)	(40.6)	(12.0)	(807.2)	(261.6)	9,489.0	-2.8%	
2013	550.2	(811.7)	(41.7)	(11.0)	(864.4)	(314.2)	10,191.7	-3.1%	
2014	634.0	(868.3)	(38.9)	(16.6)	(923.8)	(289.8)	11,346.1	-2.6%	
2015	689.7	(920.8)	(36.4)	(10.6)	(967.8)	(278.1)	11,497.7	-2.4%	
2016	692.9	(973.7)	(39.0)	(9.7)	(1,022.4)	(329.5)	11,532.8	-2.9%	
2017	691.8	(1,019.4)	(33.3)	(9.8)	(1,062.5)	(370.7)	12,509.4	-3.0%	
2018	678.7	(1,069.6)	(37.8)	(9.9)	(1,117.3)	(438.6)	12,970.3	-3.4%	

Amounts in \$ millions

<sup>1</sup> Column (2) includes employee and employer contributions, as well as employer contributions for ARP members.

<sup>2</sup> Column (7) = Column (2) + Column (6).

## Table 12

### Solvency Test

Year Ending June 30,	Actuarial Liability For				Cumulative portion of AAL covered			
	Total Active Member Contributions	Retirees and Beneficiaries	Active and Inactive Members (Employer Financed)	Total Actuarial Liability (AAL)	Actuarial Value of Assets	Total Active Member Contributions	Retirees and Beneficiaries	Active and Inactive Members (Employer Financed)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2009	\$ 2,298,505,189	\$ 6,606,725,003	\$ 4,978,042,890	\$ 13,883,273,082	\$ 9,366,271,312	100%	107%	0%
2010	2,434,760,057	6,933,427,044	4,985,322,322	14,353,509,423	9,431,321,589	100%	101%	0%
2011	2,189,058,132	7,726,559,891	5,377,454,401	15,293,072,424	9,642,229,673	100%	96%	0%
2012	2,304,519,473	8,338,284,890	5,194,168,167	15,836,972,530	9,606,304,017	100%	88%	0%
2013	2,381,795,094	9,285,395,005	4,695,089,104	16,362,279,203	9,828,547,715	100%	80%	0%
2014	2,456,349,658	9,828,072,718	4,686,899,356	16,971,321,732	10,714,996,256	100%	84%	0%
2015	2,541,087,642	10,621,041,144	4,852,296,216	18,014,425,002	11,472,378,929	100%	84%	0%
2016	2,618,651,735	11,093,020,967	4,824,755,559	18,536,428,261	11,905,958,700	100%	84%	0%
2017	2,690,665,840	12,001,060,252	5,178,971,540	19,870,697,632	12,507,831,342	100%	82%	0%
2018	2,789,838,603	12,575,650,668	5,092,506,831	20,457,996,102	12,996,625,320	100%	81%	0%

A solvency test is one way of evaluating a system's progress under its funding program. In a short-term solvency test, the plan's present assets are compared with:

1. The liabilities for active member accumulated contributions on deposit;
2. The liabilities for future benefits to present retirees and beneficiaries; and
3. The liabilities for service already rendered by active and inactive members.

In a system that has been following an actuarially determined financing principle, the liabilities for active member contributions on deposit (column 2) and the liabilities for future benefits to present retirees (column 3) should be fully covered by present assets. In addition, the additional liabilities for service already rendered by active members (column 4) should be partially covered by the remainder of present assets. Generally, if the system has been using actuarially determined financing, the funded portion of the liability will increase over time.

## Table 13

### Historical Retired Participants' Data

<u>Year Ending June 30,</u> (1)	<u>Number</u> (2)	<u>Average Monthly</u> (3)
1984	8,462	\$ 430
1986	10,004	512
1988	11,375	663
1990	12,741	767
1992	14,107	846
1993	15,001	890
1994	15,814	966
1995	16,593	976
1996	17,381	1,011
1997	18,317	1,055
1998	19,244	1,104
1999	20,109	1,139
2000	21,186	1,228
2001	22,191	1,274
2002	23,052	1,315
2003	24,085	1,376
2004	24,947	1,420
2005	26,100	1,466
2006	28,539	1,472
2007	29,969	1,523
2008	31,192	1,566
2009	32,496	1,607
2010	33,747	1,628
2011	35,457	1,669
2012	37,336	1,714
2013	40,310	1,767
2014	42,246	1,790
2015	44,043	1,819
2016	45,797	1,831
2017	47,340	1,857
2018	48,919	1,889

Note: Retirement benefits include impact of July 1 cost-of-living increases.

## Table 14

### Distribution of Active Members by Age and by Years of Service As of June 30, 2018

Attained Age	Years of Credited Service												Total	
	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over		
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	
Under 25	702 \$19,809	592 \$24,100	236 \$22,532	87 \$19,461	40 \$20,918	16 \$21,608	0 \$0	1,673 \$21,737						
25-29	666 \$27,270	1,012 \$29,532	859 \$30,793	715 \$32,280	502 \$34,571	547 \$36,941	9 \$28,196	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	4,310 \$31,414
30-34	518 \$30,769	861 \$31,569	743 \$31,986	639 \$33,655	601 \$36,157	1,896 \$43,243	430 \$43,286	5 \$25,596	0 \$0	0 \$0	0 \$0	0 \$0	0 \$0	5,693 \$37,037
35-39	513 \$31,020	763 \$34,008	674 \$34,930	635 \$38,878	600 \$40,352	1,901 \$44,905	1,662 \$49,461	347 \$49,664	3 \$45,654	0 \$0	0 \$0	0 \$0	0 \$0	7,098 \$42,159
40-44	338 \$31,776	622 \$32,349	543 \$37,641	517 \$37,829	450 \$41,133	1,767 \$47,041	1,629 \$50,142	1,447 \$55,411	251 \$53,802	3 \$55,014	0 \$0	0 \$0	0 \$0	7,567 \$45,992
45-49	317 \$31,575	521 \$36,113	513 \$34,188	471 \$37,084	449 \$38,472	1,613 \$43,022	1,724 \$48,592	1,549 \$53,211	1,233 \$58,513	121 \$55,980	2 \$52,830	0 \$0	0 \$0	8,513 \$46,484
50-54	298 \$36,438	400 \$30,557	442 \$34,560	432 \$36,978	380 \$37,148	1,409 \$43,773	1,598 \$44,828	1,490 \$49,052	1,262 \$54,130	504 \$60,608	73 \$61,725	3 \$43,443	3 \$45,633	8,291 \$45,633
55-59	274 \$33,050	396 \$34,834	383 \$35,703	387 \$38,869	324 \$41,279	1,301 \$45,555	1,588 \$43,400	1,528 \$46,462	1,260 \$52,522	536 \$59,067	250 \$63,859	25 \$55,541	25 \$45,966	8,252 \$45,966
60-64	155 \$34,662	252 \$33,906	227 \$37,412	274 \$34,733	279 \$39,583	994 \$46,542	1,137 \$44,498	955 \$46,708	733 \$51,350	484 \$64,540	213 \$72,064	106 \$64,915	106 \$47,434	5,809 \$47,434
65 & Over	135 \$33,371	206 \$33,448	155 \$34,780	203 \$32,743	188 \$33,528	621 \$44,202	509 \$45,204	399 \$50,880	272 \$50,951	220 \$61,814	127 \$90,719	117 \$93,232	117 \$47,710	3,152 \$47,710
Total	3,916 \$29,229	5,625 \$31,586	4,775 \$33,484	4,360 \$35,590	3,813 \$37,963	12,065 \$44,350	10,286 \$46,732	7,720 \$50,383	5,014 \$54,203	1,868 \$61,018	665 \$71,349	251 \$76,924	251 \$43,228	60,358 \$43,228

## Table 15

### Reconciliation of Members by Status for Year Ending June 30, 2018

	Active Members	Inactive, Nonretired Members		Annuitants			Grand Total
		Vested	Nonvested	Service Retirees	Disabled Retirees	Beneficiaries	
Number at beginning of year	59,495	10,581	36,098	43,282	840	3,218	153,514
Refund paid (non-death)	(1,545)	(410)	(2,077)				(4,032)
Refund due	(3,135)		3,135				0
Vested terminations	(1,504)	1,504					0
Retirements (nondisabled)	(1,755)	(525)	(35)	2,315			0
Disabled retirements	(20)	(16)			36		0
New Alternate Payee resulting from QDRO				40			40
Death before retirement - refund							0
Death before retirement - annuity	(26)					26	0
Death of annuitant - survivor benefit due				(193)	(11)	204	0
Death of annuitant - no further benefits due				(624)	(21)	(169)	(814)
New hires	6,905	77	1,099				8,081
Reemployments	1,943	(610)	(1,322)	(11)			0
Adjustments and corrections		20	(7)	(13)			0
Number at end of year	60,358	10,621	36,891	44,796	844	3,279	156,789

## Table 16

### Schedule of Retirees & Beneficiaries Added to/and Removed from Rolls

Year Ending June 30, (1)	Added to Rolls		Removed from Rolls		Rolls - End of Year		% Increase/ Decrease in Annual Allowances (5)	Average Annual Benefit
	Number (2)	Annual Allowances* (2)	Number (3)	Annual Allowances (3)	Number (4)	Annual Allowances (4)		
2012	2,768	\$ 72,218,345	889	\$ 14,359,797	37,336	\$ 768,140,575		\$ 20,574
2013	3,855	102,030,450	881	15,541,594	40,310	854,629,431	11.3%	21,201
2014	2,913	69,897,967	977	16,901,682	42,246	907,625,716	6.2%	21,484
2015	2,861	72,123,070	1,064	18,187,814	44,043	961,560,972	5.9%	21,832
2016	2,879	65,686,730	1,125	20,801,404	45,797	1,006,446,298	4.7%	21,976
2017	2,682	68,362,756	1,139	20,082,332	47,340	1,054,726,722	4.8%	22,280
2018	2,744	75,757,772	1,165	21,822,890	48,919	1,108,661,604	5.1%	22,663

\* The Annual Allowances added to the rolls in each year include the COLA granted to all retirees for the year. As a result, the Annual Allowances added to the rolls do not necessarily correspond to the number of retirees and beneficiaries added to the rolls in the same year.

## **APPENDIX 1**

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### **SUMMARY OF PLAN PROVISIONS**

# APPENDIX 1

## Summary of Plan Provisions

1. Effective Date: July 1, 1957
2. Plan Year/Fiscal Year: Twelve-month period ending June 30th.
3. Administration: The Educational Retirement Board of New Mexico (ERB) is responsible for administration of the plan and investment of plan assets.
4. Type of Plan: ERB is a qualified, defined benefit, governmental retirement plan. For government accounting purposes, it is a cost-sharing multiple-employer public employee retirement system.
5. Eligibility: All those employed and working more than 0.25 of a full-time equivalent (FTE) at public and state schools in New Mexico, including public colleges, universities, public technical and vocational institutions participate in ERB. Employees at regional education cooperatives and the New Mexico Activities Association participate in ERB. In addition, employees at certain state agencies that provide an educational program also participate if the employee filling a position is required to be a certified educator. Their participation is a condition of employment. However, see the section on the Alternative Retirement Plan below for an exception. Moreover, employees of ERB, the Public Education Department, certain State agencies, School for the Visually Handicapped, and School for the Deaf can choose to be ERB members upon hire.
6. Member Contributions: Members must contribute a percentage of their salary to ERB. "Salary" for this purpose includes substantially all earnings. The member contribution rate is set by statute, and has been changed from time to time. The following schedule shows recent and future member contribution rates. Member contributions are paid directly by employers so member contributions are considered "pre-tax" for federal income tax treatment.

<u>Fiscal Year Ended</u>	<u>Member Contribution Rate</u>
FYE 2005 and earlier	7.600%
FYE 2006	7.675%
FYE 2007	7.750%
FYE 2008	7.825%
FYE 2009	7.900%
FYE 2010*	9.400%
FYE 2011*	9.400%
FYE 2012*	11.150%
FYE 2013*	9.400%
FYE 2014*	10.100%
FYE 2015 and later*	10.700%

\* For members whose annual salary is greater than \$20,000. Members with annual salary of \$20,000 or less will continue to contribute 7.90%.

## APPENDIX 1 (Continued)

7. Employer Contributions: The school district or other local administrative unit which employs a member contributes a percentage of the member's salary to ERB. "Salary" for this purpose includes substantially all earnings. The employer contribution rate is set by statute, and has been changed from time to time. The following schedule shows recent and future employer contribution rates. In addition, state universities, colleges and junior colleges contribute 3% of the earnings of non-members who are participating in the Alternative Retirement Plan.

<u>Fiscal Year Ended</u>	<u>Employer Contribution Rate</u>
FYE 2005 and earlier	8.65%
FYE 2006	9.40%
FYE 2007	10.15%
FYE 2008	10.90%
FYE 2009	11.65%
FYE 2010*	10.90%
FYE 2011*	10.90%
FYE 2012*	9.15%
FYE 2013*	10.90%
FYE 2014	13.15%
FYE 2015 and later	13.90%

\* For members whose annual salary is greater than \$20,000. For members with annual salary of \$20,000 or less, the employer contributed 12.40% in FYE2010 through FYE2013.

8. Service: Employees receive credit for each calendar quarter in which they are contributing members. Credit is also granted for service prior to ERB's effective date, and certain military service. Allowed service credit may also be purchased for specific types of prior employment, including military service, teaching in another state, or teaching for an accredited private school or higher learning institution in New Mexico.
9. Tier: Members who join ERB by June 30, 2010 are in Tier 1, members who join between July 1, 2010 and June 30, 2013 are in Tier 2, and members who join later are in Tier 3. Members who terminated, took a refund, later rejoined ERB, and repaid their refund to ERB prior to June 30, 2013 were allowed to rejoin their prior tier. Otherwise, members that take a refund and later rejoin ERB will be eligible for Tier 3 benefits.
10. Final Average Compensation (FAC): The average of the member's earnings for the last five years, or such other five consecutive year period that gives the largest average. Monthly benefits are based on one-twelfth of this amount.

## APPENDIX 1 (Continued)

### 11. Normal Retirement

#### a. Eligibility:

- Tier 1 members may retire upon Normal Retirement on the earliest of (i) the date he/she attains age 65 with credit for 5 years of service, or (ii) the date the member completes 25 years of service, or (iii) the date that the sum of the member's age and service is at least 75, provided the member is at least age 60.
- Tier 2 and Tier 3 members may retire upon Normal Retirement on the earliest of (i) the date he/she attains age 67 with credit for 5 years of service, or (ii) the date the member completes 30 years of service, or (iii) the date that the sum of the member's age and service is at least 80, provided the member is at least age 65.

b. Monthly Benefit: 2.35% of FAC (monthly) times years of service. Tier 3 members who retire with 30 years of service and prior to attaining age 55 shall have their benefits reduced to an amount equal to the actuarial equivalent of the benefit the member would receive if the member had retired at age 55.

c. Payment Form: Benefits are paid as a monthly life annuity, with a guarantee that if the sum of payments made does not exceed the member's accumulated contributions with interest, determined as of the date of retirement, the balance will be paid in a lump-sum to the member's beneficiary. Optional forms of payment are available; see below.

### 12. Early Retirement

a. Eligibility: Tier 1 members may take early retirement once the sum of his/her age and service equals or exceeds 75, while Tier 2 and Tier 3 members may take early retirement once the sum of his/her age and service equals or exceeds 80.

b. Monthly Benefit: 2.35% of FAC (monthly) times years of service, multiplied by the early retirement factor in next page.

## APPENDIX 1 (Continued)

c. Early Retirement Factors:

Tier 1		Tier 2 and Tier 3	
Age at Retirement	Factor	Age at Retirement	Factor
60 or later	1.000	65 or later	1.000
59	.976	64	.976
58	.952	63	.952
57	.928	62	.928
56	.904	61	.904
55	.880	60	.880
54	.808	59	.808
53	.736	58	.736
52	.664	57	.664
51	.592	56	.592
50	.520	55	.520
49	.448	54	.448
48	.376	53	.376
47	.304	52	.304
46	.232	51	.232
45	.160	50	.160

The reduction for Tier 1 members is from age 60 and the reduction for Tier 2 and Tier 3 members is from age 65. The reduction is 2.4% per year for the first five years the retirement precedes age 60 (Tier 1) or age 65 (Tier 2 and Tier 3), and 7.2% for any additional years before the indicated age.

d. Payment Form: Same as for Normal Retirement above.

### 13. Disability Retirement

- a. Eligibility: A member is eligible provided (i) he/she has credit for at least 10 years of service, and (ii) the disability is approved by the Board of Trustees.
- b. Monthly Benefit: 2% of FAC (monthly) times years of service, but not less than the smaller of (i) one-third of FAC, or (ii) 2% of FAC times years of service projected to age 60.
- c. Payment Form: The disability benefit commences immediately upon the member's retirement. Disability benefits are payable as a monthly life annuity, with a guarantee that if the payments made do not exceed the sum of the member's accumulated contributions with interest as of the date of retirement, the balance will be paid in a lump-sum to the member's beneficiary. If the disabled member survives to age 60, the regular optional forms of payment are available.

## APPENDIX 1 (Continued)

### 14. Vested Termination Benefit

- a. Eligibility: A member with at least five (5) years of service who does not withdraw his/her contributions from the fund is eligible for a vested termination benefit.
- b. Monthly Benefit: 2.35% of FAC (monthly) times years of service. Both FAC and Service are determined at the time the member leaves active employment.
- c. Payment Form: Benefits commence when the participant attains his/her normal retirement age. Alternatively, benefits may commence at the early retirement age, applying the same reduction factors as are used for regular early retirement. The form of payment is the same as for Normal Retirement above.
- d. Death Benefit: Upon the death of an inactive vested member who has not retired, the beneficiary may elect to receive an annuity as described under the Death in Service benefit below, with payments deferred until the member would have been eligible for retirement if the member was not eligible at the time of death. Alternatively, the beneficiary may receive a refund of the member's contributions, plus interest based upon a rate set by the Board of Trustees.

### 15. Withdrawal (Refund) Benefit

- a. Eligibility: All members leaving covered employment with less than five (5) years of service for a reason other than the member's death. Alternatively, members eligible for other benefits may withdraw their contributions in lieu of the regular benefits due.
- b. Benefit: The member who elects to withdraw receives a lump-sum payment of his/her employee contributions, plus interest computed at a rate set by the Board of Trustees.

### 16. Death in Service

Benefit: Upon the death of an active member, the beneficiary may receive a refund of the member's contributions, plus interest based upon a rate set by the Board of Trustees. If the member has five (5) or more years of service, the beneficiary may elect to receive an annuity determined as though the member had retired, elected option B below, and then died, in lieu of the refund. If the member is not eligible for early or normal retirement, this benefit may still be elected, with payments deferred until the member would have been eligible for retirement.

### 17. Optional Forms of Payment: There are optional forms of payment available on an actuarially equivalent basis, as follows:

- a. Option B – A Joint and 100% Survivor annuity with a “pop-up” feature. The regular life annuity amount is reduced to provide a Joint and 100% Survivor benefit, i.e., a benefit payable as long as either the member or joint annuitant are alive. If the joint annuitant predeceases the member, then the member's benefit amount reverts to the regular life annuity amount.

## APPENDIX 1 (Continued)

- b. Option C – A Joint and 50% Survivor annuity with a “pop-up” feature. The regular life annuity amount is reduced to provide a Joint and 50% Survivor benefit, i.e., a benefit payable as long as both the member and the joint annuitant are alive, reducing to 50% of this amount upon the member’s death, if the joint annuitant is still living. If the joint annuitant predeceases the member, then the member’s benefit amount reverts to the regular life annuity amount.

18. Cost-of-Living Increase: All retired members and beneficiaries receiving benefits receive an automatic adjustment in their benefit commencing on July 1 following the later of: (i) the year a member retires, or (ii) the year in which a member attains age 65 (Tier 1 and Tier 2) or age 67 (Tier 3).

If the plan’s funded ratio for the next preceding fiscal year is 100%, or greater, Section 22-11-31(C)(1) of the New Mexico Statutes Annotated defines the adjustment factor as  $\frac{1}{2}$  of the percentage increase of the consumer price index between the next preceding calendar year and the preceding calendar year. The adjustment factor cannot exceed four percent, nor be less than two percent. However, if the percentage increase of the consumer price index is less than two percent, the adjustment factor will be equal to the percentage increase of the consumer price index.

If the plan’s funded ratio for the next preceding fiscal year is greater than 90%, but less than 100%, Section 22-11-31(C)(2) indicates that the adjustment factor for all non-disability retirements will be 95% of the adjustment factor defined in Section 22-11-31(C)(1) if the member had 25 or more years of service credit at retirement and whose annuity is less than or equal to the median adjusted annuity for the fiscal year next preceding the adjustment date. For all other retirees eligible for an adjustment, the adjustment factor will be 90% of the adjustment factor defined in Section 22-11-31(C)(1).

If the plan’s funded ratio for the next preceding fiscal year is 90%, or less, Section 22-11-31(C)(3) indicates that the adjustment factor for all non-disability retirements will be 90% of the adjustment factor defined in Section 22-11-31(C)(1) if the member had 25 or more years of service credit at retirement and whose annuity is less than or equal to the median adjusted annuity for the fiscal year next preceding the adjustment date. For all other retirees eligible for an adjustment, the adjustment factor will be 80% of the adjustment factor defined in Section 22-11-31(C)(1).

Finally, annuities shall not be decreased in the event that there is a decrease in the consumer price index between the next preceding calendar year and the preceding calendar year.

19. Alternative Retirement Plan (ARP): Beginning July 1, 1991, certain members employed by higher education may elect participation in the ARP, a defined contribution plan, rather than in ERB. If this election is not made at the time of initial hire, the employee remains a member of the ERB defined benefit plan permanently. No benefits are paid to ARP members from the ERB defined benefit plan. Also as discussed in the section on Employer Contributions above, the employer of an ARP member makes a contribution of 3.00% of the member’s salary to ERB.

## APPENDIX 2

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### SUMMARY OF ACTUARIAL ASSUMPTIONS AND METHODS

## APPENDIX 2

### Summary of Actuarial Assumptions and Methods (Adopted by the Board of Trustees on April 21, 2017)

#### I. Valuation Date

The valuation date is June 30th 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 amortized, assuming that the portion used to reduce the unfunded liability remains level as a percentage of total payroll, which is assumed to grow 3.00% per year. The 3.00% contribution made by employers to ERB on behalf of employees who elected to participate in the Alternative Retirement Plan is also used to amortize the unfunded actuarial accrued liability.

It is assumed that contributions are made monthly at the end of the month.

## APPENDIX 2 (Continued)

### 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: 7.25%, compounded annually, net of expenses. This is made up of a 2.50% inflation rate and a 4.75% real rate of return.
2. Salary increase rate: Inflation rate of 2.50% plus productivity increase rate of 0.75% plus step-rate/promotional as shown:

Years of Service	Annual Step-Rate/Promotional Component Rates of Increase	Total Annual Rate of Increase
0	8.75%	12.00%
1	3.00%	6.25%
2	2.00%	5.25%
3	1.50%	4.75%
4	1.25%	4.50%
5	1.00%	4.25%
6	0.75%	4.00%
7	0.50%	3.75%
8	0.50%	3.75%
9	0.50%	3.75%
10 or more	0.00%	3.25%

3. Cost-of-living increases: 1.90% 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), whichever is later or, for disabled retirees, until July 1 of the third year following retirement.
4. Payroll growth: 3.00% 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.

## APPENDIX 2 (Continued)

### B. Demographic Assumptions

1. Mortality after termination or retirement -

- a. Healthy males – RP-2000 Combined Healthy mortality table for males with White Collar Adjustments, no set back. Generational mortality improvements in accordance with Scale BB from the table’s base year of 2000
- b. Healthy females – GRS Southwest Region Teacher Mortality Table, set back one year. Generational mortality improvements in accordance with Scale BB from the table’s base year of 2012
- c. Disabled males – RP-2000 Disabled Mortality Table for males, set back three years, projected to 2016 with Scale BB
- d. Disabled females – RP-2000 Disabled Mortality Table for females, no set back, projected to 2016 with Scale BB

Mortality Improvement: The nondisabled annuity mortality assumption includes an explicit generational mortality improvement assumption. To account for future mortality improvement for disabled annuitants, the tables and table multipliers selected above were chosen so that the assumed mortality rates are slightly smaller than the rates observed in the last experience study, covering experience for FY 2009 – FY 2014. The ratio of the actual number of deaths occurring during this period to the expected number based on the selected assumptions was 103% for disabled male annuitants and 108% for disabled female annuitants.

- 2. Mortality rates of active members – RP-2000 Employee Mortality Tables, with males set back two years and scaled at 80%, and females set back five years and scaled at 70%. Static mortality improvement from the table’s base year of 2000 to the year 2016 in accordance with Scale BB. No future improvement was assumed for pre-retirement mortality.
- 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	.020
35	.042	.050
40	.091	.080
45	.133	.120
50	.168	.168
55	.182	.168

## APPENDIX 2 (Continued)

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

### Retirement Per 100 Members

Age	Males - Years of Service					
	0-4	5-9	10-14	15-19	20-24	25+
45	0.00	0.00	0.00	0.00	0.00	15.00
50	0.00	0.00	0.00	0.00	0.00	18.00
55	0.00	0.00	0.00	0.00	5.00	20.00
60	0.00	0.00	0.00	15.00	20.00	25.00
62	0.00	0.00	30.00	30.00	30.00	30.00
65	0.00	40.00	35.00	30.00	30.00	30.00
67	0.00	25.00	25.00	25.00	30.00	30.00
70	100.00	100.00	100.00	100.00	100.00	100.00

Age	Females - Years of Service					
	0-4	5-9	10-14	15-19	20-24	25+
45	0.00	0.00	0.00	0.00	0.00	15.00
50	0.00	0.00	0.00	0.00	0.00	18.00
55	0.00	0.00	0.00	0.00	6.00	23.00
60	0.00	0.00	0.00	20.00	15.00	25.00
62	0.00	0.00	40.00	30.00	30.00	35.00
65	0.00	35.00	40.00	40.00	40.00	40.00
67	0.00	25.00	25.00	25.00	30.00	30.00
70	100.00	100.00	100.00	100.00	100.00	100.00

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

Age	Years of Service					
	Males			Females		
	15-19	20-24	25-29	15-19	20-24	25-29
55			5.00			6.00
60		20.00	20.00		15.00	15.00
62	30.00	30.00	30.00	30.00	30.00	30.00
65	30.00	30.00	30.00	40.00	40.00	40.00

## APPENDIX 2 (Continued)

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

Completed Service	Terminations per 100 Members	
	Males	Females
0	43.4	31.4
1	28.1	23.8
2	19.6	17.2
3	14.3	13.5
4	11.9	10.6
5	10.0	9.8
6	9.1	8.6
7	7.3	7.2
8	6.1	6.3
9	5.7	5.5
10	5.2	5.0
11	4.2	4.7
12	4.0	4.2
13	3.4	3.6
14	3.4	3.5
15	3.1	3.3
16	2.2	2.3
17	2.3	2.7
18	2.3	2.1
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).

## APPENDIX 2 (Continued)

5. Investment and administrative expenses: The assumed investment return rate is intended to be the net rate of return after payment of all investment and administrative expenses.
6. Percent married: For valuation purposes 100% of members are assumed to be married.

### V. Participant 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, sex, years of service, salary, and accumulated employee contributions (without interest). For retired members and beneficiaries, the data included date of birth, sex, 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. 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.

## **GLOSSARY**

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### **DEFINITION OF ACTUARIAL TERMS**

## GLOSSARY

1. **Actuarial Accrued Liability (AAL):** That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of Future Plan Benefits which is not provided for by future Normal Costs. It is equal to the Actuarial Present Value of Future Plan Benefits minus the actuarial present value of future Normal Costs.
2. **Actuarial Assumptions:** Assumptions as to future experience under the Plan. These include assumptions about the occurrence of future events affecting costs or liabilities, such as:
  - mortality, withdrawal, disablement, and retirement;
  - future increases in salary;
  - future rates of investment earnings and future investment and administrative expenses;
  - characteristics of members not specified in the data, such as marital status;
  - characteristics of future members;
  - future elections made by members; and
  - other relevant items.
3. **Actuarial Cost Method or Funding Method:** A procedure for allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability. These items are used to determine the Funding Policy Contribution.
4. **Actuarial Gain or Actuarial Loss:** A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the Plan's assets earn more than projected, salaries do not increase as fast as assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results that produce actuarial liabilities which are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
5. **Actuarially Equivalent:** Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

## GLOSSARY (Continued)

6. **Actuarial Present Value (APV):** The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. For purposes of this standard, each such amount or series of amounts is:
  - a. adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.),
  - b. multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
  - c. discounted according to an assumed rate (or rates) of return to reflect the time value of money.
7. **Actuarial Present Value of Future Plan Benefits:** The Actuarial Present Value of those benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive, non-retired members either entitled to a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.
8. **Actuarial Valuation:** The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the funded ratio and the Funding Policy Contribution.
9. **Actuarial Value of Assets or Valuation Assets:** The value of the Plan's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly actuaries use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the Funding Policy Contribution.
10. **Actuarially Determined:** Values which have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
11. **Amortization Method:** A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

## GLOSSARY (Continued)

12. **Amortization Payment:** That portion of the pension plan contribution or Funding Policy Contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.
13. **Closed Amortization Period:** A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Funding Period and Open Amortization Period.
14. **Decrements:** Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.
15. **Defined Benefit Plan:** An employer-sponsored retirement benefit that provides workers, upon attainment of designated age and service thresholds, with a monthly benefit based on the employee's salary and length of service. The value of a benefit from a defined benefit plan is generally not affected by the return on the assets that are invested to fund the benefit.
16. **Defined Contribution Plan:** An employer-sponsored retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, and the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance. The ARP is a defined contribution plan.
17. **Employer Normal Cost:** The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.
18. **Experience Study:** A periodic review and analysis of the actual experience of the Plan which may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
19. **Funded Ratio:** The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA, although GASB 25 reporting requires the use of the AVA.
20. **Funding Period or Amortization Period:** The term "Funding Period" is used in two ways. In the first sense, it is the period used in calculating the Amortization Payment as a component of the Funding Policy Contribution. This funding period is chosen by the Board of Trustees as part of the funding policy. In the second sense, it is a calculated item: the number of years in the future that will theoretically be required to amortize (i.e., pay off or eliminate) the Unfunded Actuarial Accrued Liability, based on the statutory employer contribution rate, and assuming no future actuarial gains or losses.
21. **Funding Policy Contribution:** The employer's contribution rate determined in accordance with the funding policy established by the Board of Trustees. The Funding Policy Contribution consists of the Employer Normal Cost and the Amortization Payment. This contribution amount is sometimes referred to as the Annual Required Contribution (ARC) or Actuarially Determined Employer Contribution (ADEC).

## GLOSSARY (Continued)

22. **GASB:** Governmental Accounting Standards Board.
23. **GASB 67 and GASB 68:** Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 67 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 68 sets the rules for the systems themselves.
24. **Normal Cost:** That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits which are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated. Under the entry age normal cost method, the Normal Cost is intended to be the level cost (when expressed as a percentage of pay) needed to fund the benefits of a member from hire until ultimate termination, death, disability or retirement.
25. **Open Amortization Period:** An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. In other words, if the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount or in relation to covered payroll.
26. **Unfunded Actuarial Accrued Liability:** The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
27. **Valuation Date or Actuarial Valuation Date:** The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.